South West Milton Keynes

Energy Strategy

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0. EXECUTIVE SUMMARY

0.1 This Energy Strategy forms one of a suite of documents that form an outline application submitted by the South West Milton Keynes Consortium for a new sustainable urban extension to the South West of Milton Keynes. The Consortium consists of Taylor Wimpey, Hallam Land Management, William Davis Homes, Connolly Homes and Bellcross Homes.

0.2 The first section of this report sets out the purpose and scope of the Energy Strategy, the context within which it sits, and the description of development. The proposals would deliver up to 1,855 new homes and associated employment land, infrastructure and community facilities. A number of parameter plans have been drawn up to inform the application.

0.3 The second section sets out the policy and regulatory framework that governs energy and CO2 emissions in new development. This includes national, regional and local policy considerations, as well as Part L of the Building Regulations and the National Timescale for Zero Carbon buildings. It considers the extensive flux in both policy and legislative matters in recent years, and the implications of this ongoing uncertainty for the Energy Strategy.

0.4 The third section considers the relationship between climate change, energy and CO2 emissions, and notes how the proposals are dealing with the key issues of summer overheating, flooding, and water stress. At the detailed design stage, each dwelling will be tested for overheating risk, and mitigating measures incorporated, including shading. Non-residential uses will address overheating risks through their layout, footplate design, orientation and shading strategy. With regards to water management, an extensive sustainable urban drainage system has been designed in, including the allocation of 4.84Ha of the site for water attenuation purposes. Water stress will be addressed through the use of water efficient specifications for all uses controlled by Building Regulations and where applicable by the Code for Sustainable Homes. The detailed ecological and landscape strategies will also address the issue, creating a landscape designed to cope with more erratic rainfall patterns.

0.5 Section 4 sets out a high-level evaluation of the scheme energy demand profile and associated emissions. It indicates that the residential element is responsible for 84% of the energy demand and 82% of the CO2 emissions.

0.6 The fifth section considers the role of energy efficiency and the energy hierarchy. It sets out key design considerations for reserved matters applications to address for both residential and non-residential uses. With the increasing focus on energy efficiency within the regulatory instruments, the orientation of dwellings for solar gain has become key for cost-effective house-building. This will increase with the proposed tightening of standards within the regulatory instruments. Reserved matters applications will have to address orientation carefully. Other key detailed design issues for energy efficiency will include fabric heat loss, glazing performance, air tightness, thermal bridging and accredited/enhanced construction details, efficient heating sources and controls, reducing hot water demand through appropriate fittings, efficient lighting and appliances and the provision of effective user guidance. Key measures for the non-residential will include designing out solar gain to

reduce cooling loads; maximising the potential for natural ventilation/mixed-mode through appropriate floor plate depths; maximising natural daylighting; and integrating high performance fabrics.

0.7 Section 6 looks at the low and zero carbon opportunities the site as a whole presents, providing context of local and national markets for the technologies in question. A detailed review of gas CHP shows that the capital cost of the heat network for what is a relatively low density site is prohibitive. It also demonstrates that such a scheme would make an annual loss with current market conditions, with revenues insufficient to cover operating costs. Opportunities are identified for plot-by-plot solutions and for the non-residential elements, including:

- Solar photo-voltaics ("PV");
- Solar thermal;
- Air and ground source heat pumps;
- Log burners;
- The B1 use may represent an opportunity for heat pumps for seasonal contributions to heat and cool requirements;
- B1 use may also represent opportunities for larger solar PV arrays; and
- The school and community building uses represent an opportunity to integrate a number of small-scale technologies including solar thermal, solar pv, heat pumps and biomass as educational assets.

0.8 Section 7 provides the conclusion. The Consortium is aiming to deliver a sustainable development that addresses the environmental, social and economic issues in the round. National and local policy have been reviewed and analysed. The proposed development will be built-out over a significant period of time, and will be subject to the national timescale for zero carbon buildings. As such, it will be required by regulation to achieve very high energy efficiency and CO2 standards.

0.9 It is likely that there are significant changes to come for national energy policy, and so flexibility is key to creating a deliverable development. The residential element is responsible for the vast majority of energy demand and associated emissions. There are a number of opportunities that have been identified as potentially appropriate. The Energy Strategy represents one of many competing concerns for major developments, and viability and deliverability relies on securing an appropriate balance between the competing interests and priorities. Through the provision of this Energy Strategy, the proposed development is considered to be compliant with planning policy relating to energy and CO2.

1. APPLICATION SITE & PROJECT DESCRIPTION

Context

1.1 This Energy Strategy forms one of a suite of documents that form an outline application submitted by the South West Milton Keynes Consortium for a new sustainable urban extension to the South West of Milton Keynes. The Consortium consists of Taylor Wimpey, Hallam Land Management, William Davis Homes, Connolly Homes and Bellcross Homes. All matters with the exception of access are reserved. The proposed development is of a significant scale, and as such would be developed out over a number of years in a number of different phases.

1.2 As with all aspects of the development, the Energy Strategy will need to be flexible enough to encompass and address changes to policy, legislation, technology and economics that will occur during this development period. As witnessed over the past 5-6 years, both the planning policy framework and the regulatory framework for energy in new developments have been subject to very significant changes. For this reason, it is perhaps even more important that the Energy Strategy considers the impact of potential changes, and accounts for these in any proposed route forward.

Purpose and Scope

1.2 The Energy Strategy sets out the planning policy framework and the regulatory framework that govern energy and CO2 emissions in new developments. It then reviews the strategic options for the site in the context of technical and financial considerations, and sets out a strategy for the proposals.

Project Description

1.3 The description of the development for the purpose of the planning application is as follows.

Outline planning application with all matters reserved except for access for a mixed-use sustainable urban extension on 144.77 Ha of land to the south west of Milton Keynes, to provide for the following:

- *up to 1,855 mixed tenure dwellings (C3) on 54.16 Ha of land;*
- *an employment area (B1) on 2.07 Ha of land;*
- *a neighbourhood centre on 0.67 Ha of land accommodating retail (A1/A2/A3/A4/A5), community (D1/D2) and residential (C3) uses;*
- *provision of a primary school on 3.0 Ha of land;*
- *provision of a secondary school on 5.2 Ha of land;*
- *allotment space on 1.22 Ha of land;*
- *ground remodelling;*
- *55.75 Ha of multi-functional green open space including: parkland, sports and recreational facilities with pavilion/changing facilities; play areas, wildlife areas, a range of strategic open spaces including a community orchard and new landscaping;*

- *a Sustainable Drainage Scheme including 5.05 Ha of land for surface water attenuation measures;*
- *associated infrastructure including new junctions to the A421, Whaddon Road and Buckingham Road, primary streets, residential streets, pedestrian footpaths and cycle routes, foul water pumping stations and statutory undertakers equipment;*
- *a grid road reserve of 7.24 Ha;*
- *highway improvements on 5.56Ha;*
- *public transport infrastructure, car and cycle parking for all uses; and*
- *undergrounding of 132Kv overhead power lines.*

Land Use Schedule

1.4 The proposed land use schedule is set out below:

Table 1.1 Land Uses

Land Use	**Area (Ha)**
Allotments	1.22
Employment	2.07
Green Open Space	55.75
Grid Road Reserve	7.24
Neighbourhood Centre	0.67
Primary School	3.00
Secondary School	5.20
Water Attenuation	5.05
Residential	54.16
Highways Improvements	5.56
Total	144.77

2. POLICY AND REGULATORY FRAMEWORK

Background

2.1 SWMK has been identified historically as a suitable location for growth. The identification of an urban extension in the SWMK Area has emerged from a series of studies over the last twenty years. This section considers the policy and regulatory framework specifically regarding energy and CO2 considerations for the proposed development.

2.2 The site sits almost entirely within the administrative area of Aylesbury Vale District Council ("AVDC") although the development would be adjacent to, and fundamentally an extension of, Milton Keynes. Whilst AVDC is the principal planning authority for the determination of this outline application, it is also to be submitted to Milton Keynes for the determination of the access points. The policies of both are reviewed herein. The National Planning Policy Framework ("NPPF") is also material.

Aylesbury Vale District Local Plan (2004)

2.3 The adopted local plan is dated 2004, and further to the Secretary of State direction dated 24th September 2007, only some of the policies are saved. There are no specific references to the energy performance of new developments, nor to CO2 emissions, nor to sustainable design and construction.

Milton Keynes Core Strategy (2013)

2.4 Milton Keynes Council adopted its Core Strategy in 2013, and within Chapter 4, it sets out energy-related issues under Objective 10:

"To mitigate the Borough's impact on climate change and reduce CO2 emissions through:

- *Implementing higher than national requirements for sustainable homes and buildings;*
- *Locating development away from areas of flood risk;*
- *Promoting community energy networks and strategic renewable energy developments;*
- *Reducing waste generation and increasing the amount of recycling;*
- *Sustainable transport initiatives;*
- *Implementing the suite of initiatives under the Low Carbon Living Project."*

2.5 On page 81, the Core Strategy sets out its policy on community energy networks:
"Community Energy Networks and Large Scale Renewable Energy Schemes
The Council wishes to promote the use of renewable energy schemes where it can be demonstrated that there will not be any negative social, economic, or environmental results from the scheme.

Proposals for over 100 homes will be encouraged to consider the use of community energy networks in their development.

Where an existing local energy network is established, developments will be expected to connect to the network, if feasible."

2.6 Reviewing community energy networks is a key requirement. On the same page, the Core Strategy notes the intention to continue implementing the 2005 local plan policy D4 relating to sustainable buildings.

Milton Keynes Local Plan (2005) – Saved Policy

2.7 Policy D4 sets out the local approach to sustainable building, and also notes that further detailed requirements are set out in a supporting SPD on Sustainable Design and Construction.

"All new development exceeding 5 dwellings (in the case of residential development) or incorporating gross floorspace in excess of 1000 sq m (in the case of other development) will be required to include the following:
(i) Energy efficiency by siting, design, layout and buildings' orientation to maximize sunlighting and daylighting, avoidance of overshadowing, passive ventilation;
(ii) Grouped building forms in order to minimize the external wall surface extent and exposure;
(iii) Landscape or planting design to optimise screening and individual buildings' thermal performance;
(iv) Renewable energy production e.g. external solar collectors, wind turbines or photovoltaic devices;
(v) Sustainable urban drainage systems, including rainwater and waste water collection and recycling
(vi) Significant use of building materials that are renewable or recycled;
(vii) Waste reduction and recycling measures;
(viii) Carbon neutrality or financial contributions to a carbon offset fund to enable carbon emissions to be offset elsewhere."

National Planning Policy Framework

2.8 The NPPF sets out the Government's planning policies for England, and represents a streamlined system compared with the previous one. Its purpose is to help achieve sustainable development, focussing on positive growth whilst addressing and ensuring environmental, social and economic progress.

2.9 It is a material consideration in planning decisions, and reinforces the need for decisions to be determined in accordance with the local plan, unless material considerations indicate otherwise. It notes that there must be a presumption in favour of sustainable development as the basis of every plan, and every decision.

2.10 The key NPPF paragraphs relating to property development and energy/climate change are set out below:

"93. Planning plays a key role in helping shape places to secure radical reductions in greenhouse gas emissions, minimising vulnerability and providing resilience to the impacts of climate change, and supporting the delivery of renewable and low carbon energy and associated infrastructure. This is central to the economic, social and environmental dimensions of sustainable development.

94. Local planning authorities should adopt proactive strategies to mitigate and adapt to climate change taking full account of flood risk, coastal change and water supply and demand considerations.

95. To support the move to a low carbon future, local planning authorities should:

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

96. In determining planning applications, local planning authorities should expect new development to:

- *Comply with adopted Local Plan policies on local requirements for decentralised energy supply 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; and*
- *Take account of landform, layout, building orientation, massing and landscaping to minimise energy consumption.*

97. To help increase the use and supply of renewable and low carbon energy, local planning authorities should recognise the responsibility on all communities to contribute to energy generation from renewable or low carbon sources. They should:

- *Have a positive strategy to promote energy from renewable and low carbon sources;*
- *Design their policies to maximise renewable and low carbon energy development while ensuring that adverse impacts are addressed satisfactorily, including cumulative landscape and visual impacts;*
- *Consider identifying suitable areas for renewable and low carbon energy sources, and supporting infrastructure, where this would help secure the development of such sources;*
- *Support community-led initiatives for renewable and low carbon energy, including developments outside such areas being taken forward through neighbourhood planning; and In line with the objectives and provisions of the Climate Change Act 2008. In assessing the likely impacts of potential wind energy development when identifying suitable areas, and in determining planning applications for such development, planning authorities should follow the approach set out in the National Policy Statement for Renewable Energy Infrastructure (read with the relevant*

sections of the Overarching National Policy Statement for Energy Infrastructure, including that on aviation impacts). Where plans identify areas as suitable for renewable and low-carbon energy development, they should make clear what criteria have determined their selection, including for what size of development the areas are considered suitable; and

- *Identify opportunities where development can draw its energy supply from decentralised, renewable or low carbon energy supply systems and for co-locating potential heat customers and suppliers."*

2.11 The NPPF sets out the importance of dealing with climate change, and the use of energy efficiency and low carbon solutions. Development should be in sustainable locations to reduce CO2 emissions.

2.12 It sets out guidance for the need to align local policies with the national timeline for low carbon buildings. Further, the document makes it clear that the delivery of local standards should be balanced with viability considerations.

National Timescale for Zero Carbon Buildings

2.13 Policy in the area of low carbon buildings has been in a constant state of flux since originally introduced in 2006-2007, and thinking and policy documentation are both evolving rapidly. In 2007 Building a Greener Future set out the timeline for zero carbon buildings as follows:

- 2010 – 25% improvement on Part L 2006 (equivalent to Code level 3 for energy);
- 2013 – 25% improvement on Part L 2010 (equivalent to Code level 4 for energy);
- 2016 – 100% improvement on Part L 2010 plus zero non-regulated emissions (equivalent to Code level 6 for energy).

2.14 It was and is a policy that has not been attempted elsewhere in the world, and as such, was and is completely untested. Since 2007, significant resource has been allocated for research into zero carbon homes at the national level and within the industry. Further, the economic crisis has slowed house building to well below national targets. As a consequence, in 2011, the Chancellor's Budget 2011 changed the standard for 2016, responding to concerns raised by their own policy unit over deliverability of the policy target, the Zero Carbon Hub:

- 2010 – 25% improvement on Part L 2006 (equivalent to Code level 3 for energy) [IMPLEMENTED];
- 2013 – 25% improvement on Part L 2010 (equivalent to Code level 4 for energy);
- 2016 – 100% improvement on Part L 2010 (equivalent to Code level 5 for energy – the unregulated emissions element was dropped).

2.15 Subsequent to this significant reduction in ambition for the 2016 standard, in January 2012 the Department for Communities and Local Government issued their consultation on Part L 2013, proposing another significant down-scaling of ambition – targeting 8% savings over

Part L 2010 rather than 25% was stated to be the Government's preferred option. The final Part L 2013 targets a 6% saving on Part L 2010 – another step down.

2.16 The very significant proposed reduction in the 2013 target from 25% to 6% not only suggests that the original 2013 target was considered much too demanding for the market to bear, but also created a very significant gap between the 2013 and 2016 target – effectively a 94% improvement over the course of 3 years. In light of the reduction in ambition in the 2013 target, the revised 2016 target seems unrealistic, and open to further very significant reductions in ambition before it is implemented.

Housing Market Standards Review

2.17 In 2013 the Government undertook a consultation called the Housing Market Standards Review. The review was into the potential for reducing the regulatory burden on new development, and rationalising policies and regulations where possible. The Government's proposals in the consultation were clear in that it intended to wind down the Code for Sustainable Homes. It also suggested that the approach to setting energy and CO2 standards, amongst others, for new development should be driven nationally and not by local policy.

2.18 In March 2014 a ministerial announcement was made that set out the government's response to the Review and to the Environmental Audit Committee. It restated the aims of the review and the suggested changes that are being enacted through the Deregulation Bill. It left some uncertainty as to exactly what is being removed from local planning authorities, but the draft Bill implies that local authorities may still be able to implement renewable energy targets, but not efficiency targets. It stated that evidence on the Code for Sustainable Homes costs would be reviewed, but restated the aim to wind it down and replace it with the national regulatory standards.

2.19 In September a further technical consultation was published by the Department for Communities and Local Government. This notes that 'there will need to be a mechanism to limit planning authorities' ability to impose technical standards beyond those which emerged from the Housing Standards Review…The (written ministerial) statement will have immediate effect at the time of its publication.' The result remains that the Code for Sustianable Homes and energy standards for new developments set at the local level will be abolished at some point in 2015.

Milton Keynes Sustainable Construction SPD (2007)

2.20 The Sustainable Design and Construction SPD sets out some key requirements regarding energy and CO2 for major developments (over 5 residential dwellings). It sets out the approach that it would expect for outline applications, effectively requiring reserved matters applications to provide sustainability statements:

*"A **sustainability statement** should be used to provide information to accompany all full or reserved matters planning applications for more than 5 dwellings or 1000 sq m floorspace in*

the case of non-housing or mixed developments (either new build, conversion, renovation or extension). In the case of outline applications, a condition will be attached requiring a sustainability statement at reserved matters stage and a S106 agreement will be likely to provide for the carbon offset payment.

The sustainability statement should follow the structure outlined in the checklist below and provide clear answers to the all the questions. The statement should include sufficient details and calculations to verify the answers provided. The statement can be part of a larger document e.g. design and access statement or environmental statement. Each development will usually be required to achieve at least Pass standard in all relevant criteria to comply with Policy D4. There is potential flexibility in that achievement of a Good or Excellent standard for one criterion may lead to acceptance of a below Pass standard in another. Such proposals will be considered individually on their merits. Where possible, additional details of proposed sustainability measures should be submitted and where an issue is not being addressed, the reasons why not."

2.21 A checklist is provided within the SPD that effectively sets three levels of performance – Pass, Good and Excellent. Within the minimum performance levels, 10% CO2 reduction through onsite renewable energy is expected. Further carbon neutrality is expected through either carbon neutral development, or contributions to Milton Keynes' carbon offset fund.

Policy and Regulatory Analysis

2.22 The Aylesbury Vale extant policy framework is out-of-date due to the set-backs they have experienced in rolling forward their development plan. There are no specific energy or CO2 standards that are set out within the adopted policy framework.

2.23 Milton Keynes do have adopted policies that require certain CO2 savings through renewable energy, but as the determining authority for the access issues only, the relevance of building-related energy policies is limited. The national timescale for zero carbon buildings therefore will become the key driver and framework for the energy solutions for the development.

2.24 However, as noted above, the flux in national policy on energy and sustainability is ongoing. In this uncertain regulatory environment, it is important that new developments are planned with flexibility to deal with this environment of ongoing change.

2.25 The alteration of the 2013 target also created a disconnect between the Code for Sustainable Homes and its notional link to future building regulations standards, which are no longer aligned. Further, the Housing Standards Review brought into question the future of the Code for Sustainable Homes and the use of different local targets within planning policy.

2.26 The direction of travel is clear. National policy ambitions are being scaled back significantly in the face of serious technical and commercial concerns over the viability of the proposed targets, and the need to drive economic growth and housing numbers. The state of flux is

very likely to continue, with ongoing changes to the national timescale for zero carbon buildings.

3. CLIMATE CHANGE, ENERGY AND CO2

3.1 The national policy on zero carbon buildings reflects the wider climate change agenda, and is one of a raft of measures the Government is using to mitigate emissions. The Building Regulations are the preferred vehicle for implementing this policy. Previous iterations of local policy also noted the importance of adaptation and mitigation of climate change.

3.2 The historical purpose of the Building Regulations was to avoid condensation risk and to conserve fuel and power at a time when global energy price shocks were causing problems for the UK security of supply. Since this time, the regulations have been refined to focus first on energy efficiency, and then latterly on CO2 emissions as climate change became the key issue.

3.1 Through the recent versions of Part L, regulated emissions in both domestic and non-domestic have been controlled through setting maximum emissions targets that buildings are permitted to achieve. These regulated emissions come from uses including heating, hot water, lighting, fans, pumps, and cooling. There are building-related emissions that are not covered by regulations, including cooking, industrial appliances and other uses too. Further, there are wider sources of CO2 emissions that are not covered by the regulations.

3.2 The impacts of climate change are also only partially covered by regulation. The key impacts include the potential for buildings to over-heat in summer; for increased flooding events; and for increased water stress, and the knock-on impacts on landscape, ecology and potable water supply management.

3.2 As part of an encompassing strategy for new development, these elements need to be addressed. The proposed sustainable urban extension to South West Milton Keynes addresses these issues as follows:

- Summer Overheating:
  - Residential overheating controlled and tested through Part L 2013 and the Standard Assessment Procedure (SAP) methodology for assessing overheating risk;
  - Mitigation measures include generating the potential for good cross-ventilation, which lower density schemes such as urban extensions tend to have the ability to do;
  - Solar shading can be incorporated to glazed facades, and buildings can be oriented to minimise the cost and maximise the effectiveness of this. For example, B1 buildings can be oriented on an East-West axis to effectively create glazed facades that face North and South. The Southerly façade can be relatively simply controlled through horizontal shading.
- Flooding:
  - A flood risk assessment has been undertaken as part of the Environmental Impact Assessment which accounts for the impacts of climate change;
  - A Sustainable Drainage Strategy has been incorporated into the design, utilising 4.84Ha of the site area for attenuating site run-off.

- Water Stress:
  - All residential units have water-consuming fittings controlled by both the Building Regulations and, where applicable, the Code for Sustainable Homes;
  - Ecology and landscape strategies have been drawn up to support the application;
  - At reserved matters stages, detailed design measures will address the implications of water stress and climate change.

4. ENERGY DEMAND ASSESSMENT

Methodology

4.1 This chapter explains the methodology for assessing energy demand and CO2 emissions profile and for undertaking options appraisal for low carbon and renewable energy solutions. It provides details of the process of identifying and assessing the likely significant environmental effects of the Proposed Development.

4.2 The content and conclusions of the Strategy are based on an assessment of the proposed development identified in Section 2. Some broad estimates have been made of the floor areas in order to provide an overall indication of the likely energy demands and resulting emissions. These would be firmed up with reserved matters applications.

Indicative Accommodation Schedule

4.3 The schedule below has been extrapolated from the description of development. It is indicative only.

Uses	Total residential	167,460	sqm
	Employment (B1)	3,933	sqm
	Food retail (A1)	2,000	sqm
	Small retail	1,100	sqm
	Community centre	1,000	sqm
	Primary school	2,750	sqm
	Secondary School	4,844	sqm

4.4 The assumptions made in generating this schedule are as follows:

- Residential: a mix of types, averaging at 90sqm per unit to reflect the relatively low density of development;
- Employment: 1,900sqm per Ha;
- Local centre: ground floor allocated to non-residential use; 60% plot use; one food retailer at 2,000sqm based on discount retail/small format supermarket; 1,000 sqm community use; and 1,100sqm to other small retail;
- Primary school: two form entry scale from similar development;
- Secondary school: area from model 600 pupil design from DFES.

Energy Benchmarks

4.5 To determine an energy demand, benchmarks are applied to the indicative accommodation schedule. Regulatory CO2 factors are then applied to determine the emissions profile. The benchmarks used for this assessment are as follows:

- Residential:
    - energy demands from the Zero Carbon Hub work on Fabric Efficiency Standards, using the Interim FEES standard;
    - Space heating – from the fabric energy efficiency standard (Zero Carbon Hub);
    - Hot water – from SAP 2009-9-90 algorithm;

- Fans and pumps – from SAP 2009-9-90 algorithm;
- Lighting – from SAP 2009-9-90 algorithm assuming 75% low energy; and
- Appliances – from SAP 2009-9-90 algorithm.

- Employment: CIBSE Guide F good practice gas and electricity benchmarks for B1 office use;
- Local centre: CIBSE Guide F good practice gas and electricity benchmarks;
- Primary school: CIBSE Guide F, with estimated split between hot water and space heating (5%/95%);
- Secondary school: CIBSE Guide F, with estimated split between hot water and space heating (5%/95%).

Results

4.6 The indicative energy demand profile of the proposed development is as follows:

		SH	DHW	Power	Cooling	
	Total residential	9,043	4,020	7,627	-	MWh
	Employment (B1)	403	21	448	55	MWh
	Food retail (A1)	225	46	1,116	-	MWh
	Small retail	173	9	140	-	MWh
	Community centre	132	7	22	-	MWh
	Primary school	328	17	61	-	MWh
	Secondary School	552	29	121	-	MWh
	Sub-total	10,856	4,149	9,535	55	MWh
	Total				24,595	MWh
	Residential	9,043	4,020	7,627	-	MWh
	Non-residential	1,813	130	1,908	55	MWh
	Residential	20,689	84%			
	Non-residential	3,906	16%			

4.7 The associated emissions profile is as follows:

		SH	DHW	Power	Cooling	
Uses	Total residential	1,790	796	3,943	-	tCO2
	Employment (B1)	80	4	232	28	tCO2
	Food retail (A1)	45	9	577	-	tCO2
	Small retail	34	2	72	-	tCO2
	Community centre	26	1	11	-	tCO2
	Primary school	65	3	31	-	tCO2
	Secondary School	109	6	63	-	tCO2
	Sub-total	2,149	822	4,929	28	tCO2
	Total				7,929	tCO2
	Residential	1,790	796	3,943	-	tCO2
	Non-residential	359	26	986	28	tCO2
	Residential	6,529	82%			
	Non-residential	1,400	18%			

4.8 The energy demand profile and emissions show that the residential element is responsible for 84% of the energy demand, and 82% of the CO2 emissions of the development. Unregulated power forms a significant proportion of the residential emissions.

5. ENERGY EFFICIENCY

The Energy Hierarchy

5.1 The energy hierarchy is a widely accepted principle that provides a framework for energy policy making, helping to bring some logic to how solutions should be prioritised. Typically, it is stated as follows:

- Energy efficiency;
- Clean technology;
- Renewable energy.

5.2 Whilst early adopters of planning-based energy and carbon performance standards for new developments focussed heavily on renewable energy, there was then a marked shift towards overall CO2-savings, such as the London Plan (2011). This shift is also evident in the regulatory system, which is starting to refocus on increasing fabric performance specifically in preference to technology solutions. Part L 2013 includes maximum energy demands through the target fabric energy efficiency standard (TFEE).

5.3 The approach to low carbon development proposed for the South West Milton Keynes Urban Extension should therefore be based on prioritising energy efficiency standards over other matters. Technology can contribute, but the priority should be energy efficiency in the first instance.

Design Considerations

5.4 Detailed design for each phase will have to address energy efficiency as a key consideration. This will involve the layout planning for solar gain and shading. It will also involve the careful consideration of the following elements for the residential:

- Fabric heat loss;
- Glazing performance;
- Fabric air-tightness;
- Thermal bridging;
- Use of passive solar heating;
- Efficient boilers;
- Fans and pumps;
- Lighting;
- Heating controls;
- Water demand control through fittings and appliances;
- Reduction/avoidance of cooling requirements; and
- User guidance to ensure correct use of appliances.

5.5 Since the introduction of Part L 2013, it is clear that at the building control compliance stage, orientation for solar gain makes a very significant difference to the performance of dwellings. The setting of target energy demands per sqm mean that the benefits of solar gain in providing free heat are invaluable to a compliant SAP calculation. Where solar gain is

not effectively harvested, there is a potentially significant cost implication for the house-builder as they will have to make up the performance levels through very high fabric standards. There is a real incentive therefore for reserved matters to address this issue seriously when considering layout.

5.6 The non-domestic uses will have different priorities in achieving energy efficiency. Each reserved matters application should address efficiency specifically, with direct regard for the individual use. Some key priorities are as follows:

- Reduction of cooling requirements through appropriate orientation and solar shading;
- Maximising opportunities for natural ventilation through appropriate floorplate depths and cross-ventilation;
- Reduction in lighting demand through the use of natural daylighting and efficient luminaires; and
- High fabric performance to reduce heat loss.

6. LOW AND ZERO CARBON TECHNOLOGY

6.1 The purpose of this section of the strategy is to consider opportunities for the site as a whole, and to highlight areas that reserved matters applications should be considering in more depth. The adopted Milton Keynes policy, whilst of limited relevance, notes that developments of over 100 dwellings should consider the opportunities for community energy systems. This section looks first in some depth at gas CHP and district heating as the key option for community energy, considering technical, operational and financial considerations. Other technologies are then reviewed, drawing on the exercise that looked at gas CHP.

Gas CHP and District Heating

The Gas CHP Market

6.1 In the UK, 89% of installed CHP electrical capacity is in the industrial sector, the remaining 11% being installed across the commercial, residential, agricultural, public and transportation sectors. The average load factor for installed CHP units is 43%, equating to 3,807 full load equivalent running hours per annum. This has been dropping continuously since 2007, showing difficult economic conditions for CHP.

6.2 In 2013, there were 117 existing CHP installations with a combined capacity of 101MWe that remained mothballed due to the economic conditions. The two major factors affecting the economics of CHP are the relative cost of fuel and the value at which the electrical output can be sold, and the cost of the distribution network for the heat. For new developments, the density of development defines the heat network costs - the denser the development the more viable it becomes.

6.3 There are 86 residential group heating CHP schemes with an installed capacity of 34MWe, with an average system size of 395kWe.

6.4 There are a number of minor incentives for district heating scale CHP, but to date, there has been no major support scheme for CHP. The incentives that are potentially relevant to CHP within new property developments are as follows:

- Exemption from the Climate Change Levy for all fuels in, and all electricity out;
- Eligibility for enhanced capital allowances; and
- Business rates exemption.

6.5 The CHP market remains a difficult commercial proposition at the residential scale. This is exacerbated by the lack of support mechanisms. The number of schemes that remain mothballed is testament to the difficulties presented in maintaining a profitable operational basis for CHP.

Operational Considerations

6.6 The extract below is taken from the online CHP resource on the Department for Energy and Climate Change's website:

"Once plant installation has been completed, the required levels of performance and availability, and the associated economic benefits, can only be achieved and optimised if the plant is correctly operated and maintained. There are examples of effective and efficient CHP plants failing to deliver the anticipated benefits because of a lack of emphasis on the on-going management of plant operations and maintenance. Effective operation of a CHP plant requires the continuous monitoring both of site energy demands, and of the tariffs and costs associated with meeting those demands. Monitoring must be used as a means of continuously evaluating the most economic use of the plant, taking into account its performance and efficiency, its maintenance costs, and the costs of external energy sources such as electricity and gas. One typical scenario arising from this is that, during the overnight period, it may be cheaper to supply electricity from external sources and to use back-up heat supply plant, than to operate the CHP plant."

6.7 This text notes that if the operation of CHP is not given due consideration, the anticipated benefits may not materialise. Operations not only require the placing of carefully considered maintenance contracts, but also ongoing monitoring of the economic context within which the CHP is working.

6.8 The operational costs for CHP are generally much higher than technologies such as wind and solar due to their ongoing need for fuel, and are subject to the wholesale energy market. As noted above, 117 CHP plants remained mothballed in 2013 in the UK. These plants will have made financial sense when installed, but fluctuations in the energy market have clearly impaired the financial returns made by those 117 schemes to the extent that they are not worth operating, in the short-term at least. Key technical operational considerations are:

- Impact on any air quality management area designations;
- Optimising the running schedule to maximise CO2 savings while retaining an economically viable system;
- Metering and billing for heat use, and for electricity for non-domestic;
- Managing acute and planned downtime of the CHP unit; and
- Managing the potentially monopolistic position of the CHP operator.

Site Gas CHP Appraisal Methodology

6.9 A discounted cash flow method is employed to determine financial viability. At this stage, most data is generic as the phases concerned in this study are not yet designed in any detail. Efforts have been made to source relevant and up to date data to ensure the best level of accuracy achievable at this early stage.

6.10 Where a positive net present value can be achieved at an appropriate discount rate, then investment in the technology is potentially viable per se and warrants more detailed consideration. It is important to note that the analysis is, by necessity, based on generic data

and some stated assumptions at this stage. If viability is proven through this initial analysis, the financial model would have to be refined throughout the detailed design stage as the different inputs to the model firm up (accommodation schedule, energy demands, system costs, third party interest etc.).

6.11 The discount rate applied to this analysis was 10% as a reasonable estimate of third party investment return requirements. This is not representative of a property developer's return requirements. The Greater London Authority's viability model, developed by Three Dragons, sets out an annual return requirement of 17%, and notes that this may be higher in more difficult times. In reality, the risks associated with CHP in such a development may require a higher return requirement than 10%, or extensive legal set-up costs to manage the risks involved.

6.12 The inputs into the financial model at this stage are:

- Estimated accommodation schedule.
    - Data source: estimate based on the proposed masterplan;
- Generic energy consumption data for appropriate dwelling types with relevant fabric standards.
    - Data source: the Zero Carbon Hub; SAP 2009; Part L 2013;
- Generic cost data for CHP technology.
    - Data source: Department for Communities and Local Government, 2010.
- Generic cost data for distribution networks and ancillaries.
    - Data source: Department for Energy and Climate Change, 2009;
- Specific technology parameters (heat to power ratio, efficiency) from CHP units available on the market.
    - Data source: various;
- Generic values for heat losses and pumping energy requirements.
    - Data source: SAP 2009.
- Generic energy prices.
    - Data source: Office of National Statistics, December 2013.

6.13 Assumptions made for the modelling are as follows:

All residential heat consumers are willing to, and do, sign a contract for heat from the CHP system operator.

6.14 The investment in district heat systems requires a stable revenue stream to repay the capital expenditure. However, the free-market approach generally aims to create consumer choice, and avoids monopolistic behaviour. A district heat operator cannot therefore expect to levy whatever tariff is required to repay the capital – the tariff must be competitive with the alternative options. In order to secure the assumption made above, the model therefore assumes cost equivalence with gas heating.

Heat tariffs are based on cost-equivalence with efficient gas heating.

6.15 Cost equivalence is calculated by determining the domestic gas price, and adjusting the unit consumption to allow for boiler efficiencies. In this case, modern 90% boiler efficiencies were used.

Heat contracts are based on metered consumption without a standing charge element.

6.16 For the reasons outlined above, the revenues stream for operators is often based partly on a standing charge and partly on a consumption-based charge. This makes raising finance easier. However, by adopting a standing charge approach, the incentive for households to use less heat is diluted, as their marginal saving for each unit of heat saved is reduced. This can create the wrong behavioural incentives for saving CO2. For this reason, standing charges are not considered in this appraisal.

All commercial electrical consumers are not willing to sign a contract for provision of electricity from the CHP system operator.

6.17 In reality, many commercial companies are large-scale operations with multiple premises across the country. They can secure low cost energy by procuring at group level. This leaves them unwilling to sign local electricity supply agreements, as it dilutes their buying power and procures at higher rates. For the purposes of this study, the assumption was made that commercial uses would not be willing to sign up.

6.18 The following considerations were <u>not</u> incorporated into the model:

Impact on sales values where district heating/CHP is incorporated.

6.19 This is difficult to predict as there are not too many precedents from which to draw evidence. Generally, house-builders are concerned about the potential impact on sales of providing community heating systems due to their poor reputation from the 1960s and 1970s.

Relative costs of compliance with Part L of CHP and different technologies.

6.20 Developers have to meet increasingly stringent Part L requirements. Revisions have been implemented in 2013 and are due also in 2016, although it is fair to say that there is significant regulatory uncertainty over what the 2016 revision will incorporate. It is generally accepted, and supported by work by the Zero Carbon Hub, that the target of zero carbon by 2016 will not happen through onsite provision alone. This throws into doubt exactly where the regulations will be heading at each subsequent revision.

6.21 Due to this regulatory uncertainty, investment decisions by developers and third party technology providers based on future revisions to Part L are likely to be deferred. Investor

confidence in the low and zero carbon sector has been knocked by the ongoing changes to feed-in tariffs and the proposed changes to the renewables obligation.

CHP Findings

6.22 The main option to consider from a masterplanning point of view is whether a site-wide CHP system is appropriate for the development, and if so, how it can be designed in. The table below sets out the key technical parameters used for sizing CHP for the entire site, determining gas demand, and heat/electricity outputs, making allowances for losses in heat distribution and for pumping.

Total heat demand (MWh)	15,005
Proportion from CHP	60%
Heat from CHP (MWh)	9,003
Heat distribution losses	5%
Useful heat from CHP (MWh)	8,553
Running hours	4,000
Thermal rating (kWth)	2,138
Heat to power ratio	1.09
Electrical rating (kWe)	1,965
Efficiency	76%
Fuel rating (kW)	5,370
Fuel in (MWh)	21,481
Elec in for pumping	1%
Elec in for pumping (MWh)	90

6.23 An allowance for the provision of 60% of the heat load by the CHP is made. It is a simplified approach to sizing CHP, but appropriate in the circumstances of an outline application with no details of actual heat and electricity loads. The numbers generated above are then fed into a commercial model that looks at capital costs, operating costs, revenues and the potential returns that the system could make.

Capital cost (yr 0)	£	16,346,806
Capex per unit	£	8,812
Capital cost (yr 15)	£	1,965,286
Operating costs	£	972,870
Revenue	£	847,334
25 yr NPV	-£	16,324,338
Free cash NPV	-£	1,609,966

6.24 The capital costs of such a system are very significant, mainly due to the relatively low density of urban extensions. The heat network costs – i.e. the physical infrastructure for connecting dwellings to the system – are the most significant cost by quite some margin. The result of this is that the system cannot repay the upfront investment. Indeed, the operating costs are calculated to be slightly in excess of the potential revenues, which would mean that the system would make an annual loss even if the capital cost was written off. It should be noted that as there is currently no subsidy mechanism for CHP, the capital cost would be a direct on-cost to the development, and another infrastructure cost that it would have to

bear. Further, costs for the replacement of the district heat network have not been accounted for in this analysis. Amortising the capital cost over an anticipated lifetime of 50 years would still create a very significant additional operating cost for the system to bear – approximately £280,000 per annum.

6.25 The financial analysis demonstrates that a site-wide CHP system would not only be very expensive, but would fail to cover its running costs, and would become a redundant asset with immediate effect, and thus achieve no CO2 savings. This is in line with findings on other projects at this density, and demonstrates the difficulties underlying the development of CHP within relatively low density developments – even large urban extensions. CHP plays a very minor part in supplying heat to residential development, and will continue to do so unless market conditions change radically. It does have CO2 benefits, but until these are properly recognized economically (internalized), CHP will remain marginal.

6.26 The results of this initial appraisal mean that issues such as network routing and air quality impacts of CHP are not significant implications for the wider Environmental Impact Assessment as it is not close to being viable. There may be opportunities for phased or plot-by-plot CHP solutions including the local centre. However, there will be significant hurdles in terms of signing up different users with different energy procurement policies and targets.

6.27 This analysis is based on current energy costs from the Office of National Statistics Quarterly Energy Prices (December 2013).

Alternative District Heat-Based Solutions

6.28 The key capital cost for the site-wide CHP scheme was the heat network. This in itself creates a problem for any other technology that relies on district heat networks. These include the following:

- Biomass Heating;
- Biomass CHP;
- Anaerobic Digestion.

6.29 Anaerobic digestion (“AD”) is a technically complex biological process that is dependent on quality and homogeneity of feedstock, careful process control, and appropriate scale. The market for anaerobic digestion technology providers and suppliers of turn-key solutions is highly diverse. Broadly, AD plant can be run from a waste stream, or from crops that are grown specifically as energy crops. In the UK, and in Germany where AD is far more widely spread, much of the focus on crops for AD has been on maize. Where crops are grown specifically, the CO2 benefits can be reduced very significantly, often with little benefit over traditional gas systems.

6.30 AD systems that run from waste resources are typically in the control of whoever is producing the waste resource. This means that it is a difficult technology to develop speculatively in the hope of securing a waste stream at a later date. If a suitable source of digestible matter could be secured, there remain technical considerations including air quality/olfactory impacts. It is unlikely that AD would be applicable to the development.

6.31 It is noted that there is a landfill gas generation project to the South of the railway on the Bletchley Road, just North of Newton Longville. The operator, Infinis, is understood to generate approximately 8.5MW of electricity, which it exports to the national grid. Securing any waste heat from this would again fall foul of the cost of a heat network, which would be greater than for the site-wide CHP system due to the location away from the site. Unless there was a significant source of capital grant to fund such a network, this opportunity would not be realisable.

6.32 Biomass heating requires a central heating plant with back up boilers and a district heat network. As a renewable heat source, it benefits from the Renewable Heat Incentive which is a government initiative for subsidizing renewable heat technology. The RHI was designed to provide a return on investment of 12% based on the cost of the technology. This return was calculated without any allowance for heat network provision – it was just meant to cover the cost of the technology. As a result, biomass heat where a distribution network is required suffers from the same issues as gas CHP. The cost of the network would be prohibitive.

6.33 Biomass CHP is supported through the Renewables Obligation scheme, which provides a subsidy at the market price of the RO certificates (currently £42.57/MWh). Whilst biomass CHP has a lot to recommend it in principle, including potentially very high CO2 savings, the practicalities of implementation are more complex:

- A biomass fuel supply needs to be secured;
- A heat network is required;
- Power outputs for the larger scale systems (ORC and gasification) are not very high compared with heat outputs, limiting the effectiveness;
- Smaller gasification/pyrolysis systems show good potential theoretically but remain unproven technology at the residential scale.

6.34 Biomass CHP is unlikely to be a practical solution for the South West Milton Keynes urban extension. The cost of the network again would be prohibitive, and concerns regarding the technology mean that it would be a high-risk solution.

6.35 The cost of a heat network for the proposed development means that any clean or renewable energy technology that relies on a heat network is unlikely to be viable, certainly in current market conditions. The operational economics are also poor for a number of these solutions. If the replacement of the district heat network were to be factored in, the operational costs would be even worse.

Plot-by-Plot Opportunities

6.36 Modern dwellings have to integrate more and more technology to help them comply with increasingly stringent regulations. The types of technology that apply to individual dwellings are as follows:

- Solar photo-voltaics ("PV");
- Solar thermal;
- Air and ground source heat pumps;
- Log burners.

6.37 Solar PV is widely used in new developments as it is flexible in both scale and output, and has the potential for good CO2 savings as it displaces carbon intensive electricity (as opposed to solar thermal displacing gas). For major developments, adding solar to each and every dwelling can become an issue for grid reinforcements and associated costs. Typically if the provision is less than 3.5kWp per dwelling, this should not be an issue. Costs have been reducing dramatically for the last 4 years, but public financial support through the feed-in tariff has been reduced significantly to reflect this. Solar PV can be integrated into roofs of dwellings, garages and garden sheds, providing flexibility on location, and indeed orientation of dwellings.

6.38 Solar thermal provides hot water, and as such is limited in its utility by the demand for hot water, the storage capacity, and the available heat from the sun. Further, as solar hot water is replacing gas-based heat, the CO2 benefits are more limited. There are implications in dwelling design as storage for dual-exchange hot water cylinders are required. The panels need to be reasonably close to the hot water storage to avoid unnecessary heat loss, and as such, they have less flexibility than solar PV. For residential applications, the capital cost per tCO2 saved is currently not as good as solar PV.

6.39 Heat pumps are defined as a renewable energy technology under the Renewable Energy Directive. With current carbon factors, heat pumps do not make significant CO2 savings for new-build residential. This may change as the UK electricity supply decarbonizes, although short- to medium- term projections indicate that the impacts of this may be small. Despite the poor carbon equation, an allowance for heat pumps is made under current Building Regulations, meaning that they may also contribute to building control compliance.

6.40 Wood-burning stoves are an alternative that can be seen as attractive additions to speculative houses. However, volume house-builder house-types do not tend to incorporate flues or chimneys. There are air quality limitations to integrating log burners in certain circumstances – for example, where there are air quality controls in place, such as an air quality management area. As a log burner is very much a secondary heating source, the actual use of it, and the resulting CO2 savings are difficult to predict.

Non-Residential Opportunities

6.41 The non-residential elements are more difficult to predict in nature, and in energy demand at this stage. As with the residential, it is recommended that the commercial elements review their options at the reserved matters and building control stages. Some of the opportunities that present themselves are as follows:

- The B1 use may represent an opportunity for heat pumps for seasonal contributions to heat and cool requirements;
- B1 use may also represent opportunities for larger solar PV arrays; and
- The school and community building uses represent an opportunity to integrate a number of small scale technologies including solar thermal, solar pv, heat pumps and biomass as educational assets.

Stand-Alone Opportunities and Allowable Solutions

6.42 The emerging national policy on zero carbon buildings provides an option for offsite solutions, or for contributions to offsite funds as increasingly stringent CO2 targets are being implemented. This section looks at the options for offsite provision, and funds. Offsite solutions could include the following:

- Wind technology;
- Large-scale solar technology;
- Hydro power.

6.43 There are a number of applications for medium to large scale wind power in the locality. There is an undetermined application for a single 500-900kW turbine at Bletchley landfill site submitted by FCC in 2012. There was a rejected scheme to the South East of the site at Dorcas Lane, which is understood to be at appeal.

6.44 The refusal of the Dorcas Lane scheme, and the very extended determination period for Bletchley indicates that wind is not a simple solution in the locality. The exclusion distances from dwellings creates an issue for having medium to large-scale wind anywhere near the development site itself.

6.45 Large-scale solar is being developed within a 20km radius of the site. A 5MW development at Shelswell was permitted in 2012 by Cherwell District Council. Aylesbury Vale Disctrict Council has approved solar installations including a 16MW site at Turweston Airfield, Brackley.

6.46 There are no known exploitable hydro power opportunities hear the site.

6.47 Milton Keynes Council has led the field in the use of offsite funds, securing payments of £200/tCO2 from new developments. The 2013 consultation on allowable solutions suggested a payment of £60/tCO2 for a period of 30 years – equating to a contribution rate of £1,800/tCO2.

6.48 There may be opportunities for developing separate stand-alone solutions to address increasing CO2 targets as the national zero carbon buildings agenda is rolled out. Large-scale solar is the most likely to provide an opportunity. However, it is anticipated that many property developments will not have the opportunity for stand-alone wind/solar/hydro and that updates to the national policy will reflect this. The use of local funds provides an opportunity. The reserved matters applications will be the appropriate stage for addressing the balance between efficiency, onsite solutions, offsite solutions and contributions to funds.

7. CONCLUSION

Proposed Development

7.1 The South West Milton Keynes Consortium is applying for outline permission for a new sustainable urban extension to the South West of Milton Keynes. This Energy Strategy forms part of the outline application, and sets out the energy strategy for the development.

7.2 The proposed development will consist of up to 1,855 new dwellings, an employment area, new primary and secondary schools, a neighbourhood centre, and associated highways and green infrastructure.

7.3 The Consortium is aiming to deliver a sustainable development that addresses environmental, social and economic issues in the round. The scheme will be required achieve high levels of energy efficiency and CO2 reductions through the national standards.

Policy and Legislation

7.4 Local and national policy have been reviewed in depth, including the national Building Regulations and the national timescale for zero carbon buildings.

7.5 Aylesbury Vale District Council extant policy on energy does not include specific CO2 targets, or targets for clean and renewable energy per se. Nevertheless, the development will have to address the national timescale for zero carbon buildings. The national instruments for driving CO2 reduction in new developments will be key to determining the approach.

7.6 Milton Keynes Council will have responsibility for determining the access considerations and as such their adopted buildings-related policies are of limited relevance. However, for completeness, their planning policies regarding energy were also reviewed. They retain a requirement for new developments to address policy D4 of their old Local Plan, which sets a minimum of 10% renewable energy amongst other environmental standards, and the need to address community energy solutions.

Demand Assessment and CO2 Emissions

7.7 An outline energy model based on the development quantum has been developed to provide an initial estimate of energy demand, CO2 emissions and to quantify the potential opportunities available to the development. The scale of the site is such that it will be delivered over a long period of time, during which changes will occur to energy policy, energy regulation, and energy technology. The strategy set out herein therefore must remain flexible enough to deal with those future changes whilst addressing the policy framework within which the application is to be determined.

Opportunities

7.8 The residential units provide the opportunity for implementing high performance standards for energy efficiency. Residential energy performance is well-understood and relatively simply modelled. As residential energy regulations are tightened, there are various drivers for differing approaches to low carbon development. A fabric-first approach to minimising energy demand reflects the wider national picture for sustainable development.

7.9 Combined heat and power has been considered and is not currently considered viable as a site-wide solution. It would be costly, and would make a year-on-year loss, creating a redundant asset. There is currently no case for site-wide renewables solutions that require heat mains, due to the low density of development and the implied cost of the heat network.

7.10 There are also other opportunities that have been identified:

- Solar technology and heat pumps to residential units;
- The B1 use may represent opportunities for heat pumps for seasonal contributions to heat and cool requirements, and larger solar arrays;
- The schools represent an opportunity to integrate a number of small technologies including solar thermal, solar pv, heat pumps and biomass as educational assets;
- Local conditions are not ideal for wind technology. Wind speeds are low in the area and previous resource assessments have not identified any sites local to the development site for larger turbines. Small or medium turbines are not likely to be suitable for the non- residential uses due to the proximity to other uses, and the poor wind profile caused by the built environment;
- A stand alone solar photo-voltaic array may be possible within reasonable proximity to the development if required for allowable solutions as the zero carbon agenda is rolled out;
- Contributions to an offset fund may be an appropriate solution again if required for allowable solutions as the zero carbon agenda is rolled out.

7.11 Compliance with demanding energy efficiency standards and the provision of low carbon technology represents a significant cost to development, as noted in the body of this report. The cost of this provision needs to be accounted for, and balanced with the competing costs to the development, such as infrastructure provision, affordable housing, and S106 and CIL contributions. Reserved matters applications will be required to review the viability implications of energy standards to be incorporated.

Policy Compliance

7.12 In the development of the outline proposals for South West Milton Keynes, the design team has reviewed, interpreted and addressed the relevant planning policy on energy and CO2 emissions. The proposals have reviewed early-stage opportunities for efficiency and clean and renewable energy technology.

7.13 The scheme will have to comply with the national timescale for zero carbon buildings, implemented through the Building Regulations, as it evolves. Through this, it should achieve

high standards in energy efficiency and CO2 emissions. It is also likely that low and zero carbon technology will be required. The analysis in this document indicates that this is likely to be on a plot-by-plot basis rather than through district heat-led solutions.

7.14 Reserved matters applications will be required to develop detailed energy strategies to demonstrate how policy and regulation will be dealt with. At each stage, it is important that enough flexibility is built in to deal with changes to policy and legislation. As shown in the policy section of this report, the framework is in a state of ongoing flux that makes long-term decision-making difficult.

7.15 This Energy Strategy has addressed the planning policy framework and has put in place a strategy that ensure the proposed development is both planning policy compliant, and ready to address the forthcoming regulatory changes due during the lifespan of the development.