



Sustainability Statement

Land off Heyford Road, Kirtlington

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About Environmental Economics

Our team of experienced consultants specialise in construction and building energy. We have qualifications in sustainability, energy, engineering, building physics and construction as well as environmental, quality management and auditing.

Over the last decade, we have provided assessments and consultancy for some of the largest UK house builders, including Barratt Developments, David Wilson Homes, Bellway Homes, Abbey New Homes and Davidsons. We develop flexible, practical, cost-effective specifications for our clients through identifying solutions and delivering design advice. This includes the following disciplines:

- *Energy Reports*
- *Sustainability Statements*
- *Compliance assessments and advice covering*
 - *Part L (SAP)*
 - *Part F (ventilation)*
 - *Part G (water)*
- *Overheating assessments*
- *BREEAM*
- *SBEM (existing and new build)*
- *Minimum Energy Efficiency Standards (MEES)*
- *Thermal Bridging (Psi value calculations)*

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Contents

1. Executive Summary	1
2. Project Overview	2
2.1. Description of Site	2
2.2. National and Local Planning Policies	2
2.3. Building Regulations.....	8
3. Sustainability Appraisal	9
3.1. Green Guide Specifications.....	9
3.2. Responsible Sourcing.....	9
3.3. Waste Management.....	9
3.4. Flood Risk.....	9
3.5. Sustainable Urban Drainage (SuDS)	10
3.6. Ecology.....	10
3.7. Sustainable Transport.....	10
3.8. Electric Vehicle Charging	11
3.9. Water Use.....	12
4. Design Response	13
4.1. Assessment Methodology.....	13
4.2. Design Philosophy.....	14
4.3. Fabric Improvements Part L1A 2021	15
4.4. Building Services & Renewable Energy (LZCT).....	16
5. Conclusion	18
Appendix A – Proposed Site Layout	19
Appendix B – Flood Risk Map (Zone 1)	20
Appendix C – Bus Timetables	22
Appendix D – Water Efficiency Calculator	26
Appendix E – Low and Zero Carbon Technologies	27
Photovoltaic (PV) Cells.....	27
Solar Hot Water (SHW).....	28
Air Source Heat Pumps (ASHP)	29
Ground Source Heat Pumps (GSHP)	29
Biomass Heating Systems.....	30
Wind Turbines.....	30
WWHRS	31
FGHRS.....	31

1. Executive Summary

- 1.1.1. Environmental Economics Ltd has been commissioned by Abbeymill Homes to prepare a sustainability statement for the residential site Land off Heyford Road, Kirtlington. This document sets out how the development proposal presents a positive sustainable development.
- 1.1.2. As part of the sustainable development strategy, the proposed development has been designed to consider sustainability in accordance with the National Planning Policy Framework (NPPF) and the Cherwell District Council Local Plan.
- 1.1.3. The proposed development is designed to achieve carbon emissions in line with Part L 2021 through the adoption of good fabric performance and employment of low and zero carbon technologies.
- 1.1.4. The development is therefore in line with Policy ESD3 of the Cherwell District Council Local Plan.
- 1.1.5. The use of smart meters will provide occupiers with real time data which will allow occupiers to manage their energy consumption, save money and reduce Carbon. This is particularly important as the UK migrates towards half-hourly pricing levels and the proposed smart grid system.
- 1.1.6. Potential overheating risk will be assessed in accordance with the newly released Approved Document O.
- 1.1.7. The proposed development is situated in Flood Zone 1 in line with Policy ESD6 of the Cherwell District Council Local Plan.
- 1.1.8. Water efficiency has been reviewed as part of the design process and a Part G compliant specification will be adopted, resulting in the higher standard (lower water use) of 110 litres/person/day. This is in line with Policy ESD3 of the Cherwell District Council Local Plan.
- 1.1.9. While the development is still at an early stage of the design process, it is considered that the proposal meets or exceeds the required level of sustainability across all given criteria and meets all relevant policy requirements.

2. Project Overview

2.1. Description of Site

- 2.1.1. The site proposal consists of the construction of 14 residential dwellings made up of detached and semi-detached houses.
- 2.1.2. The proposed site plan is shown in Appendix A.

2.2. National and Local Planning Policies

- 2.2.1. Development is required to adhere to the National Planning Policy Framework (NPPF) 2021. This document states that "*achieving sustainable development means that the planning system has three overarching objectives, which are interdependent and need to be pursued in mutually supportive ways (so that opportunities can be taken to secure net gains across each of the different objectives):*
- a) *Economic objective - to help build a strong, responsive and competitive economy, by ensuring that sufficient land of the right types is available in the right places and at the right time to support growth, innovation and improved productivity; and by identifying and coordinating the provision of infrastructure;*
 - b) *Social objective - to support strong, vibrant and healthy communities, by ensuring that a sufficient number and range of homes can be provided to meet the needs of present and future generations; and by fostering well-designed, beautiful and safe places, with accessible services and open spaces that reflect current and future needs and support communities' health, social and cultural well-being; and*
 - c) *Environmental objective - to protect and enhance our natural, built and historic environment; including making effective use of land, improving biodiversity, using natural resources prudently, minimising waste and pollution, and mitigating and adapting to climate change, including moving to a low carbon economy.*
- 2.2.2. The planning authority for this site is Cherwell District Council. The local plan containing the relevant planning policy is the Cherwell District Council Local Plan.
- 2.2.3. All policies from the Cherwell District Council Local Plan are listed in Table 1 below, stating whether they are relevant for this particular report. Any policies which are relevant follow the table in full for reference.

Table 1: Cherwell District Council Local Plan Policies

<i>Policy</i>	<i>Comments</i>
Policy PSD1 – Presumption in Favour of Sustainable Development	Report outlines compliance with policy
Policy SLE1 – Employment Development	Not relevant
Policy SLE2 – Securing Dynamic Town Centres	Not relevant
Policy SLE4 – Supporting Tourism Growth	Not relevant
Policy SLE4 – Improved Transport and Connections	Not relevant
Policy SLE5 – High Speed Rail 2	Not relevant
Policy BSC1 – District Wide Housing Distribution	Not relevant
Policy BSC2 – The Effective and Efficient Use of Land	Not relevant
Policy BSC3 – Affordable Housing	Not relevant
Policy BSC4 – Housing Mix	Not relevant
Policy BSC5 – Area Renewal	Not relevant
Policy BSC6 – Travelling Communities	Not relevant
Policy BSC7 – Meeting Education Needs	Not relevant
Policy BSC8 – Securing Health and Wellbeing	Not relevant
Policy BSC9 – Public Services and Utilities	Not relevant
Policy BSC10 – Open Space, Outdoor Sport and Recreation Provision	Not relevant
Policy BSC11 – Local Standards of Provision	Not relevant
Policy BSC12 – Indoor Sport, Recreation and Community Facilities	Not relevant
Policy ESD1 – Mitigating and Adapting to Climate Change	See sections 3.4, 3.5, 3.7, 4 and relevant reports
Policy ESD2 – Energy Hierarchy and Allowable Solutions	See section 4.2
Policy ESD3 – Sustainable Construction	See sections 3.1, 3.2, 3.3, 3.9, 4 and relevant reports
Policy ESD4 – Decentralised Energy Systems	Not relevant
Policy ESD5 – Renewable Energy	Not relevant
Policy ESD6 – Sustainable Flood Risk Management	See section 3.4 and Flood Risk Assessment report
Policy ESD7 – Sustainable Drainage Systems (SuDS)	See sections 3.4, 3.5 and Sustainable Drainage Strategy report
Policy ESD8 – Water Quality	Not relevant
Policy ESD9 – Protection of the Oxford Meadows SAC	Not relevant
Policy ESD10 – Protection and Enhancement of Biodiversity and the Natural Environment	See section 3.6 and Ecology report
Policy ESD11 – Conservation Target Areas	Not relevant
Policy ESD12 – Cotswold Area of Outstanding Natural Beauty (AONB)	Not relevant
Policy ESD13 – Local Landscape Protection and Enhancement	See section 3.6 and Ecology report
Policy ESD14 – Oxford Green Belt	Not relevant
Policy ESD15 – The Character of the Built and Historic Environment	Not relevant
Policy ESD16 – The Oxford Canal	Not relevant
Policy ESD17 – Green Infrastructure	Not relevant

2.2.4. Policy PSD 1: Presumption in Favour of Sustainable Development

When considering development proposals the Council will take a proactive approach to reflect the presumption in favour of sustainable development contained in the National Planning Policy Framework. The Council will always work proactively with applicants to jointly find solutions which mean that proposals can be approved wherever possible, and to secure development that improves the economic, social and environmental conditions in the area. Planning applications that accord with the policies in this Local Plan (or other part of the statutory Development Plan) will be approved without delay unless material considerations indicate otherwise.

Where there are no policies relevant to the application or relevant policies are out of date at the time of making the decision then the Council will grant permission unless material considerations indicate otherwise – taking into account whether:

- *any adverse impacts of granting permission would significantly and demonstrably outweigh the benefits, when assessed against the policies in the National Planning Policy Framework taken as a whole; or*
- *specific policies in the Framework indicate that development should be restricted.*

2.2.5. Policy ESD 1: Mitigating and Adapting to Climate Change

Measures will be taken to mitigate the impact of development within the District on climate change. At a strategic level, this will include:

- *Distributing growth to the most sustainable locations as defined in this Local Plan*
- *Delivering development that seeks to reduce the need to travel and which encourages sustainable travel options including walking, cycling and public transport to reduce dependence on private cars*
- *Designing developments to reduce carbon emissions and use resources more efficiently, including water (see Policy ESD 3 Sustainable Construction)*
- *Promoting the use of decentralised and renewable or low carbon energy where appropriate (see Policies ESD 4 Decentralised Energy Systems and ESD 5 Renewable Energy).*

The incorporation of suitable adaptation measures in new development to ensure that development is more resilient to climate change impacts will include consideration of the following:

- *Taking into account the known physical and environmental constraints when identifying locations for development*
- *Demonstration of design approaches that are resilient to climate change impacts including the use of passive solar design for heating and cooling*
- *Minimising the risk of flooding and making use of sustainable drainage methods, and*
- *Reducing the effects of development on the microclimate (through the provision of green infrastructure including open space and water, planting, and green roofs).*

Adaptation through design approaches will be considered in more locally specific detail in the Sustainable Buildings in Cherwell Supplementary Planning Document (SPD).

2.2.6. Policy ESD 2: Energy Hierarchy and Allowable Solutions

In seeking to achieve carbon emissions reductions, we will promote an 'energy hierarchy' as follows:

- *Reducing energy use, in particular by the use of sustainable design and construction measures*
- *Supplying energy efficiently and giving priority to decentralised energy supply*
- *Making use of renewable energy*
- *Making use of allowable solutions.*

2.2.7. Policy ESD 3: Sustainable Construction

All new residential development will be expected to incorporate sustainable design and construction technology to achieve zero carbon development through a combination of fabric energy efficiency, carbon compliance and allowable solutions in line with Government policy. Cherwell District is in an area of water stress and as such the Council will seek a higher level of water efficiency than required in the Building Regulations, with developments achieving a limit of 110 litres/person/day.

All new non-residential development will be expected to meet at least BREEAM 'Very Good' with immediate effect, subject to review over the plan period to ensure the target remains relevant. The demonstration of the achievement of this standard should be set out in the Energy Statement.

The strategic site allocations identified in this Local Plan are expected to provide contributions to carbon emissions reductions and to wider sustainability.

All development proposals will be encouraged to reflect high quality design and high environmental standards, demonstrating sustainable construction methods including but not limited to:

- *Minimising both energy demands and energy loss*
- *Maximising passive solar lighting and natural ventilation*
- *Maximising resource efficiency*
- *Incorporating the use of recycled and energy efficient materials*
- *Incorporating the use of locally sourced building materials*
- *Reducing waste and pollution and making adequate provision for the recycling of waste*
- *Making use of sustainable drainage methods*
- *Reducing the impact on the external environment and maximising opportunities for cooling and shading (by the provision of open space and water, planting, and green roofs, for example); and*
- *Making use of the embodied energy within buildings wherever possible and re-using materials where proposals involve demolition or redevelopment.*

Should the promoters of development consider that individual proposals would be unviable with the above requirements, 'open-book' financial analysis of proposed developments will be expected so that an independent economic viability assessment can be undertaken. Where it is agreed that an economic viability assessment is required, the cost shall be met by the promoter.

2.2.8. Policy ESD 6: Sustainable Flood Risk Management

The Council will manage and reduce flood risk in the District through using a sequential approach to development; locating vulnerable developments in areas at lower risk of flooding. Development proposals will be assessed according to the sequential approach and where necessary the exceptions test as set out in the NPPF and NPPG. Development will only be permitted in areas of flood risk when there are no reasonably available sites in areas of lower flood risk and the benefits of the development outweigh the risks from flooding.

In addition to safeguarding floodplains from development, opportunities will be sought to restore natural river flows and floodplains, increasing their amenity and biodiversity value. Building over or culverting of watercourses should be avoided and the removal of existing culverts will be encouraged.

Existing flood defences will be protected from damaging development and where development is considered appropriate in areas protected by such defences it must allow for the maintenance and management of the defences and be designed to be resilient to flooding.

Site specific flood risk assessments will be required to accompany development proposals in the following situations:

- *All development proposals located in flood zones 2 or 3*
- *Development proposals of 1 hectare or more located in flood zone 1*
- *Development sites located in an area known to have experienced flooding problems*
- *Development sites located within 9m of any watercourses.*

Flood risk assessments should assess all sources of flood risk and demonstrate that:

- *There will be no increase in surface water discharge rates or volumes during storm events up to and including the 1 in 100 year storm event with an allowance for climate change (the design storm event)*
- *Developments will not flood from surface water up to and including the design storm event or any surface water flooding beyond the 1 in 30 year storm event, up to and including the design storm event will be safely contained on site.*

Development should be safe and remain operational (where necessary) and proposals should demonstrate that surface water will be managed effectively on site and that the development will not increase flood risk elsewhere, including sewer flooding.

2.2.9. Policy ESD 7: Sustainable Drainage Systems (SuDS)

All development will be required to use sustainable drainage systems (SuDS) for the management of surface water run-off.

Where site specific Flood Risk Assessments are required in association with development proposals, they should be used to determine how SuDS can be used on particular sites and to design appropriate systems.

In considering SuDS solutions, the need to protect ground water quality must be taken into account, especially where infiltration techniques are proposed. Where possible, SuDS should seek to reduce flood risk, reduce pollution and provide landscape and wildlife benefits. SuDS will require the approval of Oxfordshire County Council as LLFA and SuDS Approval Body, and proposals must include an agreement on the future management, maintenance and replacement of the SuDS features.

2.2.10. Policy ESD 10: Protection and Enhancement of Biodiversity and the Natural Environment

Protection and enhancement of biodiversity and the natural environment will be achieved by the following:

- *In considering proposals for development, a net gain in biodiversity will be sought by protecting, managing, enhancing and extending existing resources, and by creating new resources*
- *The protection of trees will be encouraged, with an aim to increase the number of trees in the District*
- *The reuse of soils will be sought*
- *If significant harm resulting from a development cannot be avoided (through locating on an alternative site with less harmful impacts), adequately mitigated, or as a last resort, compensated for, then development will not be permitted.*
- *Development which would result in damage to or loss of a site of international value will be subject to the Habitats Regulations Assessment process and will not be permitted unless it can be demonstrated that there will be no likely significant effects on the international site or that effects can be mitigated*
- *Development which would result in damage to or loss of a site of biodiversity or geological value of national importance will not be permitted unless the benefits of the development clearly outweigh the harm it would cause to the site and the wider national network of SSSIs, and the loss can be mitigated to achieve a net gain in biodiversity/geodiversity*
- *Development which would result in damage to or loss of a site of biodiversity or geological value of regional or local importance including habitats of species of principal importance for biodiversity will not be permitted unless the benefits of the development clearly outweigh the harm it would cause to the site, and the loss can be mitigated to achieve a net gain in biodiversity/geodiversity*
- *Development proposals will be expected to incorporate features to encourage biodiversity, and retain and where possible enhance existing features of nature conservation value within the site. Existing ecological networks should be identified and maintained to avoid habitat fragmentation, and ecological corridors should form an essential component of green infrastructure provision in association with new development to ensure habitat connectivity*
- *Relevant habitat and species surveys and associated reports will be required to accompany planning applications which may affect a site, habitat or species of known or potential ecological value*
- *Air quality assessments will also be required for development proposals that would be likely to have a significantly adverse impact on biodiversity by generating an increase in air pollution*
- *Planning conditions/obligations will be used to secure net gains in biodiversity by helping to deliver Biodiversity Action Plan targets and/or meeting the aims of Conservation Target Areas. Developments for which these are the principal aims will be viewed favourably*
- *A monitoring and management plan will be required for biodiversity features on site to ensure their long term suitable management.*

2.2.11. Policy ESD 13: Local Landscape Protection and Enhancement

Opportunities will be sought to secure the enhancement of the character and appearance of the landscape, particularly in urban fringe locations, through the restoration, management or enhancement of existing landscapes, features or habitats and where appropriate the creation of new ones, including the planting of woodlands, trees and hedgerows.

Development will be expected to respect and enhance local landscape character, securing appropriate mitigation where damage to local landscape character cannot be avoided.

Proposals will not be permitted if they would:

- *Cause undue visual intrusion into the open countryside*
- *Cause undue harm to important natural landscape features and topography*
- *Be inconsistent with local character*
- *Impact on areas judged to have a high level of tranquillity*
- *Harm the setting of settlements, buildings, structures or other landmark features, or*
- *Harm the historic value of the landscape.*

Development proposals should have regard to the information and advice contained in the Council's Countryside Design Summary Supplementary Planning Guidance, and the Oxfordshire Wildlife and Landscape Study (OWLS), and be accompanied by a landscape assessment where appropriate.

2.2.12. It should be noted in relation to Policy ESD3 of the Cherwell District Council Local Plan that the reference to Government Policy for zero carbon development is no longer applicable. Part L 2021 building regulations compliance is instead sought.

2.2.13. This report seeks to address the planning policies relating to sustainability relevant for the proposed site and present a sustainable strategy.

2.2.14. This report should be read in conjunction with other reports prepared for this development.

2.3. Building Regulations

2.3.1. All newbuild development must comply with Building Regulations. The newly implemented Approved Document L 2021 (AD-L 2021) provides for a 31% reduction in Carbon emissions over the previous 2013 edition.

2.3.2. AD-L 2021 came into effect 15th June 2022, with a 12 months transitional arrangement. Sites which have been notified to local authorities prior to this date have 12 months transitional allowance on a plot by plot basis. That is to say if a plot has commenced construction prior to 15th June 2023 it will be built under AD-L 2013. It is understood that Land off Heyford Road will be developed in accordance with AD-L 2021.

3. Sustainability Appraisal

3.1. Green Guide Specifications

- 3.1.1. The Green Guide is used to examine the environmental impact of the construction materials commonly used within dwellings.
- 3.1.2. The proposed development should be constructed using materials consisting of predominantly 'A' and 'A+' Green Guide rated elements. 'A+' rated construction elements include: pitched roof construction, internal upper floors, internal timber partitions and external cavity walls.

3.2. Responsible Sourcing

- 3.2.1. Materials used within construction of the proposed development are to be at a certified standard, proving the materials sourced have been done so with sustainability in mind.
- 3.2.2. Responsible sourcing of materials can come in a variety of certifications including: BES 6001, FSC, PEFC and EMS.
- 3.2.3. Additionally, the site aims to utilise timber that is procured sustainably and independently accredited by either the FSC or PEFC schemes.

3.3. Waste Management

- 3.3.1. The proposed development aims to use waste reduction procedures to enable waste reduction and diversion of waste from landfill. The goal is to minimise waste and maximise re-use of resources in response to climate change.
- 3.3.2. It is recommended that a waste management plan be utilised to divert maximum waste from landfill.
- 3.3.3. It is understood that adequate provision will be provided for both the storage and sorting of recyclable and non-recyclable waste during occupancy.

3.4. Flood Risk

- 3.4.1. Appendix B shows the Environment Agency Flood Risk Map for the site location.
- 3.4.2. All residential development on site will be within Flood Zone 1, the lowest probability evaluated by the Environment Agency. Flood Zone 1 is defined as land with less than 1 in 1000 annual probability of river or sea flooding.
- 3.4.3. Zone 1 flood risk is considered best practice for a positive sustainable development and would be well located for a site that is resilient to climate change.
- 3.4.4. A Flood Risk Assessment has been carried out for this development.
- 3.4.5. The proposed development conforms to Policy ESD6 of the Cherwell District Council Local Plan.

3.5. Sustainable Urban Drainage (SuDS)

- 3.5.1. Sustainable Urban Drainage assessments consider any potential drainage and flood risk issues which could arise from the development and put forward recommendations to mitigate these impacts.
- 3.5.2. A full Drainage Strategy has been prepared for the proposed development informed by a full Drainage Assessment.
- 3.5.3. The current proposal consists of discharging runoff to a nearby watercourse, permeable paving and pond usage for surface water collection and storage.

3.6. Ecology

- 3.6.1. A full Ecology Statement has been carried out for the site.
- 3.6.2. The Ecology Statement takes into account any habitats and species which could be impacted by the proposed development and puts forth recommendations on how to minimise any potential impacts and protect or improve any habitats.
- 3.6.3. Full details of the recommended approach to ecology can be found in the associated report.

3.7. Sustainable Transport

- 3.7.1. There are several bus stops within walking distance of the proposed development which provide access to Bicester and Oxford.
- 3.7.2. Timetables for the number 24 and 250 buses can be found in Appendix C.
- 3.7.3. The closest railway station is Tackley Station, roughly 5 miles from the development. This provides access to the wider national rail infrastructure.

3.8. Electric Vehicle Charging

- 3.8.1. Providing EV charging points or the ability to retrofit EV charging points is an exemplary measure for sustainability and promotes sustainable lifestyles for residents.
- 3.8.2. With the provision of EV charging points, residents would have ready opportunity to purchase / lease EV's and have immediate secure charging infrastructure. This aligns with current government policy to stop the sale of new petrol and diesel cars by 2030 (GOV.UK, November 2020).
- 3.8.3. The BEAMA Guide to Electric Vehicle Infrastructure (BEAMA, 2015) illustrates the various "Modes" of electric car charging, with Mode 1 being the slowest, and Mode 4 the fastest. Mode 1 is not recommended and Mode 4 is only recommended for public and commercial use. Modes 2 to 3 are suitable for dedicated charging of EV's at domestic properties. Please refer to Figure 1 below which shows common infrastructure side connections for Mode 2 and 3.

CONNECTOR TYPE	BS 1363	BS EN 60309-2	BS EN 62196-2 TYPE 2	BS EN 62196-2 TYPE 3
MODE	2	2	3	3
MAX POWER (kW) <small>(at mains voltage i.e. harmonised EU voltages)</small>	Single phase - 3	Single phase - 28.8 Three phase - 86.6	Single phase - 16.1 Three phase - 43.7	Single phase - 7.4 Three phase - 43.7
NOTES	Standard UK household plug & socket-outlet system	Standard industrial plug & socket-outlet system	Specialist EV	Specialist EV

Figure 1 – Common infrastructure options for Mode 2 and 3 EV charging points (BEAMA, 2015)

- 3.8.4. It is currently proposed that there will be passive provision for the easy retrofitting of one compliant EV charging point for each dwelling on the development.

3.9. Water Use

- 3.9.1. The criteria for measuring potable water usage are set out in Approved Document G of the Building Regulations.
- 3.9.2. All dwellings on site can be designed to achieve the maximum of 105 litres per person per day internal potable water, with an additional allowance for external water use of 5 litres per person per day. The total internal water consumption estimate is 101.6 litres per person per day for dwellings with a bath and shower; and 90.6 litres per person per day for any dwellings with only a shower. An additional 5L is specified for external use. The specification of water fittings will be identified at the detailed design stage.
- 3.9.3. Representative data has been input into the BRE's Water Efficiency Calculator for New Dwellings for relevant domestic water consuming components; dual flush WC, taps and kitchen sink taps, bath and shower. Washing machine and dishwasher specification have been set to default rates as standard practice.
- 3.9.4. The following representative rates have been utilised:
- *Dual Flush WC – 4L & 2.6L flush volumes*
 - *Taps – 4L per minute flow rate*
 - *Bath – 195L overflow capacity*
 - *Shower – 8L per minute flow rate*
 - *Kitchen sink taps – 4L per minute flow rate*
- 3.9.5. Alternative component consumption rates are available which can achieve the required water consumption. The rates provided are representative only.
- 3.9.6. The calculator can be found in Appendix D.
- 3.9.7. The calculated results show that utilisation of the representative component's water consumption can achieve a maximum of 105 litres per person per day internally, and additional external water use of 5 litres per person per day.
- 3.9.8. This is in line with Policy ESD3 of the Cherwell District Council Local Plan.

4. Design Response

4.1. Assessment Methodology

4.1.1. Environmental Economics will model the proposed dwellings using the software Design SAP 10 by Elmhurst and approved by BRE. The software provides a number of outputs, and based of the provided specification for this proposed development, we are able to assess the following areas for our calculations:

- *Building regulations compliance, including:*
 - *Carbon emissions (kg CO₂/m²/year)*
 - *Primary Energy Demand (kWh/m²/annum)*
 - *Fabric Energy Efficiency (kWh/m²/annum)*
- *Energy usage per year (kWh/annum)*
- *Energy costs per year (£/annum)*
- *More detailed breakdowns by end use (space heating, water heating, cooking, lighting, appliances)*

4.1.2. Each of these outputs can be used in different ways to analyse the performance of the dwelling. The total regulated carbon emissions for each property is based upon:

- *Space heating;*
- *Water heating;*
- *Electricity for pumps and fans;*
- *Electricity for lighting.*

4.1.3. SAP software is issued by independent software suppliers, and checked and approved on behalf of government by the Building Research Establishment (BRE).

4.1.4. The dwellings on the proposed development will be assessed using this methodology during the detailed design stage.

4.2. Design Philosophy

4.2.1. Upgrades have been made to a number of elements from a standard build specification in order to improve energy efficiency across the development. The site adopts the good design principles endorsed and promoted by The Zero Carbon Hub, the construction industries' key advisors and partners with the Governments Communities and Local Government Department. This guidance follows the general good principles of energy efficiency as the industry moves towards zero carbon. The principles are illustrated in figure 2 below.

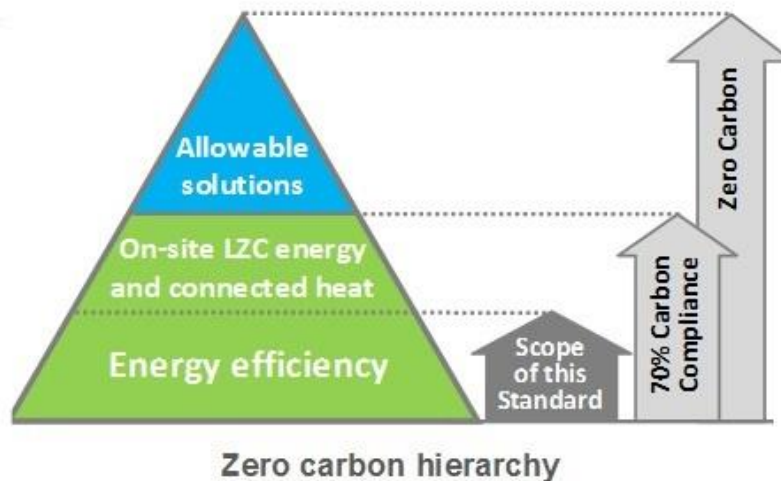


Figure 2

4.2.2. In order to reduce the residual carbon emissions a number of improvements were made to the standard material and product specification. These improvements include:

- *Upgraded heating and hot water controls*
- *Delayed start thermostat*
- *Design air permeability of 4m³/hr/m²*
- *Bespoke thermal bridging details*

4.2.3. The development thereby complies with Policy ESD2 of the Cherwell District Council Local Plan

4.3. Fabric Improvements Part L1A 2021

4.3.1. The building fabric for all dwellings is to be improved from the minimum standards required to an enhanced specification. These fabric improvements reduce the space heating requirement upon a property. The improvements have been made through a combination of upgraded materials and increased insulation thicknesses. Enhanced glazing with a larger transmittance factor allowing for increased solar gains will also be used. Potential changes to the U-Value of external elements for dwellings built to Part L 2021 are shown in Table 1 below:

Table 1 – Part L 2021 Build Specification

<i>Element</i>	<i>Minimum Standard</i>	<i>Improved Specification</i>	
-	<i>W/m²k</i>	<i>Description</i>	<i>W/m²k</i>
Walls	0.26	Masonry with 125mm Insulated Cavity	0.21
Roof	0.16	500mm Mineral Wool Horizontal Ceiling, Loft Space	0.09
		Sloping Ceiling to have 100mm PUR between joists, and 55mm PUR Board underlaid	0.15
Floors	0.18	Insulated Beam and Block	0.12
Doors	1.60	Double glazed Low-E, u-PVC frame	1.2
Glazing	1.60	Double glazed Low-E, u-PVC frame	1.3

- 4.3.2. Please note that this specification is not finalised and is subject to change up until detailed design stage.
- 4.3.3. As improvements are made to the thermal conductivity of main elements, thermal bridging and air permeability becomes increasingly significant in the overall fabric performance. Bespoke thermal bridging designs have been utilised, which achieve much lower heat loss levels in comparison with standard practice.
- 4.3.4. As a result of following these junction details and focusing on build quality air permeability will also decrease. A target air pressure rating of 4m³/hr.m² has been set for all houses on site which is an improvement on the maximum allowable rating in the 2021 Building Regulations.

4.4. Building Services & Renewable Energy (LZCT)

- 4.4.1. The systems used in a property to supply hot water and heating, as well as control it, are important to the overall energy demand of a property. AD-L 2021 includes requirements for efficiency and controls of such equipment, including space heating, water heating, ventilation and lighting.
- 4.4.2. The design of building services which provide space heating and domestic hot water, ventilation, and lighting, must be considered in a holistic way in order to avoid unintended consequences and to maximise the benefits from such systems.
- 4.4.3. After due consideration of the potential LZCT available (shown in Appendix E) the design team propose to adopt the following technologies which provide benefits / compliance with national and local policies as listed:
- **Photovoltaic (PV) panels**
 - **PV diverters**
 - Excess power from PV panels utilised for heating the hot water cylinder
 - **Waste water heat recovery (WWHR)**
 - Passive technology, no maintenance required;
 - Recovers waste heat from shower, pre-heats incoming cold. This reduces the amount of hot water required from the hot water cylinder;
 - Typical systems recover ~60% waste heat
- 4.4.4. It is currently proposed that PV panels will be used to improve dwelling performance to the level required for Part L 2021. The amount of PV which will be required for this development is to be calculated at the detailed design stage.
- 4.4.5. For Part L 2021 it is currently proposed to provide heating and hot water via mains gas boilers.
- 4.4.6. Where installed, hot water cylinders can lose a significant amount of energy. To minimise this energy loss and corresponding carbon emissions, cylinders which have higher levels of insulation in comparison to typical hot water cylinders will be used.
- 4.4.7. Hot water distribution pipework will be fully insulated.
- 4.4.8. The future direction of travel for the UK is to implement a low carbon electricity network which will become the main fuel for residential heating and hot water. However, as the development is a low density housing project with a lack of land available for an energy centre, guidance issued by the Greater London Authority (below) suggests that heat networks are currently inappropriate for this kind of development:

9.34. Depending of the density of development, it may not always be appropriate to connect individual houses to heat networks. This is due to the higher network heat losses that typically occur when supplying individual

houses that generally have a lower heat density compared to apartments. They also have a higher cost of connection.

4.4.9. Lighting provision will be from LED low energy fittings achieving a minimum efficacy of 100 lamp lumens per circuit watt, an improvement of over 50% from AD-L 2013 performance levels.

4.4.10. Smart meters will be installed on all properties, providing:

- Real time information on energy use both in terms of consumption and cost
- Occupier can manage their energy, save money and reduce carbon emissions
- Smart meters will also allow for easier switching between suppliers
- Facilitate a more reactive, price driven, demand-response
- End estimated billing and eliminate the need for meter readers to visit premises

5. Conclusion

- 5.1.1. This sustainability statement has been produced for the residential site Land off Heyford Road, Kirtlington
- 5.1.2. The development strategy sets a high standard of overall sustainability with measures that include:
- Building elements with highest standard 'A+' Green Guide ratings including upper floors, external cavity walls, internal partitions, insulation and pitched roof;
 - Material suppliers with responsible sourcing certification guided by a high-quality sustainable procurement policy;
 - Effective waste management procedures to minimise waste;
 - The implementation of flood risk, sustainable drainage and ecology assessments;
 - Efficient internal and external water use in line with building regulations;
 - Enhanced building fabric specification with a Fabric-First approach including high efficiency insulation and provision of efficient appliances;
 - Use of PV to achieve the efficiency levels required under Part L 2021.
- 5.1.3. It should be noted that future policies and building regulations may require an update to the sustainability measures within this report.
- 5.1.4. The proposed site is found to present a positive sustainable development based on the assessed sustainability criteria and exceeds current standards with an exemplary strategy.

Appendix A – Proposed Site Layout



Appendix B – Flood Risk Map (Zone 1)



Flood map for planning

Your reference	Location (easting/northing)	Created
Land off Heyford Road	450110/220210	10 Feb 2023 15:25

Your selected location is in flood zone 1, an area with a low probability of flooding.

You **will** need to do a flood risk assessment if your site is **any of the following**:

- bigger than 1 hectare (ha)
- **In an area with critical drainage problems as notified by the Environment Agency**
- identified as being at increased flood risk in future by the local authority's strategic flood risk assessment
- at risk from other sources of flooding (such as surface water or reservoirs) and its development would increase the vulnerability of its use (such as constructing an office on an undeveloped site or converting a shop to a dwelling)

Notes

The flood map for planning shows river and sea flooding data only. It doesn't include other sources of flooding. It is for use in development planning and flood risk assessments.

This information relates to the selected location and is not specific to any property within it. The map is updated regularly and is correct at the time of printing.

Flood risk data is covered by the Open Government Licence which sets out the terms and conditions for using government data. <https://www.nationalarchives.gov.uk/doc/open-government-licence/version/3/>

Use of the address and mapping data is subject to Ordnance Survey public viewing terms under Crown copyright and database rights 2022 OS 100024198, <https://flood-map-for-planning.service.gov.uk/os-terms>



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Appendix C – Bus Timetables

Table C1 – Number 250 (Bicester – Oxford) bus Monday to Friday

Bicester Village Station (opp)							16:10	18:50	
Bicester Manorsfield Road (Stand 4)	06:25	07:30	10:02	12:02	14:02	15:05	16:15	17:33	18:55
Middleton Stoney, adj Park Close	06:33	07:40	10:11	12:11	14:11	15:15	16:25	17:43	19:03
Heyford Park, opp Free School	06:41	07:49	10:17	12:17	14:17	15:21	16:32	17:49	19:09
Heyford Park, adj Dacey Drive	06:44	07:52	10:20	12:20	14:20	15:24	16:35	17:52	19:12
Lower Heyford, o/s Kingdom Hall	06:47	07:55	10:23	12:23	14:23	15:27	16:38	17:55	19:15
Kirtlington, o/s Oxford Arms	06:55	08:03	10:30	12:30	14:30	15:35	16:46	18:03	19:22
Bletchingdon, opp Blacks Head Inn	07:01	08:08	10:34	12:34	14:34	15:39	16:50	18:07	19:26
Hampton Poyle, o/s The Bell	07:05	08:13	10:38	12:38	14:38	15:43	16:54	18:11	
Gosford, opp Kings Arms	07:09	08:18	10:41	12:41	14:41	15:47	16:58	18:15	
Summertown Shops (Stop C)	07:21	08:32	10:51	12:51	14:51	15:58	17:09	18:26	
Oxford, adj Keble Road	07:31	08:42	10:58	12:58	14:58	16:06	17:17	18:34	19:49
Oxford Magdalen Street East (Stop C6)	07:35	08:46	11:01	13:01	15:01	16:09	17:20	18:37	

Table C2 – Number 250 (Oxford – Bicester) bus Monday to Friday

Oxford Magdalen Street (Stop C4)		07:40	09:00	11:05	13:05	15:05	16:13	17:25	18:40
Oxford, opp Keble Road	06:29	07:41	09:01	11:06	13:06	15:06	16:15	17:28	18:41
Summertown Shops (Stop B)		07:47	09:07	11:11	13:11	15:11	16:23	17:44	18:48
Gosford, o/s Kings Arms		07:57	09:16	11:20	13:20	15:23	16:38	17:48	18:58
Hampton Poyle, opp The Bell		08:00	09:19	11:23	13:23	15:26	16:41	17:51	19:01
Bletchingdon, o/s Blacks Head Inn	06:50	08:05	09:24	11:28	13:28	15:31	16:47	17:56	19:06
Kirtlington, opp Oxford Arms	06:54	08:09	09:28	11:32	13:32	15:35	16:51	18:01	19:10
Lower Heyford, opp Kingdom Hall	07:01	08:16	09:35	11:39	13:39	15:42	16:58	18:08	19:17
Heyford Park, opp Dacey Drive	07:04	08:19	09:39	11:42	13:42	15:45	17:01	18:11	19:20
Middleton Stoney, opp Park Close	07:13	08:28	09:50	11:51	13:51	15:54	17:11	18:20	19:27
Bicester Manorsfield Road (Stand 4)	07:25	08:42	09:59	12:00	14:00	16:03	17:23	18:32	19:36
Bicester Village Station (opp)		08:47						18:37	19:41

Table C3 – Number 250 (Bicester – Oxford) bus Saturday

Bicester Manorsfield Road (Stand 4)	08:02	10:02	12:02	14:02	16:05	18:24	
Middleton Stoney, adj Park Close	06:15	08:11	10:11	12:11	14:11	16:14	18:32
Heyford Park, opp Free School	06:20	08:17	10:17	12:17	14:17	16:21	18:38
Lower Heyford, o/s Kingdom Hall	06:24	08:22	10:22	12:22	14:22	16:26	18:43
Kirtlington, o/s Oxford Arms	06:31	08:29	10:29	12:29	14:29	16:34	18:50
Bletchingdon, opp Blacks Head Inn	06:35	08:33	10:33	12:33	14:33	16:38	18:54
Hampton Poyle, o/s The Bell	06:39	08:37	10:37	12:37	14:37	16:42	18:58
Gosford, opp Kings Arms	06:42	08:40	10:40	12:40	14:40	16:46	19:01
Summertown Shops (Stop C)	06:50	08:50	10:50	12:50	14:50	16:56	19:10
Oxford Magdalen Street East (Stop C6)	06:58	09:00	11:00	13:00	15:00	17:13	19:18

Table C4 - Number 250 (Oxford – Bicester) bus Saturday

Oxford Magdalen Street (Stop C4)	07:05	09:05	11:05	13:05	15:05	17:15	19:25
Gosford, o/s Kings Arms	07:20	09:20	11:20	13:20	15:20	17:35	19:40
Hampton Poyle, opp The Bell	07:23	09:23	11:23	13:23	15:23	17:38	19:43
Bletchingdon, o/s Blacks Head Inn	07:28	09:28	11:28	13:28	15:28	17:43	19:47
Kirtlington, opp Oxford Arms	07:32	09:32	11:32	13:32	15:32	17:48	19:51
Lower Heyford, opp Kingdom Hall	07:39	09:39	11:39	13:39	15:39	17:55	19:58
Heyford Park, opp Park Homes	07:44	09:44	11:44	13:44	15:44	18:00	20:03
Middleton Stoney Bicester Road (E-bound)	07:50	09:50	11:50	13:50	15:50	18:06	20:09
Bicester Manorsfield Road (Stand 4)	07:59	09:59	11:59	13:59	15:59	18:18	20:18

Table C5 – Number 250 (Bicester – Oxford) bus Sunday

Bicester Village Station (opp)	08:55	17:55
Bicester Manorsfield Road (Stand 4)	09:00	18:00
Middleton Stoney, adj Park Close	09:09	then hourly until 18:09
Heyford Park Village Centre (W-bound)	09:15	18:15
Heyford Park, adj Dacey Drive	09:18	18:18

Table C6 – Number 250 (Oxford - Bicester) bus Sunday

Heyford Park, opp Dacey Drive	08:27	17:27
Heyford Park Village Centre (E-bound)	08:30	17:30
Middleton Stoney, opp Park Close	08:36	then hourly until 17:36
Bicester Manorsfield Road (Stand 4)	08:45	17:45
Bicester Village Station (opp)	08:50	17:50

Table C7 – Number 24 (Bicester – Oxford) bus Monday to Friday

Bicester Manorsfield Road (Stand 4)	09:50	11:45	14:15	16:15			
Weston-on-the-Green, opp Oxford Court							17:51
Wendlebury, o/s The Lion	10:00	11:55	14:25	16:25			
Weston-on-the-Green, adj Oxford Court	06:38	07:48	10:08	12:03	14:33	16:33	
Kirtlington, o/s Oxford Arms	06:44	07:54	10:14	12:09	14:39	16:39	
Bletchingdon, opp Blacks Head Inn	06:50	08:00	10:20	12:15	14:45	16:45	
Hampton Poyle, o/s The Bell	06:53	08:03	10:23	12:18	14:48	16:48	
Gosford, opp Kings Arms	06:56	08:06	10:26	12:21	14:51	16:51	18:04
Oxford Magdalen Street East (Stop C6)	07:13	08:23	10:43	12:38	15:08	17:08	18:21

Table C8 – Number 24 (Oxford - Bicester) bus Monday to Friday

Oxford Magdalen Street (Stop C4)	07:20	08:30	10:45	12:45	15:15	17:15	18:30
Gosford, o/s Kings Arms	07:35	08:45	11:00	13:00	15:30	17:30	18:45
Weston-on-the-Green, adj Oxford Court	07:48						
Hampton Poyle, opp The Bell		08:48	11:03	13:03	15:33	17:33	18:48
Bletchingdon, o/s Blacks Head Inn		08:51	11:06	13:06	15:36	17:36	18:51
Kirtlington, opp Oxford Arms		09:00	11:15	13:15	15:45	17:45	19:00
Weston-on-the-Green, opp Oxford Court		09:06	11:21	13:21	15:51	17:51	19:06
Wendlebury, opp The Lion		09:10	11:25	13:25	15:55		
Bicester Manorsfield Road (Stand 4)		09:20	11:37	13:37	16:07		

Table C9 – Number 24 (Bicester – Oxford) bus Saturday

Bicester Manorsfield Road (Stand 4)	09:50	11:45	14:15	16:15			
Weston-on-the-Green, opp Oxford Court							17:51
Wendlebury, o/s The Lion	10:00	11:55	14:25	16:25			
Weston-on-the-Green, adj Oxford Court	07:48	10:08	12:03	14:33	16:33		
Kirtlington, o/s Oxford Arms	07:54	10:14	12:09	14:39	16:39		
Bletchingdon, opp Blacks Head Inn	08:00	10:20	12:15	14:45	16:45		
Hampton Poyle, o/s The Bell	08:03	10:23	12:18	14:48	16:48		
Gosford, opp Kings Arms	08:06	10:26	12:21	14:51	16:51	18:04	
Oxford Magdalen Street East (Stop C6)	08:23	10:43	12:38	15:08	17:08	18:21	

Table C10 – Number 24 (Oxford - Bicester) bus Saturday

Oxford Magdalen Street (Stop C4)	08:30	10:45	12:45	15:15	17:15	18:30
Gosford, o/s Kings Arms	08:45	11:00	13:00	15:30	17:30	18:45
Hampton Poyle, opp The Bell	08:48	11:03	13:03	15:33	17:33	18:48
Bletchington, o/s Blacks Head Inn	08:51	11:06	13:06	15:36	17:36	18:51
Kirtlington, opp Oxford Arms	09:00	11:15	13:15	15:45	17:45	19:00
Weston-on-the-Green, opp Oxford Court	09:06	11:21	13:21	15:51	17:51	19:06
Wendlebury, opp The Lion	09:10	11:25	13:25	15:55		
Bicester Manorsfield Road (Stand 4)	09:20	11:37	13:37	16:07		

Appendix D – Water Efficiency Calculator

WATER EFFICIENCY CALCULATOR FOR NEW DWELLINGS - (BASIC CALCULATOR)									
House Type:		Type 1		Type 2		Type 3		Type 4	
Description:		Bath and Shower		Shower only					
Installation Type	Unit of measure	Capacity/ flow rate	Litres/ person/ day	Capacity/ flow rate	Litres/ person/ day	Capacity/ flow rate	Litres/ person/ day	Capacity/ flow rate	Litres/ person/ day
Is a dual or single flush WC specified?		Dual		Dual		Select option:		Select option:	
WC	Full flush volume	4	5.84	4	5.84		0.00		0.00
	Part flush volume	2.6	7.70	2.5	7.40		0.00		0.00
Taps (excluding kitchen and external taps)	Flow rate (litres / minute)	4	7.90	4	7.90		0.00		0.00
Are both a Bath & Shower Present?		Bath & Shower		Shower only					
Bath	Capacity to overflow	195	21.45		0.00		0.00		0.00
Shower	Flow rate (litres / minute)	8	34.96	8	44.80		0.00		0.00
Kitchen sink taps	Flow rate (litres / minute)	4	12.12	4	12.12		0.00		0.00
Has a washing machine been specified?		No		Yes					
Washing Machine	Litres / kg		17.16	8.1	17.01		0.00		0.00
Has a dishwasher been specified?		No		No					
Dishwasher	Litres / place setting		4.50		4.50		0.00		0.00
Has a waste disposal unit been specified?		No		No					
Water Softener	Litres / person / day		0.00		0.00		0.00		0.00
Calculated Use		111.6		99.6		0.0		0.0	
Normalisation factor		0.91		0.91		0.91		0.91	
Code for Sustainable Homes	Total Consumption	101.6		90.6		0.0		0.0	
	Mandatory level	Level 3/4		Level 3/4		-		-	
Building Regulations 17.K	External use	5.0		5.0		5.0		5.0	
	Total Consumption	106.6		95.6		0.0		0.0	
	17.K Compliance?	Yes		Yes		-		-	

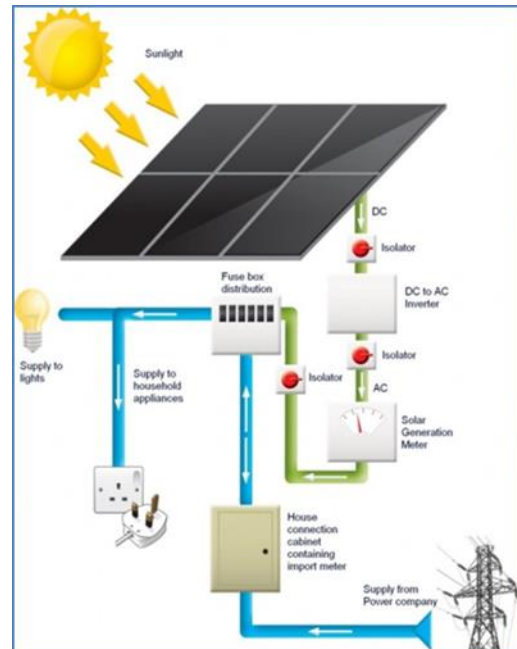
Appendix E – Low and Zero Carbon Technologies

Photovoltaic (PV) Cells

The efficiency of PV cells has improved rapidly over the last 15 years. This has made a previously uneconomical technology an increasingly viable solution to rising energy costs and demand. The cells can be produced in a variety of formats but are typically manufactured as a panel or a roof tile for domestic housing applications.

The PV system typically produces direct current (DC) which is then sent through an inverter to supply the house with electricity. If a greater amount of electricity is produced than used by the household, this extra can be exported to the national grid.

A PV cell is assessed on its peak power rating. This is tested by exposing the cell to the equivalent of full solar radiation and measuring the power output. The peak power is input into the Design SAP software as well as the physical attributes of the installation such as pitch, orientation and over-shading. A total energy saving per year can then be calculated through SAP for the PV installation. This is then offset against the electricity energy demand for the house.



Solar Hot Water (SHW)

SHW systems generate energy which is used to heat stored water (in a special solar hot water cylinder) which offsets the energy required for the boiler, thereby reducing fuel use and reducing carbon emissions. Therefore, SHW systems are ideally utilised when the design of a dwelling already calls for a hot water cylinder, and not when a combination boiler is specified.



There are two main SHW systems: evacuated tubes and flat plate collectors. Evacuated tubes are more efficient at transferring solar irradiation to the fluid although flat plate collectors are considered to be better aesthetically and to install.

The final energy contribution to the household, calculated through SAP, is based on several factors:

- *Pitch, orientation, and over-shading*
- *Heat absorption efficiency for the collector*
- *Average hot water usage of the dwelling*

Most of the energy savings will be made in the hot water demand for the dwelling however, adding a SHW system will impact upon other energy demands.

Air Source Heat Pumps (ASHP)

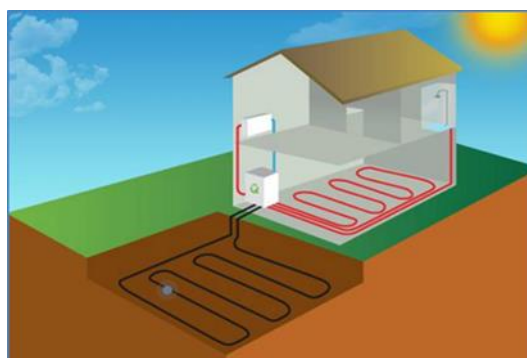
ASHP provide heating and hot water to a home through thermal energy gathered from air outside the dwelling. Systems can be designed to work in conjunction with a boiler system but in the case of energy efficient new builds it is possible for an ASHP unit to provide 100% of the heating and hot water demand.



The thermal performance of the unit depends on the outside temperature as well as the unit's Coefficient of Performance. This is the ratio of thermal energy produced to energy used. A typical value for this would be around 3.5, meaning that for every 1kW of electricity consumed the unit would provide 3.5kW of thermal energy to the household. This efficiency leads to large carbon and energy savings for both space and water heating.

Ground Source Heat Pumps (GSHP)

GSHP provide heating and hot water to a dwelling through geothermal effects. A GSHP system would offset the energy demand from the main space heating. There is, however, an additional electricity demand for the pump and control system. This would reduce energy savings from the installation.



GSHP are expensive to install and rely on having appropriate ground conditions and suitable space around the dwelling for the pipe looping. Energy savings are dependent upon the type of system being replaced and the way the system is operated by the homeowner.

Biomass Heating Systems

Biomass heating systems burn fuels, considered carbon neutral, to heat the water required for a dwelling. There are a large variety of systems available, and choice depends on the type of fuel to be burned and the level of automation.



The system would offset the energy demand from the hot water and main space heating. However, biomass systems typically require a large amount of maintenance and monitoring.

The savings from such a system, in terms of CO₂ and money, depends upon what it is replacing. The savings are greatest when replacing an electrical hot water system but are considerably less for replacing mains gas.

Wind Turbines

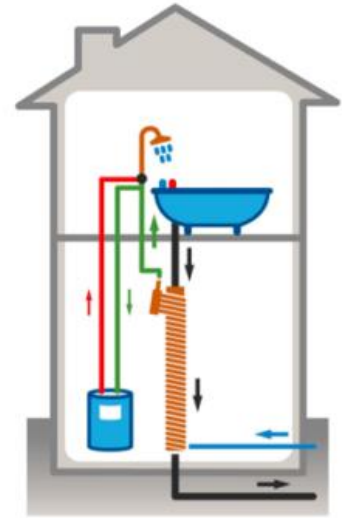
Wind turbines provide electricity directly to a dwelling. They can be added to a property in two ways: pole mounted or building mounted. The pole mounted systems are free standing and therefore require enough space around them to allow for the construction and maintenance of the structure, as well as to allow for efficient operation. The building mounted systems have a lower power output but do not require additional structures, as can be seen in figure

The energy produced from a wind turbine is heavily dependent upon the surrounding landscape. The energy saved will be offset against the electricity usage of the dwelling.



WWHRS

Waste water heat recovery system (WWHRS) recovers the energy that is lost from the waste water that is generated from showers. It uses a heat exchange system which recovers a portion of the energy that would normally be wasted. The waste heat is partially transferred to the incoming mains water inlet, which reduces the change in temperature required for the boiler to make. It therefore has the ability to reduce the amount energy required for the boiler to operate at specific points in the day.



FGHRS

Flue gas heat recovery system (FGHRS) works by recovering waste heat from the flue of a boiler. This waste heat is partially transferred to the main water inlet which raises the temperature of the water which is fed into the boiler. This reduces the amount of energy required to heat the boiler, as it reduces the temperature increase required for the boiler to operate, and therefore reduces the energy demand to heat the dwelling.

