



Energy and Carbon Strategy

Denbow, Exeter

January 2023

Turley
Sustainability

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Partners Ltd

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Demonstrating climate leadership

The energy and carbon strategy proposed for the Denbow New Town fully supports the national transition to a net zero economy and the locally declared climate emergency.

Key principles of the energy strategy



Key principles of the energy and carbon strategy include:

- Creating a clear route to net zero
- Detailed feasibility of decentralised energy
- A flexible and responsive to changes in technology and policy
- Use of 'smart' technology and innovation
- Supportive of the transition to a net zero economy
- A strategy to reduce construction carbon.

Smart Energy Systems



The development will make use of smart energy systems and innovation, including:

- Smart energy capable homes and buildings
- Consideration of an onsite Solar Array to provide additional energy generation
- Use of energy storage systems, including batteries to manage onsite energy demand

Embodied Carbon



Life Cycle Assessment - Development to undergo Life Cycle Assessment to identify options to reduce embodied carbon.



RIBA 2030 - Development to meet the RIBA 2030 embodied carbon targets which reduce over time

Operational Energy and Carbon Strategy

The Operational Energy and Carbon Strategy will embrace the future homes and future buildings standards from the outset as a minimum, recognising these will likely improve further over time and technologies will change. As a minimum the development will include the following.



Net Zero Ready - Development to meet the requirements of the Future Homes Standard and Future Buildings Standard to deliver Net Zero Ready homes and buildings



Energy Efficiency - High levels of fabric efficiency and passive design measures



Low Carbon Heat - Detailed feasibility to explore connection to the Cranbrook Heat Network Extension



Renewable Energy - All buildings to include Solar PV to provide onsite energy generation

Non-Residential Targets

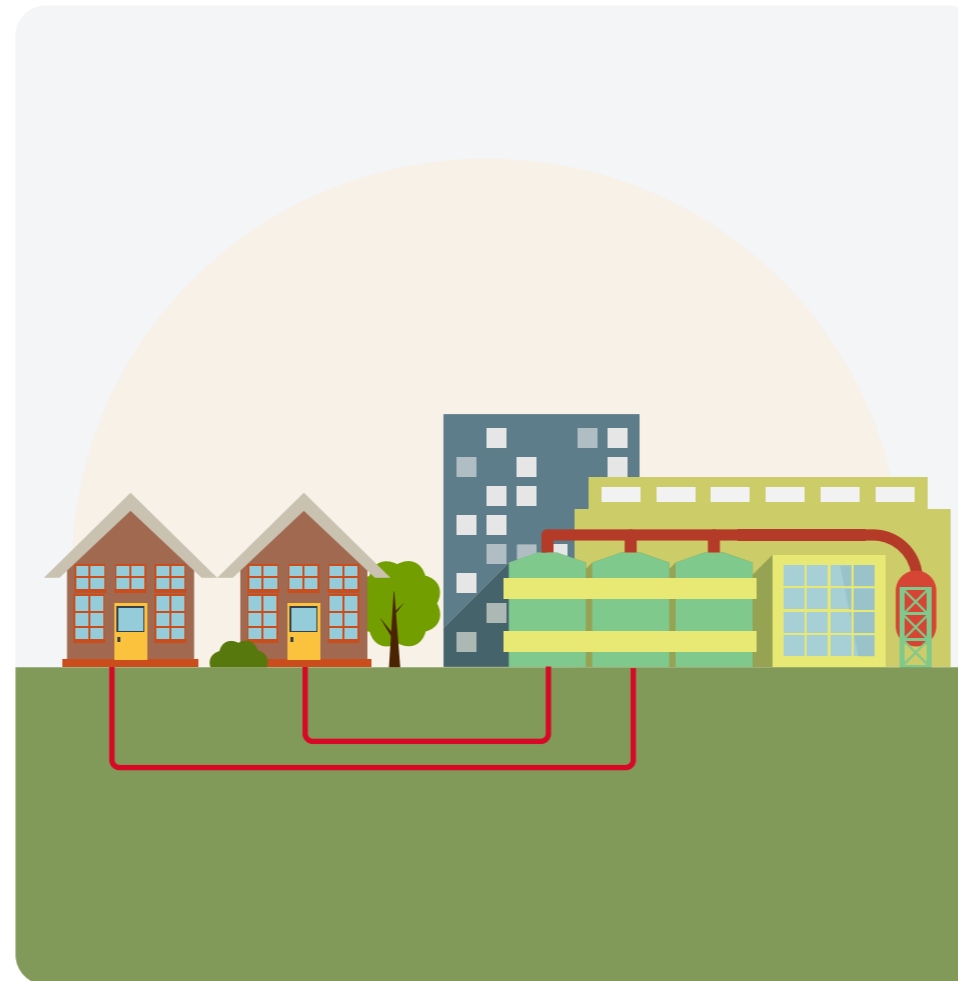
A range of specific energy and carbon targets are proposed for elements of the development, including:



Commercial employment areas to meet the UKGBC Net Zero framework requirements to deliver Net Zero development.



Commitment to deliver Net Zero community buildings and schools.



Policy

Future Homes Standard and Future Buildings Standard - The development will align with the Future Homes Standard (FHS) requiring homes to achieve a 75-80% reduction in CO2 emissions. The Future Buildings Standard (FBS) is also being progressed and further consultation is expected in time. The FBS is anticipated to set a similar target for non-residential development.

East Devon Local Plan 2013 to 2031 - The development will endeavour to:

- Incorporate sustainable methods of design and construction including material re-use, use of renewable technologies, and use of local materials. It will also be resilient to climate change, mitigate adverse impacts that will potentially arise, and incorporate biodiversity improvements.
- Developments with 10 or more dwellings or with a floor space of at least 1,000m² will connect to any existing or proposed nearby Decentralised Energy Network.

Draft East Devon Local Plan 2020 to 2040 - East Devon District Council is preparing a new local plan and the draft, whilst still being finalised, includes the following policies that will need to be met:

- Developments will be required to support East Devon becoming carbon neutral by 2040 through delivery of net zero development, maximising opportunities for the delivery of renewable energy, district heat networks, energy storage facilities, and assessing the embodied carbon of buildings.
- New developments will be required to deliver net-zero carbon emissions, be future proofed against temperature discomfort, and maximise opportunities for renewable energy.
- Major development will connect to an existing heat network where they are located within 1km of the development proposals or, where one does not already exist, a new heat network will be deployed for developments of over 1,200 homes or 10ha of commercial floorspace.

1. Introduction

This Energy and Carbon Strategy has been prepared to demonstrate how the proposed new community at Denbow in the West End of East Devon District will implement an energy and carbon strategy which is fully supportive of the UK national net zero targets. It also sets out how it will meet or exceed policies on energy and climate change at a national level and those contained in the emerging East Devon Local Plan.

1.1 The site

The emerging East Devon Local Plan 2020-2040 is proposing to allocate a “New Town” of approximately 8,000 dwellings within the West End of the District of East Devon (hereafter referred to as ‘The Site’ or ‘Denbow’). East Devon District Council (hereafter referred to as ‘The Council’) are currently consulting on the Regulation 18 Local Plan which has identified and subsequently assessed three areas where this new community could be located. These areas are referred to as Options 1 – 3 with the plan confirming that the most sustainable option is Option 1, followed by Option 3 and then Option 2.

The development consortium (hereafter referred to as The Clients) are currently promoting a large site which is referred to as Denbow and which broadly correlates to Option 1. The site boundary for the proposed town, located in the East Devon District, sitting between the village and civil parish of Clyst Honiton

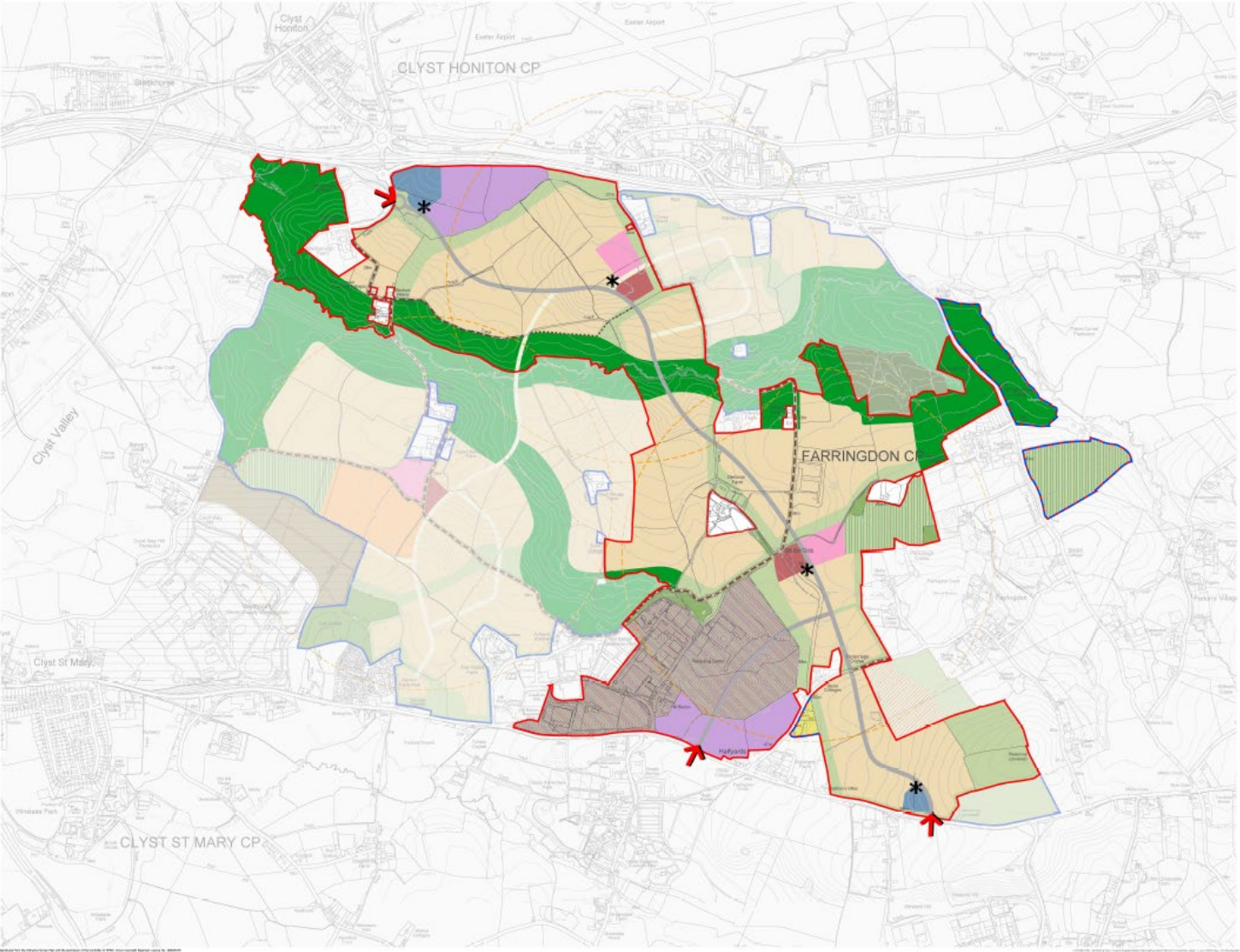
and Hill Barton Business Park, extends approximately 347 hectares. It is situated approximately 9km to the east of Exeter and is bordered to the north by the A30 and by the A3052 to the south with Exeter airport located just north of the A30. The strong transport connectivity makes it an excellent place to focus a new, internalised sustainable settlement.

1.2 The Proposed Development

Once fully constructed, the site will deliver approximately 136.31 hectares of new homes, 19.71 hectares of employment land and 2.76 hectares of mixed-used development, 4.02 hectares park and ride site, two primary schools, a Traveller site, 41.87 hectares of open space, and 62.93 hectares for SANG.

Figure 1 shows the concept plan of the proposed development.

Figure 1: Concept Plan, Option 1



This Energy and Carbon Strategy has been prepared to communicate the ambition of the Clients to deliver an exemplar new community which includes an Energy and Carbon strategy that fully supports national policy and specifically the sustainability and energy policies within the draft Local Plan. Given the timescales of development it is highly likely that the energy strategy will change over time as new technologies become available, one of the aims of the strategy is therefore to provide a framework for considering alternative options over time and for further development during any outline planning applications.

The Energy and Carbon Strategy provides an estimate of the construction and operational carbon emissions of the proposed development based on the following parameters: the exact areas will be subject to change as the design of the development evolves.

Table 1: Estimated Development Parameters

Use	Parameters
Homes	8,000
Employment	19.71 hectares
Mixed use	2.76 hectares
Education	2 x 2FE Primary

1.3 Document Structure

The following chapters sets out the energy strategy for the proposed development, setting out how the development will secure its energy requirement and aims to meet or exceed local and national energy and climate change related polices.

Chapter 1 Introduces the proposed development

Chapter 2 Sets out the local and national policy context for the development

Chapter 3 Considers the requirements of the Energy and Strategy

Chapter 4 Provides details on the Cranbrook Heat Network Extension and potential for Denbow

Chapter 5 Outlines the energy strategy for the proposed development.

Chapter 6 Includes a conclusion and summary.

Please note, the terms “carbon”, carbon dioxide (CO₂)” and “greenhouse gas (GHG)” are used interchangeably in this Strategy depending on the terminology of referenced document.

2. Policy Context

This chapter sets out the policy context for the proposed Energy and Carbon Strategy including key national and local policy and guidance for tackling climate change and mitigating greenhouse gas emissions in new developments such as Denbow.

2.1 National Policy

2.1.1 Climate Change Act

The **Climate Change Act 2008**¹ is the basis for the UK's approach to tackling and responding to climate change. It requires that emissions of carbon dioxide and other greenhouse gases are reduced and that climate change risks are prepared for.

In June 2019 the Government amended the Act to set a new legally binding target of net zero carbon emissions by 2050.

The built environment accounts for 25% of total UK greenhouse gas emissions², so reducing carbon emissions generated by building construction and operation will play a key role in meeting the UK's net-zero target.

2.1.2 Committee on Climate Change (CCC) Net Zero Report

The **Committee on Climate Change** (CCC) provides independent advice to the government on building a low carbon economy and preparing for climate change. The CCC's 2022 Progress Report³ assesses the UK's progress to Net Zero setting out recommendation to the Government to enhance progress. The 2020 recommendations include ensuring the Future Homes Strategy is implemented by 2025 and that phasing out of gas boilers is confirmed.

2.1.3 CCC UK Housing: Fit for the future?

The UK Housing: Fit for the future?⁴ Report assesses whether the UK's housing stock is adequately prepared for the challenges of climate change; both in terms of reducing emissions from UK homes and ensuring homes are adequately prepared for the impacts of climate change. Key findings from the report include that the UK's net zero target will not be met without near complete decarbonisation of the UK's building stock. Energy efficiency must be pursued alongside heat decarbonisation, and new build homes will have to meet higher standards to ensure they are fit for the future. Such standards include:

- Low carbon heating
- No new homes on the gas grid by 2025
- Higher levels of airtightness
- Triple glazed windows and external shading
- Passive cooling measures Mechanical ventilation and heat recovery

¹ Climate Change Act - <http://www.legislation.gov.uk/ukpga/2008/27/contents>

² UKGBC - [Climate change - UKGBC - UK Green Building Council](#)

³ [2022 Progress Report to Parliament - Climate Change Committee \(theccc.org.uk\)](#)

⁴ <https://www.theccc.org.uk/wp-content/uploads/2019/02/UK-housing-Fit-for-the-future-CCC-2019.pdf>

The fit for the future report also identifies that as we decarbonise heating and increase our reliance on renewable forms of generation, meeting electricity demand will face new challenges and will require buildings to have greater flexibility in energy demand away from peaks and towards periods when renewable energy is available. Some key enablers include:

- Greater fabric efficiency and thermal storage to enable shifting of heat demands
- Batteries to enable peak management for all demands associated with electricity use. Smart meters and smart appliances to enable smart control of heating and appliances
- Smart charging of electric vehicles to enable EVs to take advantage of off-peak periods, help to balance the frequency of the grid, and facilitate wider demand flexibility in homes, for instance by storing excess household power in the EV battery for use during high electricity grid demand

2.1.4 National Planning Policy Framework

The **National Planning Policy Framework (NPPF)**⁵ provides a framework for the development and application of locally prepared plans and the Government’s planning policies for England.

Paragraph 7 of the NPPF states that: ‘the purpose of the planning system is to contribute to the achievement of sustainable development’.

It states that to deliver sustainable development, the planning system must perform three distinct objectives, aligned to the three pillars of sustainability, which must not be taken in isolation and should be pursued jointly. This involves delivering economic and social benefits, as well as protecting and enhancing the environment.

The NPPF’s environmental objectives include both mitigating and adapting to climate change and supporting the transition to a low carbon economy.

⁵ [National Planning Policy Framework - GOV.UK \(www.gov.uk\)](https://www.gov.uk/government/publications/national-planning-policy-framework)

⁶ PPG - <https://www.gov.uk/government/collections/planning-practice-guidance>

⁷ National Design Guide - <https://www.gov.uk/government/publications/national-design-guide>

2.1.5 Planning Practice Guidance

Planning Practice Guidance (PPG)⁶ provides further advice on various planning issues associated with development, including those linked to sustainability and renewable energy and underpins the policies within the NPPF.

PPG is a material consideration in planning decisions and should be followed unless there are clear reasons not to. It sets out how local authorities should include policies that protect the local environment and strategies to mitigate and adapt to climate change and support developments that are functional and adaptable for the future.

2.1.6 National Design Guide

The **National Design Guide**⁷ published in October 2019 forms part of the PPG. It sets out the characteristics of well-designed places and explains what good design means in practice, including how development can contribute to climate change mitigation through greenhouse gas emissions reduction during both construction and operation.

2.1.7 Building Regulations (Future Homes and Buildings Standards)

Whilst not planning policy, the **Building Regulations** (and specifically Approved Document Part L: Conservation of Fuel and Power) set out the requirements for energy and carbon performance in new buildings.

Periodic updates to these national regulations will drive energy efficiency and carbon reduction improvements. Government has stated that developers will continue to have flexibility in how they meet carbon reduction targets; but that the emphasis is on using a “fabric first” approach.

Updated in June 2022 the latest Building Regulations Part L 2021 sets out the requirements for new buildings in response to the recommendations of the interim Future Homes Standard (FHS) and Future Buildings Standard (FBS) and the first step towards Net Zero Ready development and the full standards from 2025.

The 2025 FHS will ensure that new homes deliver a minimum 75% CO₂ improvement on Part L 2013 through a range of measures. From 2025, it is likely that new dwellings will utilise the following:

- An all-electric energy strategy for both heating and lighting;
- A very energy efficient fabric with double/ triple glazing
- Water and space heating provided by air/ ground source heat pumps
- Wastewater heat recovery
- Extensive use of solar PV
- High levels of air-tightness

The new standard will require buildings to use no fossil fuels, be 'zero-carbon ready', with the aim of reducing carbon emissions and helping to meet the UK's 2050 zero carbon target.

Meeting the FHS only requires housebuilders to address regulated energy only, unregulated energy and embodied carbon are not included within this policy. Delivering homes that only use electricity to heat and power the buildings means that as the carbon content of electricity approaches zero (as we approach 2050) then the homes effectively become net zero.

The Government considers that all new homes built to the FHS will be sufficient to meet our net zero commitment however key stakeholders (such as the Climate Change Committee and The Council) do not believe this standard is sufficient and so it is expected that further improvements to Building Regulations will be required post 2025.

The Future Buildings Standard (FBS) is being progressed alongside the FHS is likely to set a similar target for all non-residential development and is expected to follow a similar path, i.e., promotion of all-electric strategies with the use of heat pumps and Solar PV. Further consultation on this is also expected in time. In addition to the Part L updates, two new Building Regulations came into effect in June 2022, Part S and Part O.

New approved document Part S sets out guidance for electric vehicle (EV) charging infrastructure and specifies that EV charge points must be provided for each dwelling (or where the total number of parking spaces is less than each dwelling, all spaces should be provided with an active EV charging point). Any

remaining spaces must have cable routes for charge points to be installed. For non-residential car parks with more than 10 spaces, at least one active EV charge point must be provided, with cabling to the remaining 20% of spaces.

Part O sets out new requirements for mitigating overheating, specifying that residential developments must limit unwanted solar gains in the summer and provide means to remove heat. Compliance with part O can be demonstrated using two methods to demonstrate the risk of overheating from rising summer temperatures has been mitigated:

- Following a simplified prescribed glazing and free area ratio; or,
- Use of a Dynamic Simulation Modelling.

The FHS and FBS are highly relevant to the energy strategy for Denbow as they introduce substantial new requirements for homes and buildings that are mandatory.

2.2 Local Policy

2.2.1 East Devon Local Plan 2013 to 2031

The Local Plan, adopted in January 2016, sets out the planning policy through to 2031. While the Council is in the process of developing a new Local Plan, this is not due for adopting until 2024 and therefore this Plan may still be in place at the time of an application. Key policies therefore include:

Strategy 38 Sustainable Design and Construction – The policy encourages proposals for new development to demonstrate through a Design and Access Statement how:

- Sustainable design and construction methods will be incorporated, specifically, through the re-use of material derived from excavation and demolition, use of renewable energy technology, landform, layout, building orientation, massing, use of local materials and landscaping.
- The development will be resilient to the impacts of climate change.
- Potential adverse impacts, such as noise, smell, dust, arising from development are to be mitigated.

- Biodiversity improvements are to be incorporated. This could include measures such as integrated bat and owl boxes, native planting or green roofs.

Strategy 40 Decentralised Energy Networks – The policy requires new development with a floor space of at least 1,000m² or comprising ten or more dwellings to, where viable, connect to any existing, or proposed, Decentralised Energy Network in the locality.

Strategy 41 Allowable Solutions – Where on-site provision of renewable technologies is not desirable or appropriate, developments can meet requirements through contributing to ‘off site’ provision in the form of making ‘Allowable Solutions contributions’. Monies gathered will contribute to a ‘Community Energy Fund’ that will be used to pay for/contribute to energy conservation/renewable initiatives.

2.2.2 East Devon Local Plan 2020 to 2040 Preferred Options Reg. 18 Consultation Draft Plan

East Devon District Council is in the process of preparing a new Local Plan to cover the period 2020-2040. It will replace the existing plan that covers the period 2013-2031. Addressing the climate emergency is clearly a critical theme within the plan which is evident from the following draft policies. The Preferred Options Reg. 18 Consultation Draft Plan contains a number of draft policies which will likely need to be met by the development:

Draft Strategic Policy – Climate Emergency will require developments to support East Devon becoming carbon neutral by 2040, through delivering net-zero development, maximising opportunities for delivery of renewable energy, district heat networks, zero-carbon energy and energy storage facilities, and calculating the impact of embodied carbon and retaining existing buildings where possible.

Draft Strategic Policy – Net-Zero Carbon Development will require all new residential and commercial development to deliver net-zero carbon emissions. A “carbon statement” will be submitted to demonstrate how this will be achieved, in accordance with the energy hierarchy. Homes will also be future proofed to avoid temperature discomfort because of rising temperatures.

Opportunities for renewable energy will also be maximised and in-use energy performance will be kept as close as possible to design intent. Finally, major developments will be required to calculate the whole lifecycle carbon emissions using a nationally recognised Whole Life Cycle Carbon Assessment.

Draft Strategic Policy – Promoting renewables and zero carbon energy states that zero carbon and renewable energy schemes will be supported within the District. The Council will encourage the use of community-led schemes and support renewable and low carbon energy proposals where there are no unacceptable impacts to landscape, visual or residential amenity, noise, air, water, highways, health, biodiversity, the natural and historic environment, radar, telecommunications, or the safety of aircraft operations.

Draft Strategic Policy – Suitable areas for solar energy developments states that solar photovoltaic development will be supported in the identified solar energy suitable area, where there are no unacceptable impacts (as outlined above), and there is no direct conflict with any local plan policy that safeguards or allocates land for an alternative development.

Draft Strategic Policy – Energy Storage states that planning permission will be granted for energy storage facilities to help to achieve carbon neutrality and support renewable energy production and use subject to schemes not having adverse impacts on account of noise, environmental considerations, or amenity impacts, and not being in direct conflict with any local plan policy that safeguards or allocates land for an alternative development.

Draft Strategic Policy – Heat Networks will require all major development within 1km of an existing heat network to connect in order to secure planning permission. In addition, where no new heat network currently exists, a new heat network will be required for proposals above 1,200 homes or 10 ha of commercial floorspace.

Draft Strategic Policy – Embodied carbon requires all developments to demonstrate actions taken to reduce embodied carbon. Developers should retain existing buildings, or at least the foundations unless it can be demonstrated that refurbishment is either unviable or impractical. Replacement of existing habitable buildings with new developments will only

be supported in exceptional circumstances and will be required to demonstrate that the full lifecycle carbon emissions will be net-zero.

Draft Strategic policy – Walking, cycling and public transport states that new development should incorporate the principles of a “20-minute neighbourhood” either within the site at larger development, or through links to features outside the site for smaller development. Walking and cycling links should be prioritised in new development – such links should be coherent, direct, safe, comfortable and attractive. Cycle paths should be segregated from pedestrians to reduce the potential for conflict. New development should facilitate access to high quality public transport through its location, layout, and, where necessary, contributions to public transport services and/or facilities (e.g., bus stops, bus priority measures).

Draft Policy – Residential car parking standards will require all new residential development to provide Electric Vehicle Charging points in accordance with the Building Regulations 2010 (Part S of Schedule 1) and any other relevant latest Government guidance. Non-residential parking standards and policy is still being developed.

2.2.3 Climate emergency

East Devon District Council declared a Climate Emergency in July 2019, committing to becoming a carbon neutral Council by 2040. Their **EDCC Climate Change Strategy**⁸ sets out policies to achieve this and the **Climate Change Action Plan**⁹ has been produced to help the Council achieve its targets within a defined timescale and encourage others to follow a similar approach. The Plan will be updated every five years to reflect on the annual carbon reductions achieved.

2.3 Additional Guidance

In addition to local and national policy there are a number of emerging guidance documents which consider options for delivering Net Zero homes and buildings.

⁸ [East Devon District Council Climate Change Strategy](#)

⁹ [Climate Change Action Plan](#)

¹⁰ [2030 Climate Challenge \(architecture.com\)](#)

2.3.1 RIBA 2030 and London Energy Transformation Initiative (LETI) Standards

Within the last twelve months, RIBA and LETI have released their own energy performance standards addressing embodied carbon and both regulated and unregulated energy.

Embodied carbon generally contributes over 60% of a developments lifetime carbon emissions and is currently not part of mainstream national policy, although policies are starting to emerge in London, Bristol and Bath. To date the embodied carbon of development has largely been ignored, however the rise of climate issues has shone a light on the energy and carbon emissions taken in creating new materials. Materials such as concrete, steel, insulation and bricks take a lot of energy to manufacture and transport to site and as the efficiency of buildings continues to increase the embodied carbon proportion of a buildings lifetime emissions also increases.

The table below sets out the RIBA 2030 Challenge¹⁰ embodied carbon and operational energy performance targets for new housing (there are also commercial development targets).

Table 2: RIBA 2030 Challenge Targets

RIBA Metrics	Business as Usual	2025 Targets	2030 Targets
Operational; Energy (kWh/m ² /yr)	120 kWh/m ² /yr	<60 kWh/m ² /yr	<35 kWh/m ² /yr
Embodied Carbon (kgCO ₂ e/m ²)	1200 kgCO ₂ e/m ²	<800 kgCO ₂ e/m ²	<625 kgCO ₂ e/m ²

The LETI standard¹¹ for new housing includes:

- A space heating demand of 15kWh/m² (equivalent to PassivHaus)
- A total energy demand of 35kWh/m² – equivalent to the RIBA 2030 target
- Maximising onsite energy generation
- Best practice embodied carbon of <500 kgCO₂e/m² from 2020 and <300 kgCO₂e/m² from 2030. These exceed the RIBA 2030 challenge targets.

2.3.2 Delivering Net Zero Buildings – UK GBC Framework

The UK Green Building Council's (UKGBC) Net Zero Framework¹² sets out a framework to deliver net zero buildings via the implementation of two main steps: Net Zero Carbon Construction (NZCC), and Net Zero Carbon Operation (NZCO). For both NZCC and NZCO development is expected to reduce emissions as far as practical and then utilise high-quality offsets to mitigate residual emissions. No specific targets for NZCC have been set yet, however, to achieve NZCO, the framework recommends that for housing the LETI energy performance targets noted above are implemented.

The UKGBC Net Zero framework is now being used to support commercial B2/B8 development and drive net zero warehousing and employment uses.

2.4 Planning Policy Summary

National and local guidance sets out a clear need for development to tackle climate change, particularly to reduce carbon emissions.

Latest national planning policy and guidance confirms the Government's approach to sustainable development is being driven through the updates to the Building Regulations to ensure that new buildings are well designed and reduce emissions in line with the UK's national carbon targets. To achieve our national net zero target there is a clear need to decarbonise our housing sector, move away from gas and deliver highly energy efficient dwellings that deploy renewable energy and low carbon heat technologies.

Locally, East Devon District Council have declared a Climate Emergency and their Climate Change Strategy, Climate Change Action Plan and the Regulation 18 Local Plan clearly demonstrates the Council's commitment to using the planning process to promote the creation of sustainable new developments in the District.

¹¹ [252d09_3b0f2acf2bb24c019f5ed9173fc5d9f4.pdf \(leti.london\)](#)

¹² <https://www.ukgbc.org/ukgbc-work/net-zero-carbon-buildings-framework/>

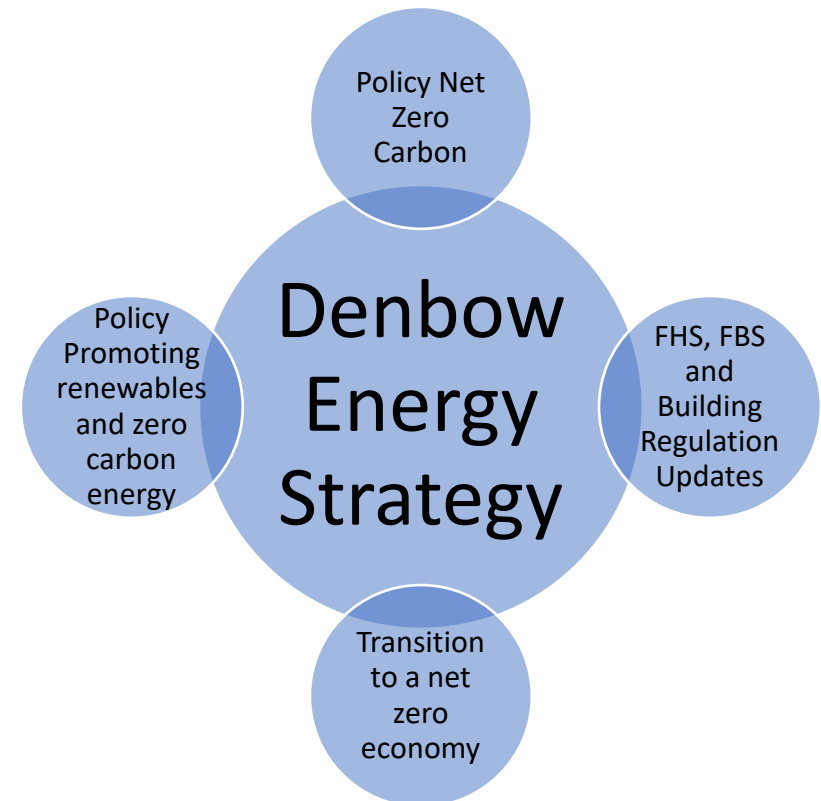
The draft Local Plan contains a range of evidence base documents which demonstrate how the proposed new settlement could support the net zero ambitions of the Council. It is evident therefore that the preferred new settlement option must take a proactive and robust approach to net zero and climate change.

Denbow is committed to delivering a development which fully supports the Council's net zero ambitions. It will deliver an ambitious strategy to mitigate the effects of climate change through reducing carbon emissions at both the construction and operational stages of development as well as provide workers and residents with the opportunities to live a highly sustainable, net zero lifestyle if they so choose. The following sections of this report set out how the development will incorporate a range of measures to reduce carbon emissions and deliver a new community that fully supports the transition to a net zero economy.

3. Requirements of the Energy and Carbon Strategy

Following the review of the Regulation 18 Local Plan, an energy strategy has been developed for Denbow that meets a range of local and national requirements outlined below:

- To demonstrate that sufficient energy can be supplied to Denbow to meet its projected demands and that this is both deliverable, viable and fully supportive of the **Draft East Devon Local Plan**.
- To demonstrate that the energy strategy will meet (and indeed exceed where possible) the renewable energy requirements of the draft strategic **Policies 'within the Regulation 18 Local Plan**
- To establish how the proposed development will comply with updates to the **Building Regulations** and the **Future Homes Standard and set a framework to go beyond this where viable**
- To demonstrate the unique characteristics of Denbow which create the potential for an expansion of the Councils district heating network at Cranbrook
- To explain how the proposals support the transition to a **net zero economy by 2050**.



4. The Potential for a Heat Network

4.1 Introduction

Strategic Policy 33 of the draft Local Plan requires all major development to connect to an existing heat network where they are located within 1km of the development proposals. In addition, where no new heat network currently exists, a new heat network should be deployed for proposals above 1,200 homes or 10 ha of commercial floorspace.

The Cranbrook New Community is one of the most high-profile settlements in England as a result of its active gas fired heat network. Buoyed by this success the Council has plans for further networks to the west around the Skypark and Exeter Science Park which includes new employment land and residential development.

To fund this ambition the Council has applied for, and been successful¹³, in receiving a grant from the Heat Network Investment Project (HNIP) to provide a connection to an Energy from Waste (EfW) plant (under construction) located at Hill Barton (within Denbow and Option 1) to expand the delivery of low carbon heat to the networks noted above and support the continued expansion of Cranbrook.

Figure 2 shows the potential location of the heat network infrastructure connecting the proposed EfW to the Cranbrook site to the North, provision will be included in the preparation of the masterplan for the heat network infrastructure.

¹³ [Some of Our Successful HNIP Funded Projects – GHNF \(tp-heatnetworks.org\)](https://tp-heatnetworks.org)

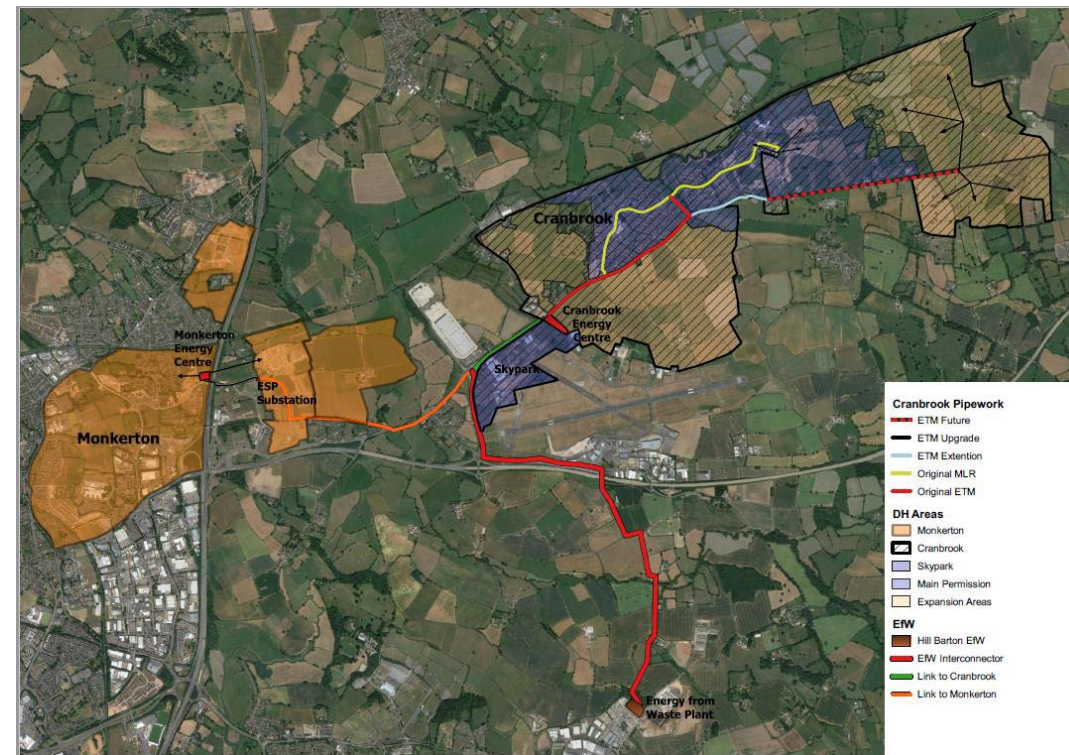


Figure 1: Heat network connection red line

4.2 Opportunities

The presence of the heat network extension and EfW within the proposed development provides a number of potential climate mitigation benefits which are unique to Denbow given the higher potential for the heat network in this area.

Heat for homes and businesses – The network could be utilised to provide heat for homes and new commercial spaces via a heat exchanger providing a heating and hotwater.

Carbon savings – While the burning of waste to generate energy does emit carbon emissions this is considered beneficial over the alternative of sending waste to landfill. Landfill waste emits methane which has a greater greenhouse impact over carbon, using it to generate energy can therefore provide a benefit. In terms of utilising this for the development however it would need to be considered alongside alternatives for the development which may also provide low carbon heat.

Innovative business opportunities – The presence of the heat network could provide opportunities to support innovative businesses. For example, supporting sustainable food production industry by locating greenhouses or aquaculture based growing enterprises along the heat network to facilitate the growth of foods from tropical/ Mediterranean climates.

4.3 Future Considerations

While there is clearly the potential for a heat network at Denbow, further detailed feasibility studies will be required to confirm the commercial and technical viability and that any heat work will result in significant reductions in

¹⁴ https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/424254/heat_networks.pdf

Figure 3 - Innovative heat use

Zero Carbon Farms Ltd¹ is a UK-based AgTech company building and operating Controlled Environment Farms using 90% less water and a small percentage of space compared to conventional farming. Their first working farm in Clapham, London utilises a disused air raid shelter 33 metres underground and stocks major UK retailers including Marks and Spencer, Waitrose and Ocado. The farm is powered using 100% renewable energy to grow crops and is a certified carbon neutral+ organisation meaning they are net carbon negative, offsetting more emissions than they emit.

The Netherlands has glasshouses that can cover up to 175 acres and save 90% water use compared with open fields. Greenport West-Holland² is a world-leading innovator of greenhouse horticulture supplying customers worldwide with high-quality flowers and plants.

carbon emissions. The clients have, at a strategic stage, considered some of the issues which will need to be addressed further as part of detailed feasibility studies.

Viability - The implementation of a heat network includes capital costs for the pipework infrastructure which can range from £800/m to £1,200/m¹⁴, as well as costs for the installation of a heat interface unit in each building, although this is offset against the cost of an alternative heating unit, e.g., heat pump and is likely to be comparable. The pipework costs can potentially be met by third parties, for example at Cranbrook the initial network was funded in part by the HNIP programme, Council and Eon (in lieu of an S.106 obligation).

Given the location of the EfW and heat network infrastructure within the site at this stage it is clear that Denbow has unique characteristics that increase the potential for the deployment of a heat network. This will however need to be considered as the design of the development moves forward against other emerging technologies and options. This includes considering the viability and technical feasibility of connection, fuel security and protecting residents from higher fuel bills, as well as consideration of the long-term carbon impacts of the network and measures required to decarbonise the system and emissions compared to alternative options.

In addition to connection to the network consideration will be given to how employment uses can be clustered around the infrastructure and businesses encouraged which may have a high heat demand.

5. Outline Energy and Carbon Strategy for Denbow

This section describes the proposed energy and carbon strategy for Denbow which will implement local policy requirements and fully support National Net Zero ambition and the Council's 2040 Carbon Neutral objective. The strategy demonstrates how residential and non-residential buildings will reduce energy demand and carbon emissions.

5.1 Introduction

This section sets out the energy strategy that Denbow will adopt to meet national and local policy requirements and create a new settlement that fully supports the transition to a net zero economy.

The specific policies and regulations which Denbow must meet include:

- Meeting the requirements of **Draft Strategic Policy Climate Emergency**, requiring developments to support East Devon in becoming carbon neutral by 2040, and **Draft Strategic Policy Net-Zero Carbon Development** which requires all new residential and commercial development to deliver net-zero carbon emissions, maximise opportunities for renewable energy and calculate whole life carbon emissions.
- Meeting the requirements of **Draft Strategic Policy Heat Networks** requiring major development to connect to an existing heat network within 1km of the proposals or deploy a heat network for proposals above

1,200 homes or 10 ha of commercial floorspace, where one does not already exist.

- The **Future Homes/Building Standard** which is being introduced in 2025.
- Meeting the requirements of the draft sustainability policies in the Regulation 18 Local Plan

For a development of this scale and significance, it is also important to demonstrate how it will align with the wider UK's requirement to be net zero carbon by 2050 and the climate emergency declared by the East Devon District Council. The Council and the development consortium for Denbow recognise the huge opportunity to create a highly sustainable new settlement which embraces current and future technology to facilitate a net zero carbon lifestyle.

From the outset it is important to recognise that Denbow may take more than 30 years to be delivered, and during this time it is inevitable that there will be huge advances in policy, legislation and technology which will directly influence the construction of new homes, buildings and infrastructure. This energy strategy will therefore evolve over time to embrace these new technologies and opportunities to create an even more sustainable settlement. Furthermore, construction of the dwellings at Denbow are unlikely to commence before 2025 meaning that all buildings will have to meet the full Future Homes and Building Standard as a minimum.

The Council will likely require revised energy strategies to be submitted with Reserved Matters applications to ensure that there is positive evolution over time to match the scale of ambition from the Council and landowners.

Key Principles of the Energy and Carbon Strategy

Based on the policy review in **Section 2** several key principles have been developed to guide the energy strategy. These are:

- Consideration of carbon emissions from both construction and operation of the development.
- Consideration of available low carbon infrastructure, including the Cranbrook Heat Network extension and provision of heat from the onsite EfW.
- The strategy must be flexible to respond to the inevitable changes in technology and policy over the construction period
- The strategy will set a series of key principles and parameters which will guide each landowner and future applications.
- The use of 'smart' technology and innovation will be integral to the energy strategy
- The need to deliver energy efficient homes that minimise energy use and therefore fuel bills is key; and
- The strategy must respond positively to local policy and be wholly supportive of the transition to a net zero economy.

5.2 The Energy and Carbon Strategy

These sections set out the proposed Energy and Carbon Strategy for Denbow, including how the development aims to tackle embodied carbon, operational energy and carbon, as well as a number of specific targets for particular elements of the development.

5.2.1 Construction Carbon

Strategic Policy 34 of the draft Local Plan includes a requirement for new development to calculate Whole Life Carbon and consider the embodied carbon.

The embodied carbon of buildings can account for over half of a building's lifetime emissions¹⁶, it is therefore a key area to consider in reducing the carbon emissions from development.

The embodied carbon of development includes carbon emissions from the manufacture and installation of materials in construction.

As part of the detailed design of new homes a Life Cycle Assessment (LCA) will be carried out to estimate the embodied carbon of proposed house types. The assessment will consider measures to reduce embodied carbon, including:

- Lean design to minimise materials use.
- Use of natural materials which sequester carbon such as timber.
- Specification of low carbon materials, for example steel and concrete with recycled materials content.
- Use of local supplies and labour where feasible.
- The use of Modern Methods of Construction including off-site prefabrication of building elements.

Given that embodied carbon contributes so significantly to developments overall lifetime emissions consideration has been given to available guidance on targeting reductions in embodied carbon. In that context the development

¹⁶ Royal Institution of Chartered Surveyors (RICS) (2017). Whole life carbon assessment for the built environment RICS professional statement, UK.

proposes to meet the embodied carbon targets set out in the RIBA 2030 challenge set out below.

Table 3: RIBA 2030 Embodied Carbon Targets

RIBA Metrics	Business as Usual	2025 Targets	2030 Targets
Domestic / Residential Targets	1200 kgCO ₂ e/m ²	<800 kgCO ₂ e/m ²	<625 kgCO ₂ e/m ²
Non-domestic / Office Targets	1400 kgCO ₂ e/m ²	<970 kgCO ₂ e/m ²	<750 kgCO ₂ e/m ²
Non-domestic / School Targets	1000 kgCO ₂ e/m ²	<675 kgCO ₂ e/m ²	<540 kgCO ₂ e/m ²

Based on these targets **Table 3** below shows the estimated embodied carbon of the proposed development and how this will reduce over time.

Table 4: Estimated Embodied Carbon

	Business as Usual	2025 Targets	2030 Targets
Embodied Carbon (tonnes CO ₂ e)	966,392	644,971	503,790

5.2.2 Operational Energy and Carbon

The strategy has been developed in accordance with the principles listed above and via the application of the ‘Energy Hierarchy’.

When considering the energy strategy for a new development it is a best practice approach to apply the principles of; lean, clean and green, respectively. ‘Be Lean’ refers to reducing energy use through increasing fabric efficiency and passive design measures. ‘Be Clean’ reflects the provision of energy efficient building services. Finally, ‘Be Green’ involves the provision of means to produce on-site low carbon renewable energy.

This report will also address the opportunity around smart energy management and flexibility in energy demand as identified in the ‘UK Housing: Fit for the future?’ report.

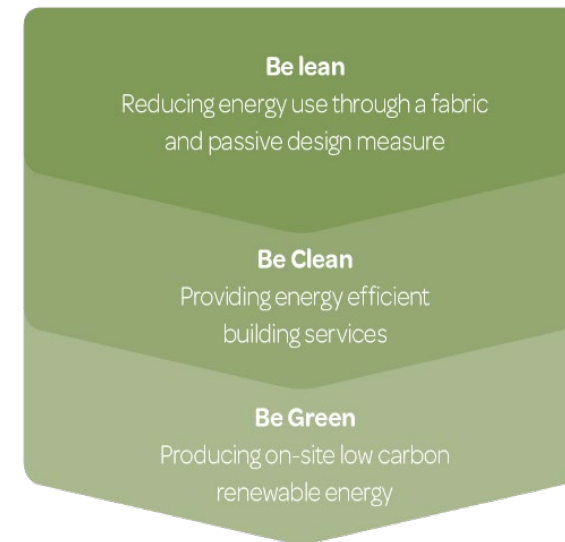


Figure 4: The Energy Hierarchy

Delivering Lean (energy efficient) buildings at Denbow

The Lean stage refers to reducing energy demand at source from the buildings and infrastructure. The primary method to reduce energy demand is by using good fabric standards and reducing air permeability of the buildings. The emerging Local Plan does not set any specific requirements for fabric for new

buildings however the forthcoming FHS and FBS do set much higher fabric targets when compared to the 2013 building regulations. Given that construction of new dwellings and buildings is unlikely to commence before 2025, it is reasonable to conclude that all buildings at Denbow must meet the full FHS and FBS as a minimum from the outset and strive to go beyond these where viable in order to deliver net zero buildings.

While the exact details of the full FHS and FBS has not yet been confirmed, preliminary information from the government provides an indication of the anticipated u-values and air permeability that will be needed which are set out in **Table 4**.

Table 5: Likely U Values and air tightness for the dwellings at Denbow

Building element	Part L 2013	Part L 2021	FHS 2025	% ↓
Wall (W/m ² K)	0.18	0.18	0.15	17%
Roof (W/m ² K)	0.13	0.11	0.11	15%
Floor (W/m ² K)	0.13	0.13	0.11	15%
Windows (W/m ² K)	1.4	1.2	0.8	43%
Air permeability (m ³ /h. m ² @50Pa)	5	5	3*	40%

*Assumed

U-values measure how effective a material is an insulator. U-values are measured as the rate of transfer of heat through a structure divided by the difference in air temperature (W/m²K). A lower U-value indicates a better insulated structure and less heat loss. Air permeability is used to measure the airtightness of the building fabric. It is defined as air leakage rate per hour per m² of envelope area at a pressure of 50 Pascal (m³/h. m²@50Pa). Air leakage is the uncontrolled flow of air through gaps in the fabric of a building (sometimes known as draughts). In the summer air leakage can cause issues with bringing warm, humid air into buildings, in the winter, it can result in condensation, mould and rot. The benefits of higher air tightness include less heat loss,

reduced carbon emissions, lower bills, reduced condensation, fewer defects, and improved comfort.

The application of the values specified in **Table 4** from the outset will result in all buildings being constructed with a highly efficient building fabric that will reduce heating demand (and therefore energy requirements) substantially.

All non-domestic buildings will also meet the full FBS however there is little information available with respect to the fabric standards and requirements and so these have not been listed here. It is anticipated however that these will be similar in ambition to those for the FHS.

In both cases this standard of fabric performance will be significantly better than that currently required by the 2013 Building Regulations (as demonstrated in **Table 4**) and represent a reasonable estimate of the optimal balance of cost and performance. Should development at Denbow occur, it is likely that this will occur beyond 2025 and therefore the clients will explore the commercial and technical viability going beyond the FHS and FBS. It is important to note however that meeting both the FHS and FBS as a minimum will meet the strategic objectives of the draft Plan and provide a clear framework for the achievement of net zero dwellings.

Delivering Clean Energy to Denbow

As noted in **Section 4** the presence of the Cranbrook Heat Network extension provides a unique opportunity for the development and the clients are committed to working proactively with the Council and exploring the feasibility of creating a network in some form. It will be important to examine alternative energy supply options as well either instead of or to supplement any heat network.

Alternative Options

The most likely alternative or complimentary solution at this stage is the use of an all-electric strategy utilising heat pumps to deliver heating and hot water.

Heat pumps take a low-grade source of heat, normally air, ground, or water,

and use electricity to upgrade it to a temperature that can provide heating and hot water. Recent analysis by the CCC has focused predominantly on heat pumps as one of the leading low-regret low-carbon heating options, especially in new homes where the system can be designed optimally for the property and the costs of connecting to the gas grid can be avoided. Heat pumps can deliver several units of useable heat for each unit of electricity used. This coefficient of performance (CoP) improves as the temperature of the heat provided reduces. This favours new development such as Denbow, where the high thermal efficiency will enable heating to be very low temperature. (There may be exceptions in non-domestic elements with large volume spaces.)

Because heat pumps use electricity, they are already much lower carbon than main gas systems. Crucially, they also have a clear pathway to being net zero, because the electrical grid is projected to reduce in carbon intensity to zero by 2035 (See Figure 5). It is expected that air source heat pumps will provide the vast majority of thermal demand at Denbow.

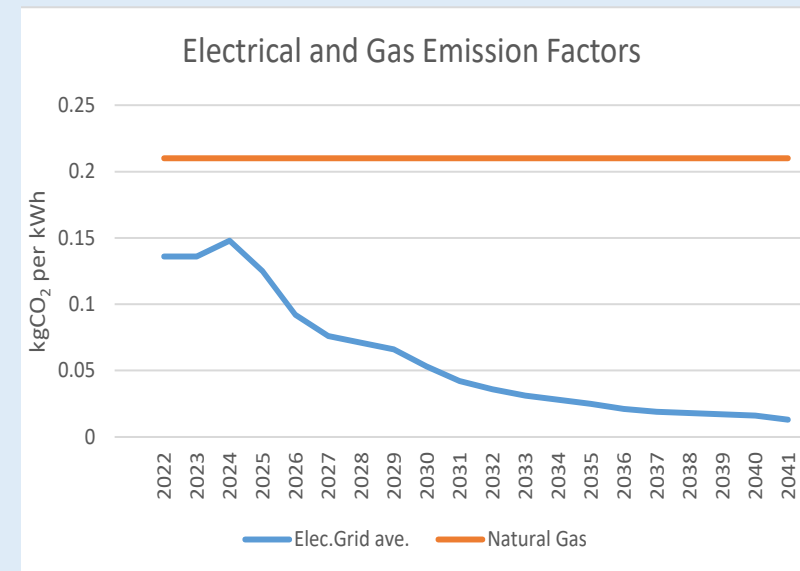
Delivering Green Energy to Denbow

This aspect considers the provision of renewable energy on-site at both a strategic and individual building level. There is a strong policy requirement for the use of renewable energy technologies across Denbow. Draft Policies Climate Emergency and Net Zero Carbon Development require opportunities for renewable energy to be maximised. Furthermore, there is a strong commitment from the developers of Denbow to use renewable energy technologies where commercially and technically viable. At Denbow renewable energy technologies can be installed at a strategic scale and at an individual building level. Further to the proposed EfW within the site options have been considered to provide additional renewable electricity, including:

- Solar power
- Wind power

Figure 5 – Decarbonisation

The UK government has committed to decarbonising the grid by 2035, 15 years earlier than the previous commitment to a fully decarbonised power system by 2050 set out in the Energy White Paper¹. Progress has already been made, with grid emissions falling by 44% while GDP rose by 76.4%¹ between 1990 and 2019. Decarbonisation of the electricity grid means that an all-electric development will be virtually net-zero in operational carbon emissions by 2035. (see graph below)



Wind Power

Wind turbines are a cost-effective method of renewable energy production. Large turbines are not viable for Denbow because of the large clear area they require and issues of noise, visual impact and shadow flicker.

Building mounted or micro turbines are now very rarely employed due to their low performance and issues around noise and vibration.

Solar Power

Solar power is a cost-effective method of renewable energy production in the UK. Systems are scalable from those suitable for individual homes that are a few kilo-Watt peak to utility scale systems that are hundreds of MegaWatts

It is likely that the Future Homes Standard will make solar power one of the easiest and most viable means to achieve compliance through the generation of renewable electricity.

Even with the connection of homes to a heat network it is likely that all new homes may require the use of Solar PV to meet the requirements of the FHS, this could require between 2.5kWp (for a mid-terrace home) and 4.5kWp (for a large, detached home). Of PV overall this may equate to a total PV deployment across Denbow of c.24MWp which is a substantial figure.

In the non-domestic elements, it is likely solar power will be more variable with deployment being matched to on-site demand patterns to optimise its use.

Large Scale Solar Array

A potential area has been identified within the masterplan for Denbow for a large-scale array within the eastern area of the site. Typically, it is possible to install around 1MW of Solar PV on 5.5 acres of land. The area identified is estimated to be circa 4MW in scale and would, if feasible, help generate additional onsite renewable energy.

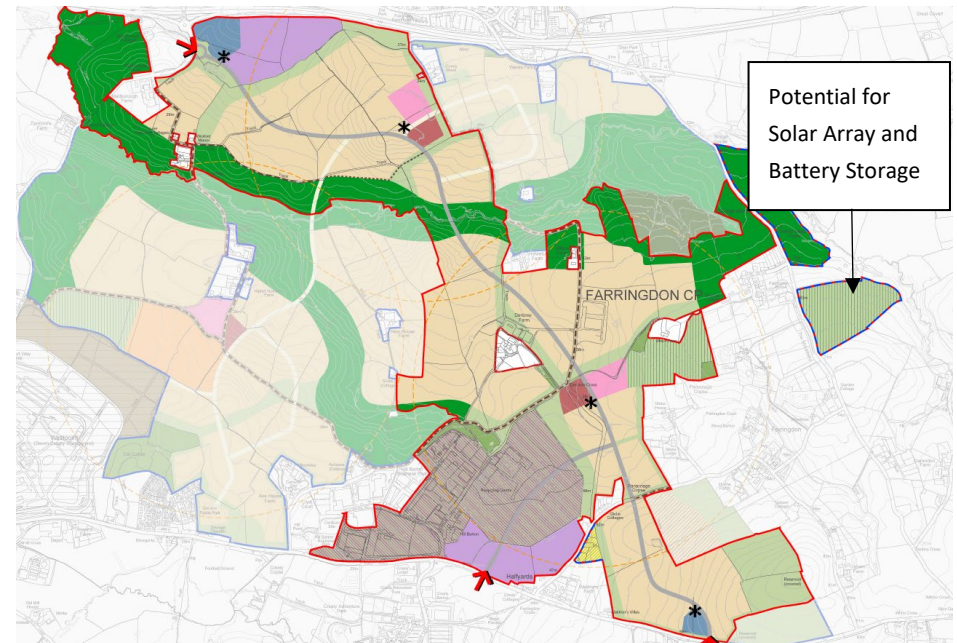


Figure 2: Site renewable energy infrastructure

5.2.4 Smart Energy Management

It is widely recognised that in our journey to a net zero economy we not only need to generate far greater quantities of energy from renewable sources, but we also need to manage the energy we use in a smarter, more efficient manner.

Smart energy management at Denbow will be deployed over time and may take the form of large scale (such as batteries) or stand-alone energy storage systems to individual homes. These systems manage key energy demand and supply such as hot water storage, electric vehicle charging and solar power to choose when energy is consumed and even occasionally supplied back into the grid.

Energy Storage at Denbow

Draft Strategic Policy 32 permits the deployment of energy storage technology within East Devon provided there are no significant environmental impacts. At the energy strategy for Denbow will explore a range of energy storage options at both a strategic and building specific scale. These options may take the form of large battery technology and at a building level:: hot water tanks, stand-alone batteries and electric vehicles.

Homes with dedicated car parking will have an electric vehicle charging point, with two-way capability, enabling the vehicle to be charged when renewable energy is cheap and plentiful and discharged into the home or even the electrical grid when required.

Stand-alone batteries may perform a similar function, where they may be used by buildings to store grid electricity or excess solar power generation and discharge at the most beneficial time. Large scale battery storage could be co-located with a Solar Array or adjacent to the main site substation.

The feasibility of smart energy systems will increase rapidly over the construction timeline of Denbow and so the use of these systems will be considered in detail by each of the landowners and the feasibility of installation reported during future planning applications.

For non-domestic development, smart energy systems are already deployed in buildings across the UK and will be considered for use within Denbow.

Time of Use Tariffs

Time-of-use tariffs use different prices to encourage consumers to use electricity use at different times of day when electricity is available more cheaply. This can help to balance out energy demand throughout the day and support the transition to a more flexible and sustainable electricity system.

The inclusion of smart metering and energy storage will enable residents at Denbow to make better use of time-of-use tariffs, reducing the money spent on energy bills and helping to support the transition to net zero by 2050.

5.2.5 Renewable Energy Tariffs

The market now makes available a range of certified renewable energy tariffs for business and the public. Through the use of these people are able to operate Net Zero. As part of the development new homes and buildings will be provided with a renewable energy tariff as part of handover packages to enable them to live and operate Net Zero.

5.3 Energy and Carbon Targets

As noted above as a minimum the homes and buildings proposed as part of the development will meet the requirements of the FHS and FBS as a minimum following the Government's pathway to delivering Net Zero and Net Zero Ready buildings. In addition, a number of additional targets are proposed, including:

- Development to target the RIBA 2030 challenge embodied carbon targets.
- New commercial employment uses (B2/B8) to deliver Net Zero development in line with the UKGBC Net Zero framework.
- New community buildings and Schools to also be designed to be Net Zero.

It is likely that from 2030 buildings will go beyond the requirements of the FHS and FBS as regulations and technologies change, the objective of the strategy is to be flexible and able to respond to such changes and each phase of development will review the Energy and Carbon Strategy and update proposals as necessary.

5.4 Summary

In summary, Denbow has developed a concept energy and carbon strategy that meets the principles identified by East Devon District Council and the draft Strategic policies within the Regulation 18 Local Plan. The strategy can be summarised as follows:

- Detailed feasibility of a heat network on site which connects to the Cranbrook Heat Network extension and EfW plant within the site.
- Assessment of embodied carbon targeting the embodied carbon reductions set out in the RIBA 2030 challenge.
- Buildings to embrace the full FHS /FBS standards from the start as a minimum, utilising high levels of fabric efficiency and passive design measures to minimise energy demand from the outset.
- Extensive deployment of Solar PV across all buildings and consideration of a Solar Array as part of the development.
- Smart energy capable, including consideration of battery storage as part of homes, buildings or within the site's energy infrastructure.
- Energy and carbon targets for specific elements of the development including construction of B2/B8 commercial development in accordance with the UKGBC Net Zero Framework and commitment to Net Zero educational and community facilities.
- A strategy that is flexible that will allow it to evolve with technology and policy over the construction period considering alternative options, for example an all-electric strategy and use of heat pumps to provide heat to the buildings.

Each development plot within Denbow will develop its own energy strategy that meets with these principles but may evolve with different focus areas and technologies over time.

6. Conclusion

This Energy and Carbon Statement has been prepared to demonstrate how the proposed energy strategy for Denbow is fully supportive of the transition to a net zero economy and meet the emerging policies of the draft Local Plan.

East Devon District Council recognises the importance of delivering the New Town with an ambitious energy strategy that fully supports the transition to net zero economy whilst delivering the energy efficient homes and jobs that are required. This ambition is fully supported by the Denbow new community.

Early in the design of Denbow, a series of principles have been identified to guide the energy strategy for Denbow which are:

- Denbow should have a clear route to net zero.
- The development should consider the potential of the Cranbrook Heat Network Extension given its location with the site boundary.
- The strategy must be flexible to respond to the inevitable changes in technology and policy over the construction period.
- The strategy will set a series of key principles and parameters which will guide each landowner and future applications.
- The use of 'smart' technology and innovation will be integral to the energy strategy.

- The need to deliver energy efficient homes that minimise energy use and therefore fuel bills is key.
- The strategy must respond positively to local policy and be wholly supportive of the transition to a net zero economy.

With these principles in mind a concept energy strategy has been developed which recognises that:

- At this stage of the proposed allocation there is still considerable design work required to allow the formulation of a more detailed energy strategy.
- There will be considerable changes in policy and technology over the construction period of Denbow and the strategy must be flexible enough to accommodate this.
- The proposed approach will need to consider the implications of the strategy compared to alternative options, considering the technical feasibility and viability of alternatives, as well as the long-term carbon impact of systems to ensure the development does not emit more carbon that is necessary.

Using the principles established, a concept energy and carbon strategy has been developed which can be summarised as follows:

- Commitment to assessing the embodied carbon of development and meeting the RIBA 2030 Challenge embodied carbon targets.
- To embrace the full FHS /FBS standards from the start as a minimum recognising that these will likely improve over time and homes from 2030 will likely go beyond these requirements.

- High levels of fabric efficiency and passive design measures to minimise energy demand from the outset.
- Provision of low carbon heat, at this stage exploring the viability of connection to the Cranbrook Heat Network via the EFW plant at Hill Barton
- Consideration of alternative options energy supply options that may supplement or replace a heat network such as an all-electric strategy
- Extensive deployment of solar PV across buildings and homes.
- Smart energy capable.
- Commercial employment areas (B2/B8) to meet the UKGBC Net Zero framework requirements to deliver Net Zero development.
- Commitment to delivering Net Zero community buildings and schools.

Through these measures the strategy proposed meets all of the requirements of the emerging policies within the draft East Devon Local Plan.

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