Colchester City Council's

Climate Change SPD

Contents

Contents

Glossary

Carbon dioxide (CO2)
A gas in Earth's atmosphere. It occurs naturally and is also a by-product of human activity such as burning fossil fuels and land-use change. It is the principal anthropogenic greenhouse gas.

Carbon dioxide equivalent (CO2e)
CO2e (carbon dioxide equivalent) is the metric measure used to compare the emissions from various greenhouse gases on the basis of their global-warming potential (GWP).

Climate
Average weather and its variability over a period of time, ranging from months to millions of years. The World Meteorological Organization standard is a 30-year average.

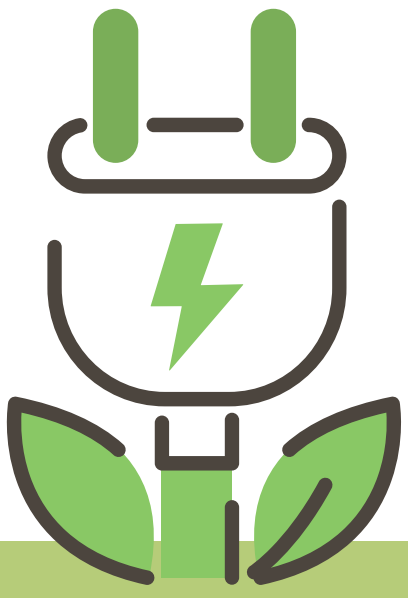
Climate change
A change in the climate's mean and variability for an extended period of decades, or more.

Fossil fuels
Biomass lain down in the Earth millions of years ago, such as coal, oil, and natural gas, which when burnt produce carbon dioxide.

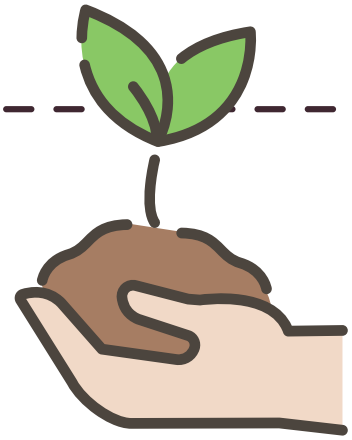
Global warming
A rise in the Earth's temperature, often used with respect to the observed increase since the early 20th century.

Greenhouse gases
Gases in the atmosphere, which absorb thermal infra-red radiation emitted by the Earth's surface, the atmosphere and clouds e.g. water vapour, carbon dioxide, methane and nitrous oxide.

SuDS management train, or treatment train
The management train concept promotes division of the area to be drained into sub-catchments with different drainage characteristics and land uses, each with its own drainage strategy. Dealing with the water locally not only reduces the quantity that has to be managed at any one point, but also reduces the need for conveying the water off the site. The management train starts with preventing run-off.

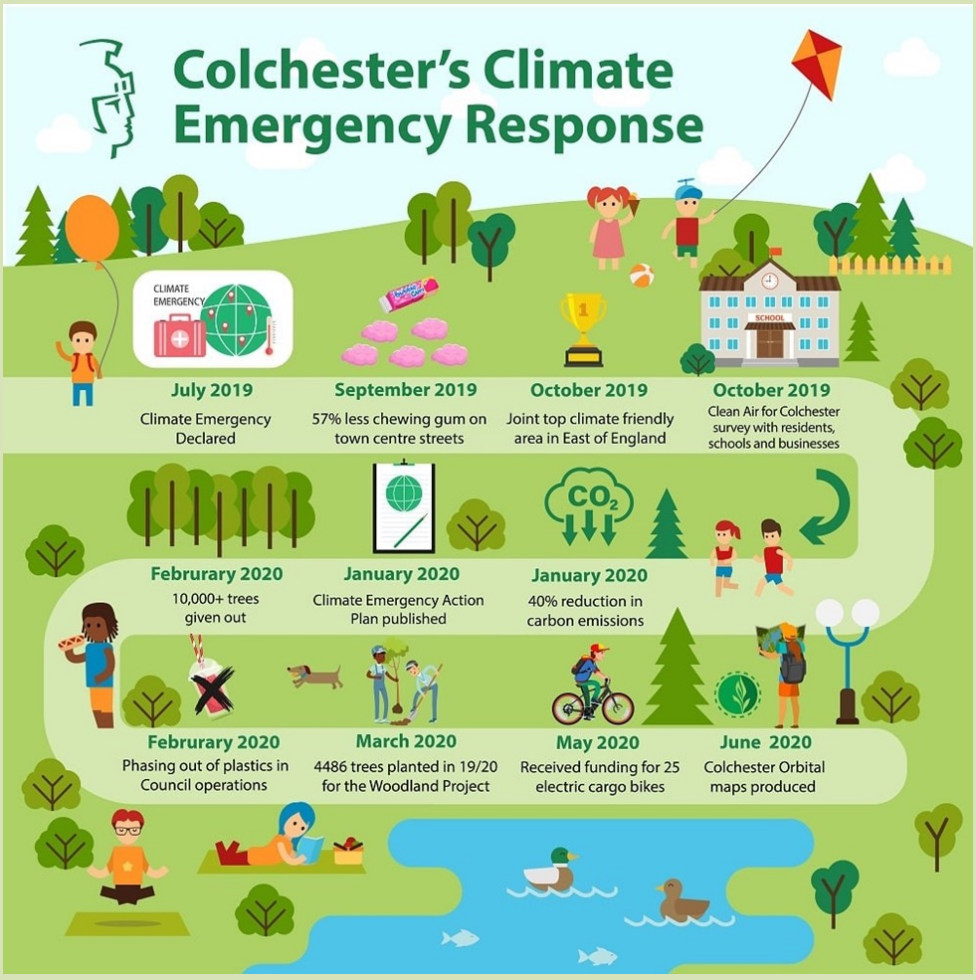


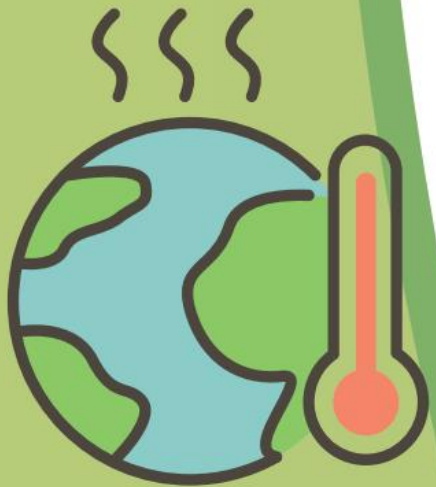
Chapter 1: Introduction

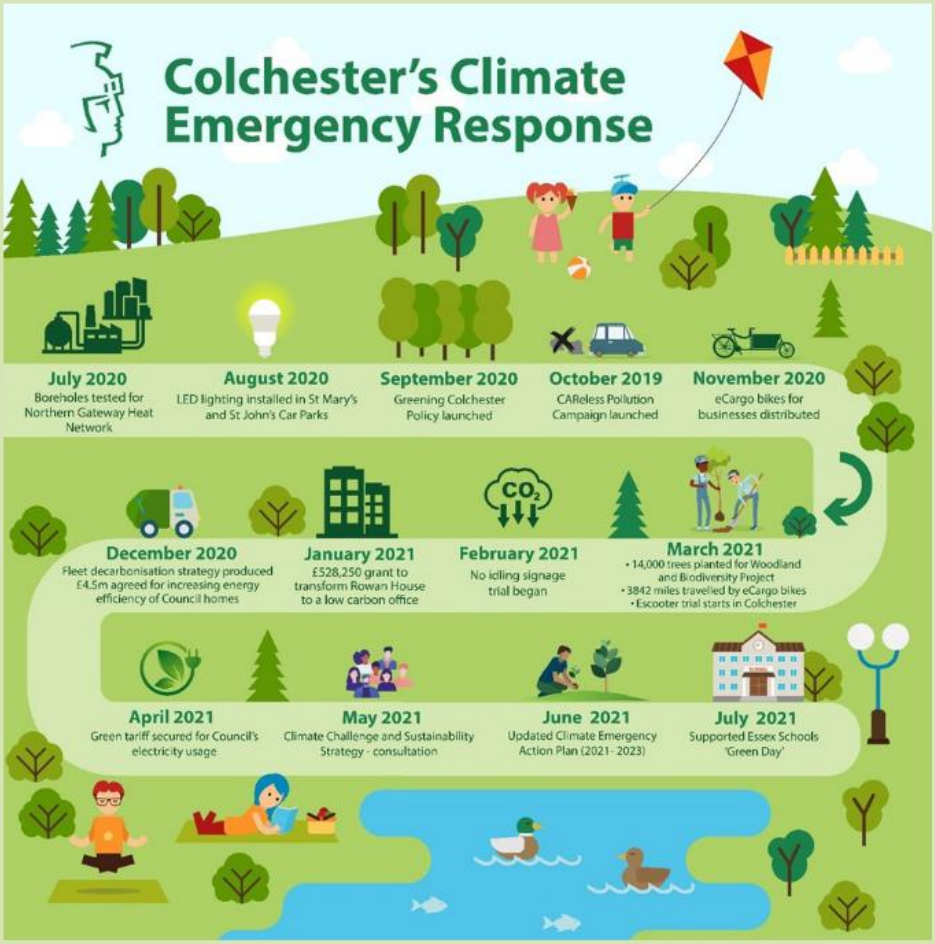


Climate change is a global issue affecting everyone. Co-ordinated action from all sectors, national and local governments, and individuals is needed to mitigate and adapt to climate change. The science tells us that to avoid catastrophic effects we need to limit the increase in global temperature to 1.5oC. Mitigation measures are required to significantly reduce greenhouse gas emissions and limit global temperature rise. However, even with efforts to limit the cause of global warming, further climatic changes are inevitable in the future and the UK will need to adapt to the growing risks from climate change.

Colchester City Council declared a climate emergency in 2019 and since then have carried out numerous pieces of work across the organisation and city to respond to the climate emergency. The infographics, below, highlight the key areas of work in 2019/20, 2020/21 and 2021/22.






Colchester's Climate Emergency Response
July 2020
Boreholes tested for Northern Gateway Heat Network
August 2020
LED lighting installed in St Mary's and St John's Car Parks
September 2020
Greening Colchester Policy launched
October 2019
CAReless Pollution Campaign launched
November 2020
eCargo bikes for businesses distributed
December 2020
Fleet decarbonisation strategy produced £4.5m agreed for increasing energy efficiency of Council homes
January 2021
£528,250 grant to transform Rowan House to a low carbon office
February 2021
No idling signage trial began
March 2021
• 14,000 trees planted for Woodland and Biodiversity Project
• 3842 miles travelled by eCargo bikes
• Escooter trial starts in Colchester
April 2021
Green tariff secured for Council's electricity usage
May 2021
Climate Challenge and Sustainability Strategy - consultation
June 2021
Updated Climate Emergency Action Plan (2021-2023)
July 2021
Supported Essex Schools 'Green Day'


Colchester's Climate Emergency Action 2021-2022
August 2021
Launch of the social media A-Z waste reduction campaign
September 2021
9% increase in engine switch offs through CAReless pollution campaign
October 2021
Castle Park, Highwoods Country Park and Colchester Cemetery and Crematorium all get green flag awards!
November 2021
Electric refuse collection vehicle trialled
December 2021
Home Burning campaign launch to raise awareness of air pollution from stoves/fire.
March 2022
7170 trees planted over planting season with over 400 volunteers | Launch of first litter picking hubs in Colchester for 'on the go' litter picking | 4 Smart waste bins announced for Dedham as pilot
February 2022
Over 50 people in Colchester received free bike training from Essex County Council
January 2022
Council's Climate Emergency Action Plan rated as 2nd best in Essex | 3 EV chargers installed in Priory Street Car Park – First in CBC owned car parks
April 2022
Careless pollution campaign 'highly commended' in Edie Sustainability Leader Awards | Signage produced by schools to explain no mow areas
May 2022
Community Cycle project to repair and rehome old bikes restarts
June 2022
Six electric vans purchased – The start of the Council's fleet transition
July 2022
Council supports 11 schools as part of Essex Schools Green Day!

We are in a climate and ecological emergency – the time to act is now

The Council is drafting 3 Supplementary Planning Documents (SPDs) to communicate Colchester City Council's ambitions for all development within the city. SPDs are material considerations in planning decisions. They build on adopted planning policy and provide guidance on how policy requirements should be implemented. The 3 climate emergency SPDs build on the adopted Local Plan and explain how development proposals should respond to the climate and ecological emergency. The SPDs are: Active Travel, Biodiversity, and Climate Change. All development proposals should strive to achieve ambitious carbon reductions, biodiversity enhancement and promotion of active travel to contribute towards Colchester becoming a greener city that is resilient to the climate and ecological emergency.

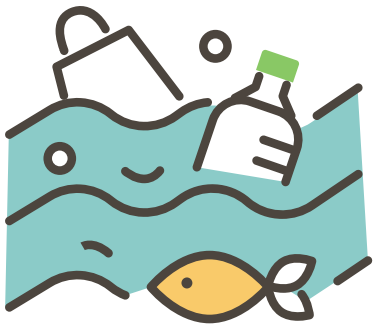
The 3 climate emergency SPDs will bring multiple benefits including benefits to health and wellbeing. A healthy environment plays a role in improving health and wellbeing. Many of the actions proposed in the 3 SPD's will also achieve health benefits for our communities. An increase in active travel will lead to more walking and cycling. More energy efficient homes will be good for people's wellbeing and reduce heating costs. An increase in biodiversity and green infrastructure is good for people's mental wellbeing.

This is the Climate Change SPD. It aims to clearly set out the principles the Council expects to ensure that development proposals respond to the climate emergency by delivering sustainable buildings, which are highly energy efficient, include renewable energy and combine green infrastructure. This SPD is ambitious and explains how applicants can successfully integrate a best-practice approach towards the climate emergency in their development proposals.

Chapter 2 of the SPD sets out the background and context and provides a summary and links to relevant reports. Chapter 3 sets out the Colchester context. It includes relevant Local Plan policies and discusses Colchester City Council's climate emergency declaration. Chapter 4 includes guidance on Improving Layout and Building Design. Topics covered in this chapter include passive design, building orientation and massing, overshadowing, windows, building fabric and materials, ventilation and air tightness, reducing overheating, working from home space, and green-blue infrastructure. Chapter 5 provides advice on renewable and low carbon energy. The Council's ambition is that development should be fossil free and residual energy demand for heating, hot water and other uses is met from renewable or low carbon energy sources. Chapter 6 explains the LETI standard, which the Council encourages to achieve net zero carbon buildings. The LETI standard of net zero carbon includes energy use targets rather than a reduction in emissions. Chapter 7 includes advice on electric vehicle charging, which is included in the Essex Design Guide. Reducing the risk of drought is crucial in adapting to a changing climate and chapter 8 sets out water efficiency measures that the Council encourages. Chapter 9 provides advice for householder applications.

There is a wealth of information, guidance, toolkits, and best practice available. This SPD does not attempt to distill all this information and guidance into one document. Links are provided throughout the SPD to more detailed guidance for those who want to read more.

Chapter 2: Background and Context



In December 2015, the UK joined 195 countries in signing an historic global deal to tackle climate change. The Paris Agreement commits the international community to reduce greenhouse gas emissions in order to avoid some of the most severe impacts of climate change. The UK has long-term, legally-binding targets to bring greenhouse gas emissions to net zero by 2050.

The government's Net Zero Strategy: Build Back Greener (October 2021) sets out policies and proposals for decarbonising all sectors of the UK economy to meet the net zero target by 2050. The strategy states that the science could not be clearer: by the middle of this century the world has to reduce emissions to as close to zero as possible, with the small amount of remaining emissions absorbed through natural carbon sinks like forests, and new technologies like carbon capture. The strategy recognises the importance of the planning system to common challenges like combating climate change and supporting sustainable growth. One of the key commitments in the strategy is: ensure the planning system can support the deployment of low carbon energy infrastructure.

The Climate Change Committee's Sixth Carbon Budget was introduced into law in 2021 and this sets a target to reduce UK greenhouse gas emissions by 78% by 2035 (compared with 1990 levels). Meeting the Sixth Carbon Budget, which delivers three-quarters of the emissions reductions needed to reach net zero by 2050, is the only way that the UK can deliver on its contribution to the Paris Agreement. It requires the UK to reduce emissions by 2.25% of 1990 levels per year. Alongside the Sixth Carbon Budget, the Climate Change Committee has published a report for local authorities detailing their commitments to net zero and how to achieve them.

In May 2019, the Climate Change Committee published the report: Net Zero – The UK's contribution to stopping global warming, which proposed the net zero target. The report found that the target will be met through known technologies alongside improvements in people's lives. Different sectors are set out; for buildings the report finds that net zero can be achieved through efficiency, heat networks and heat pumps in the 2020s and electrification, expanded heat networks and potential switch to hydrogen in the 2030/40s. For land use, the report finds that afforestation and peatland restoration are needed. The report acknowledges that societal and behaviour changes are important. The report recommends that the foundations for change are in place, but a major ramp up in policy effort is required. We can all play our part in mitigating and adapting to climate change and a major ramp up across all sectors, including local government, is needed.

The State of Nature 2019 reported that climate change is one of the most significant threats to global biodiversity. While climate change has had the second largest impact (after agricultural change) on

UK nature over the last 40 years, impacts on wildlife have been mixed. There is growing evidence that climate change is driving widespread and rapid changes in the abundance, distribution, and ecology of the UK's wildlife, causing changes to species communities and will continue to do so for decades or even centuries to come. Conserving and restoring nature-rich areas of the UK will contribute to mitigating climate change and benefit species, while strategies to counter the negative effects of climate change will help species to adapt to its increasing influence in future.

National Planning Policy and Legislation

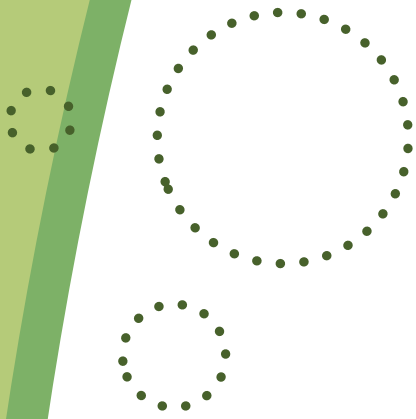
There is a strong duty placed on plan-making to mitigate and adapt to climate change by Planning and Compulsory Purchase Act 2004 Section 19. The National Planning Policy Framework (NPPF) brings the Climate Change Act 2008 target regime (via footnote 53) into plan-making. The Planning and Energy Act 2008 empowers local authorities to set higher standards on energy efficiency.

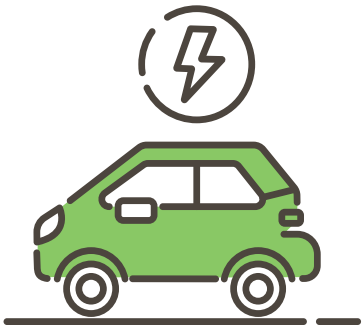
Paragraph 8 of the NPPF makes clear that mitigating and adapting to climate change is a core planning objective. To be in conformity with the NPPF, local development plans should reflect this principle, ensuring that planning policy clearly and comprehensively deals with climate change mitigation and adaptation.

Section 14 of the NPPF (paras 152-173): Meeting the challenge of climate change, flooding and coastal change is relevant. The NPPF says that the planning system should support the transition to a low carbon future in a changing climate, taking full account of flood risk and coastal change. It should help to: shape places in ways that contribute to radical reductions in greenhouse gas emissions, minimise vulnerability and improve resilience; encourage the reuse of existing resources, including the conversion of existing buildings; and support renewable and low carbon energy and associated infrastructure (paragraph 152). The NPPF states that plans should take a proactive approach to mitigating and adapting to climate change, taking into account flood risk, coastal change, water supply, biodiversity and landscapes, and the risk of overheating from rising temperatures (paragraph 153).

New development should be planned for in ways that avoid increased vulnerability to the range of impacts arising from climate change (through adaptation measures including the planning of green infrastructure), and help to reduce greenhouse gas emissions through location, orientation, and design (paragraph 154).

Paragraph 155 says that to increase the use and supply of renewable and low carbon energy and heat, plans should provide a positive strategy for energy from these sources, consider identifying suitable areas for renewable energy, and identify opportunities for development to draw its energy supply from decentralized, renewable or low carbon energy supply systems.





Building Regulations

The Future Homes and Buildings Standard is a set of rules that will come into effect from 2025 to ensure new buildings produce less carbon emissions. The government introduced major Building Regulations changes in June 2022, with new homes in England now needing to produce around 30% less carbon emissions from the energy uses that are covered by Building Regulations (known as regulated energy use, e.g. heating, lighting and hot water) compared to the old regulations. However, regulated energy use is estimated to only make up 50% of the total energy use in homes. Councils in Essex, including Colchester City Council as part of the Local Plan Review, are looking at developing net zero planning policies to ensure new development is the best it can be in terms of climate mitigation and adaptation (including minimising emissions from all energy use not just regulated emissions) and contribute to wider energy system objectives so we stay on track with the UK 2050 target.

Further government consultation on changes to Building Regulations is expected in 2023 with legislation introduced in 2024, ahead of implementation of the Future Homes Standard in 2025.

Essex Climate Action Commission

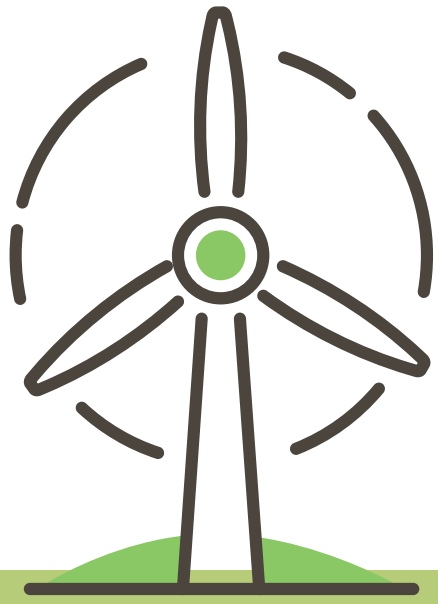
Essex County Council (ECC) has formed an Essex Climate Action Commission, which recognises the role of planning in mitigating and adapting to climate change. The first report – Net Zero: Making Essex Carbon Neutral was published in July 2021.

The plan brings together the work of the Commission across the past year. The Commission recognise that the natural world is our best ally in reversing climate change – it is key to absorbing and storing carbon. Risks from already changing weather systems – more flooding, over-heating, soil degradation, subsidence and water shortage can be tackled by making space for green infrastructure and nurturing our natural world.

The report says that if we are to succeed in our goal of Essex becoming a net zero county by 2050, the bulk of the work needs to be done in the next decade. In this report, the Essex Climate Action Commission, makes recommendations that they believe are both necessary for Essex to be net zero by 2050 as well as achievable. Many of them are for measures to be taken, or be well underway, by 2030. The Commission believe that the measures detailed in the report will also lead to an improved natural environment for people to enjoy and a vibrant economy for the benefit of local jobs and livelihoods. By transforming Essex into a net zero county, it can become a sustainable, thriving place to live, work and play.

The Commission's work is structured around the following six core themes: land use and green infrastructure, energy, the built environment, transport, waste, and community engagement.

The emissions from our buildings account for 26% of the UK's total emissions. 18% of this total is from our homes. Tackling these emissions is essential to mitigating climate change, and also would benefit occupiers too. It is therefore important for new homes to be designed and built to use significantly less energy which also means they would cost a lot less to run. Building to higher fabric standards also means that our buildings will be more resilient to the impacts of a changing climate and improve the comfort, health and wellbeing of occupants.



Chapter 3: Colchester context

Colchester Borough Council's Climate Emergency

Colchester Borough Council declared a climate emergency on 17 July 2019.

The Council noted the United Nations Intergovernmental Panel on Climate Change's (IPCC) warning that we have 12 years to make the necessary changes to limit a rise in global temperatures to 1.5oC. Failure to act will see a marked increase in sea levels and flooding, extreme and abrupt changes to weather patterns, crop failures, extinctions of plant, insect and animal species, and global economic disruption and crisis. Total populations of mammals, birds, fish, and reptiles have declined globally by 60% since 1970, and all of the 20 warmest years on record, have occurred in the past 22 years. Failure to take immediate and decisive action on this will detrimentally impact on the wellbeing of the people of Colchester and billions of people around the world.

At the Global Climate Talks in Poland in December 2018 the UK along with over 200 nations agreed action on climate change with a much greater role strongly implied for local and regional authorities, like Colchester, in assisting governments to achieve their carbon emission savings.

It is everyone's duty to do what they can to stop this existential threat to our planet. Through declaring a climate emergency, it has become a priority of Colchester City Council to spur urgent action to reduce our carbon footprint and promote sustainable urban environments and economies.

In passing and following through on the climate emergency declaration, Colchester City Council intends to take a radical step forward in tackling climate change and conservation as a local authority.

The first Colchester Climate Emergency Action Plan was reported to Cabinet in January 2020. The Action Plan is a 10 year journey for the Council to become net carbon zero by 2030. The most recent iteration of the Climate Emergency Action Plan published in January 2023 has nine themes and one of these themes is Sustainable Planning.

The Council initially set a target to reduce greenhouse gas emissions by 40% by 2020 relative to 2008/09 levels. This was achieved by 2020 with 2020/21 emissions totalling 5406.4 tonnes of CO2e, a 46.7% reduction on 2008 levels (10,150 tonnes of CO2e). The most recent emissions report for the Council showed the emissions to be 5887.2 tonnes of CO2e in 2021/2022. The Council's baseline greenhouse gas emissions for measuring progress have been measured at 6549.3 tonnes of CO2e and this is the level from which the Council will aim to meet its target of becoming carbon neutral in its operations and services. The emissions included in this target refer to those from fuels used in Council fleet operations, gas used to heat Council owned buildings and offices, emissions associated with the generation of electricity that the Council uses in its owned buildings and other service operations e.g. car parks, street lighting, disposal and treatment of waste produced from Council services, supply and treatment of water consumed in Council operations, business travel conducted by Council employees and employee commuting.

Colchester's Local Plan

The most relevant policies to this SPD are Policies CC1 (Climate Change) and DM25 (Renewable Energy, Water, Waste and Recycling) of Colchester's Section 2 Local Plan (July 2022). These policies are set out below.

Policy CC1: Climate Change

Colchester Borough Council made a Climate Emergency declaration in 2019. A Climate Challenge and Sustainability Strategy and a Carbon Management Plan will support the Climate Emergency Action Plan and will set out detailed specific carbon reduction projects. In addressing the move to a low carbon future for Colchester, the Local Planning Authority will plan for new development in locations and ways that reduce greenhouse gas emissions, adopt the principles set out in the energy hierarchy and provide resilience to the impacts of a changing climate.

A low carbon future for Colchester will be achieved by:

(i) Encouraging and supporting the provision of renewable and low carbon technologies.

(ii) Encouraging new development to provide a proportion of the energy demand through renewable or low carbon sources.

(iii) Encouraging design and construction techniques which contribute to climate change mitigation and adaptation by using landform, layout, building orientation, massing, tree planting and landscaping to minimise energy consumption and provide resilience to a changing climate.

(iv) A Canopy Cover Assessment will be required for all major applications. Development proposals should seek where appropriate to increase the level of canopy cover on site by a minimum of 10%. In circumstances, where this is not possible or desirable, compensatory provision should be identified and secured through a legal obligation.

(v) Requiring both innovative design and technologies that reduce the impacts of climate change within the garden community.

(vi) Supporting opportunities to deliver decentralised energy systems, particularly those which are powered by a renewable or low carbon source. Supporting connection to an existing decentralised energy supply system where there is capacity to supply the proposed development, or design for future connection where there are proposals for such a system.

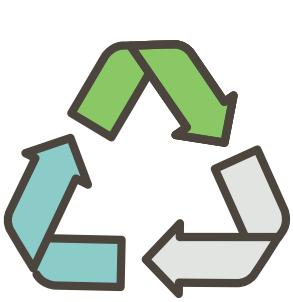
(vii) Requiring development in the Northern Gateway to connect to or be capable of connecting to the district heating scheme where there is capacity to supply the proposed development and where it is appropriate and viable to do so.

(viii) Supporting energy efficiency improvements to existing buildings in the Borough where appropriate.

(ix) Minimising waste and improving reuse and recycling rates.

(x) Development will be directed to locations with the least impact on flooding or water resources. All development should consider the impact of and promotion of design responses to flood risk for the lifetime of the development and the availability of water and wastewater infrastructure for the lifetime of the development.

(xi) Green infrastructure should be used to manage and enhance existing habitats. Opportunities should be taken to create new habitats and assist with species migration. Consideration should be given to the use of green infrastructure to provide shade during higher temperatures and for flood mitigation. The potential role of green infrastructure as 'productive landscapes' should also be considered.'



Policy DM25: Renewable Energy, Water, Waste and Recycling

The Local Planning Authority's commitment to carbon reduction includes the promotion of efficient use of energy and resources, alongside waste minimisation and recycling.

The Local Planning Authority will support residential developments that help reduce carbon emissions in accordance with national Building Regulations. The use of the Home Quality Mark will be supported. Non-residential developments will be encouraged to achieve a minimum BREEAM rating of 'Very Good'.

The Local Planning Authority will encourage the use of sustainable construction techniques in tandem with high quality design and materials to reduce energy demand, waste and the use of natural resources, including the sustainable management of the Borough's water resources.

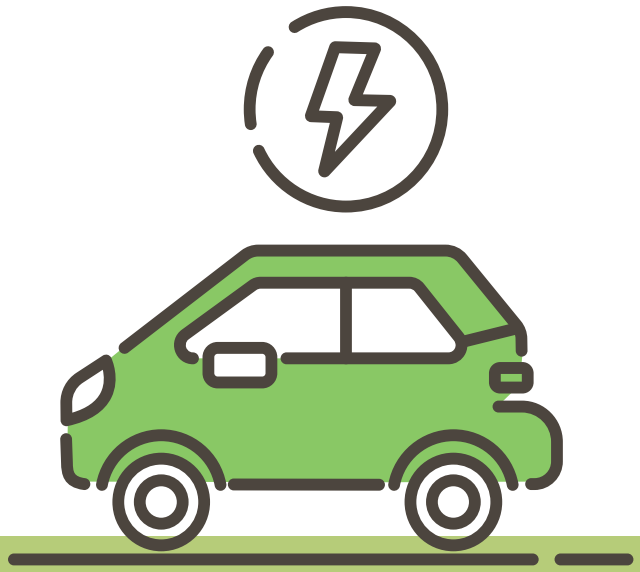
To achieve greater water efficiencies new residential developments will be required to meet the Building Regulation optional higher water efficiency standard of 110 litres per person per day, as set out in Building Regulations part G2.

To help meet waste reduction and recycling targets, the Local Planning Authority will support proposals for sustainable waste management facilities identified in the Waste Management Plan which minimise impacts on the communities living close to the sites (noise, pollution, traffic) and on the local environment and landscape. New developments will be expected to support this objective by employing best practice technology to optimise the opportunities for recycling and minimising waste and by providing better recycling facilities.

The Local Planning Authority will support proposals for renewable energy projects including micro-generation, offshore wind farms (plus land based ancillary infrastructure) solar farms, solar panels on buildings, wind farms, District Heating Networks and community led renewable energy initiatives at appropriate locations in the Borough, which will need to be subject to a Habitats Regulations Assessment and if necessary an Appropriate Assessment, to help reduce Colchester's carbon footprint.

Renewable energy schemes with potential for adverse effects on internationally or nationally designated nature conservation sites, sites or nationally designated landscapes (Dedham Vale AONB) and heritage assets, will only be supported in exceptional circumstances, where it can be demonstrated that the designation objectives for the area will not be compromised, that adverse impacts can be adequately mitigated or where it can be demonstrated that any adverse impacts are clearly outweighed by the social and economic benefits provided by the energy proposal.

All applications for renewable energy proposals should be located and designed in such a way to minimise increases in ambient noise levels. Landscape and visual impacts should be mitigated through good design, careful siting and layout and landscaping measures. Transport Assessments covering the construction, operation and decommissioning of any wind farm or solar farm proposal will be required and should be produced at the pre-application stage so acceptability can be determined and mitigation measures identified. A condition will be attached to planning consents for wind turbines and solar farm proposals to ensure that the site is restored when the turbines or panels are taken out of service.'



This SPD provides guidance on the implementation of these policies. It is structured around five key objectives that relate to Policies CC1 and DM25:

- Improving Layout and Building Design
- Renewable and low carbon energy
- Net zero carbon buildings (the LETI approach)
- Electric Vehicles
- Water efficiency measures

The SPD also includes a section relevant to householder applications.

Climate Change SPD

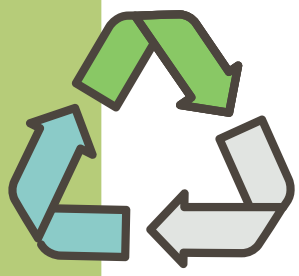
This SPD is part of the Council's response to the climate emergency. It expands on the adopted Local Plan and Climate Emergency Action Plan and outlines how these policies and ambitions can be met.

This SPD is ambitious – it recommends that development proposals go further than adopted policies. The adopted policies were written before the plan was submitted in 2017. Since then, the Council has declared a climate emergency and this SPD includes measures to address the climate emergency. Whilst the Council cannot set new policies through this SPD, the SPD sets out what the Council would support from development proposals and how applicants can successfully integrate a best-practice approach towards the climate emergency in their development proposals. Climate change affects us all and we should all play our part in mitigating and adapting to climate change and creating communities and buildings that are resilient.

The most effective way to build a development which successfully addresses the climate emergency and is resilient to a changing climate is to design for it from the outset. This reduces the complexity of the build, the associated costs and gives clear direction to all involved in the development process on what the objectives are.

Applicants should refer to the Net Zero Carbon Toolkit developed by Levitt Bernstein, Elementa, Passivhaus Trust and Etude commissioned by West Oxfordshire, Cotswold and Forest of Dean District Councils, funded by the LGA Housing Advisers Programme. This resource was prepared by leading technical experts from Etude, the Passivhaus Trust, Levitt Bernstein and Elementa Consulting. It contains the very latest design approach and good practice within the field of Net Zero buildings. The Council encourages applicants to follow this good practice. The Net Zero Carbon Toolkit is aimed at everyone: small or medium -size house builders, architects, self -builders, consultants, etc. The Toolkit helps explains how net zero carbon can be delivered through construction. Elements of this toolkit have been included in this SPD.

Chapter 4: Improving Layout and Building Design



This chapter include various layout and design principles. It is important that the design principles included should form part of a cohesive and comprehensive design approach for the wider application/proposal.

Passive Design

Passive design is the optimisation of the layout and orientation of new buildings. Passive design maximises natural environmental factors to help reduce energy needs by avoiding overshadowing, maximising passive solar gain, maximising the potential internal daylight levels and providing ventilation. There is the need to balance this with the need to mitigate overheating risk and avoiding the need for energy intensive technology for cooling.

The Essex Solar Design Guide (2022) has been produced by Etude and Levitt Bernstein on behalf of Essex County Council, to give developers, architects and homeowners an easy-to-use guide, laying out the key considerations for good solar design. The core principles of good solar design are to balance the needs of daylighting, useful solar gain and mitigating overheating. The Council recommends that applicants take into account this guidance and incorporate the 'design actions' that are included throughout the guide into development proposals.

Optimising building form can make it easier and cheaper to achieve lower levels of space heating demand (the LETI KPI for space heating demand for residential dwellings is 15-20 kWh/m2/yr – see chapter 6).

Notwithstanding the policy requirement (Policy DM15) for development proposals to be designed to a high standard which responds positively to its context, development and building form should be as simple and compact as possible. This will reduce the exposed surface area reducing the amount of heat that is lost through the walls and roof. The use of stepped roofs, roof terraces, overhangs, inset balconies, dormers and bay windows should be avoided as these features will decrease the building's energy efficiency.

Buildings with a lower form factor (form factor = exposed external surface area/gross internal floor area) are more energy efficient. This is not to say all homes should become boxes, high quality design is important, but strategic decisions should be taken on adding articulation to the building forms (such as dormers, bay windows, built in undercroft parking etc.). Joining of homes together into terraces further reduces heat loss from the building. Consideration to the number of more exposed forms such as detached and semi-detached should therefore be given.

Passive solar design should be used to harness energy from the sun for heating and for daylighting to avoid the need for artificial lighting. This reduces winter heating load, limits summertime overheating and aids natural ventilation. To maximise useful solar gains in winter, rooms where people spend most of their time should be positioned along the south side of the building to maximise natural daylight and warmth in the winter. Site layout should maximise number of

dwellings with a main living room that has at least one window on a wall facing 90° due south. Bedrooms should avoid west elevations because they receive solar gain at end of the day just before they are occupied so carry risk of overheating.

Building Orientation and Massing

The massing and density of a development can influence access to sunlight, daylight, and solar gains to internal and external spaces. It is best practice to avoid placing higher elements to the south of a site, ideally these should be placed to the north to avoid excessive shading of other buildings and external amenity spaces. Consideration should also be given to surrounding buildings off site. Strategic breaks should be included in building massing to let sunlight in. When designing for sunlight, consider the sun's angle at different times of the day across different seasons. Housing layouts should be designed to maximise daylight and sunlight while taking into account other factors, such as privacy and the attractiveness of the wider streetscape whilst balancing the risk of overheating. The orientation and massing of the building should be optimized to allow useful solar gains and prevent significant overshadowing in winter. Buildings should be south facing (+/- 30°) with solar shading and dual aspect should be prioritised. Overshadowing of buildings should be avoided as it reduces the heat gain from the sun in winter.

Where urban design principles necessitate the move away from a predominantly north/south orientation, even slight twists to the building orientation can assist to reduce energy demand. Decisions on orientation and window area should also be balanced with the risk of overheating, with window shading considered to mitigate against this.

A building's form, orientation and window proportions are all aspects that do not add extra construction cost, but if optimised within the design can significantly improve the building's efficiency.

Overshadowing

Building spacing and street proportions should be assessed to reduce the extent of overshadowing. Priority should be given to the south in orientating masterplans, angling the roofs to make the most of PV opportunities to the south. It is good practice to allow a distance of 1 to 1.5 times the buildings height between buildings to avoid overshadowing and impacting the internal solar gains. High density developments should consider and demonstrate that year-round sun paths have been included in the design to allow as many dwellings as possible to receive sunlight throughout the year.

Sunlight is a welcome feature of external spaces such as communal gardens, public squares and roof terraces. The BRE guidance Site layout planning for daylight and sunlight: a guide to good practice advises that it is best practice to design for at least half of the total area of amenity space to receive direct sunlight for two hours on the 21st March (spring equinox).

While a room facing north will not receive direct sunlight, it can still be adequately daylit as it receives diffuse light (i.e. reflected or scattered light). The amount of daylight a room receives is dependent on external overshadowing from neighbouring buildings; overhangs or balconies; the size and location of windows; the depth of the room; the materials and colours used; and the visible light transmittance of the windows. These issues should all be considered as part of the design to maximise the amount of daylight entering and building.

Windows

To minimise heat loss to the north, smaller windows should be installed and to provide sufficient solar heat gain from the south larger windows should be installed. Consideration should be given to the portion of the window that is useful for daylight, solar gain, ventilation, privacy, and views. Shading should be provided to avoid overheating in summer.

Horizontal windows are more effective than vertical windows in terms of improving room lighting distribution and increasing the amount of openable area available for ventilation. Side-hung windows are favoured to top-hung windows.

Building fabric and materials

Airtightness significantly improves energy efficiency and comfort, often for a relatively modest cost. Excellent levels of insulation and airtightness, and minimal thermal bridging are required to meet the LETI KPI for space heating demand for residential dwellings of 15-20 kWh/m2/yr (see chapter 6). The list below outlines the things to consider.

- Insulation standards, or U-values (W/m2), are a measure of how well heat passes through an element. The lower the u-value the better the insulator.
- Thermal bridging is where a building component allows significantly more heat to travel through it than the materials surrounding it. This can create “cold” spots and sources of heat loss and mould.
- Airtightness (m3 /h/m2) is a measure of the leakiness of a building and how much air passes between different building elements and junctions. This uncontrolled ventilation leads to heat loss.
- Thermal mass plays a big part in thermal comfort. Thermal mass (such as brick or blockwork) inside the building helps to stabilise internal temperatures throughout the day. Lightweight buildings with little thermal mass will be subject to larger temperature swings. An allowance for appropriate wall thickness needs to be made at an early stage in the design process to ensure the number of homes expected on site will fit and can be delivered.
- Choose materials that have certification from the Forest Stewardship Council (FSC), the Programme for Endorsement of Forest Certification (PEFC), ISO 14001 (Environmental Standard), BES 6001 Framework for Responsible Sourcing, CARES steel certification.

Ventilation and air tightness

Natural ventilation improves thermal comfort in summer. Where possible, windows should be designed to be fully openable and floors plans arranged to allow cross ventilation, which is the most effective form of natural ventilation.

Excellent levels of air-tightness and Mechanical Ventilation with Heat Recovery (MVHR) are required to meet the LETI KPI for space heating demand for residential dwellings of 15-20 kWh/m2/yr (see chapter 6).

The key to energy efficient ventilation in all buildings is being in control of where, when, and how air flows through a building. This starts with very good airtightness to limit any uncontrolled infiltration. Trickle vents should be avoided as they do not control infiltration. Practical guidance on how to achieve good levels of airtightness can be found in the Forest of Dean, Cotswold and West Oxfordshire District Councils’ Net Zero Carbon Toolkit.

A key component to energy efficient, airtight homes is Mechanical Ventilation with Heat Recovery (MHVR). MVHR is suitable for all building types. Long used in non-domestic buildings, it is increasingly used in homes to ensure good indoor air quality and to remove and replace stale air in an energy efficient

manner. MVHR units supply air into occupied spaces, and extract air from circulation spaces, or kitchen and bathroom spaces in the case of homes, it does this using very little energy and recovers heat energy from outgoing air. Units should be positioned close to an external wall to prevent heat loss from the ductwork that connects to the outside. These ducts should be accurately fitted with adequate insulation to prevent heat loss, and generally ductwork should avoid having sharp bends which could affect pressure loss and flow. MVHR units include filters that must be changed regularly (usually at least once per year but check the manufacturer's instructions).

Reducing overheating

Climate change is already bringing warmer summers with more extreme temperature highs. In June 2021, the Committee on Climate Change released its Independent Assessment of UK Climate Risk. It said in the last 5 years, "over 570,000 new homes have been built that are not resilient to future high temperatures". Overall in England, the summer of 2022 was the joint hottest on record. 2022 was also the hottest year on record between January-August 2022, and the driest so far since 1976. The highest ever recorded temperature of 39°C for the county of Essex was recorded in July 2022. These high temperatures led to a notable increase in wildfires, with several experienced in the borough of Colchester (in Mersea, Stanway and on Middlewick).

Overheating in buildings is becoming an increasing threat to occupants' health and wellbeing, particularly for vulnerable people. In future years, this is set to become even more of an issue.

Overheating can be reduced through good design and all developments should demonstrate how the risk of overheating has been sufficiently mitigated through good design.

All developments should:

1. Ensure glazing areas are not excessive i.e. no more than 20-25% of facade on south or west façades.
2. Favour dual aspect homes to allow cross ventilation.
3. Provide appropriate external solar shading. South façades should have horizontal shading over the window and the west façade should ideally have efficient movable shading e.g., shutters. Do not rely on internal blinds – these can be ineffective and removed by residents.
4. Ensure good levels of secure natural ventilation are possible. Design window openings to take advantage of cross-ventilation (from one side to another) and/or stack ventilation (from bottom to top). Avoid fixed panes and maximise opening areas of windows. Side hung windows typically allow more ventilation than top hung.
5. Select a g-value (the solar factor indicating how much heat is transmitted from the sun) for glass of around 0.5 where possible. Avoid reducing it too much as this would also reduce free winter solar gains.
6. Utilise thermal mass in buildings to help dampen temperature swings throughout the day, and work with secure natural ventilation to provide passive night-time cooling
7. Utilise green and blue infrastructure to provide natural cooling to the local environment and reduce the urban heat island effect.

The Good Homes Alliance has developed a tool and accompanying guidance which aims to help planners and design teams identify and mitigate overheating risks in new homes at an early stage.

CIBSE have a detailed methodology to assess overheating risk to occupiers over the lifetime of a development. Assessing the overheating risk and ensuring mitigation measures are incorporated into the design, will help ensure the comfort, health and wellbeing of occupiers and improve resilience of the development to a changing climate. Using the CIBSE methodology for assessing and mitigating overheating risk from not only current climate, but also projected future climate, is encouraged on major development proposals.

Working from home space

All new dwellings should be designed to accommodate the space and services necessary for comfortable home working. This will reduce the need to travel. As a guide, a suitable home office should include:

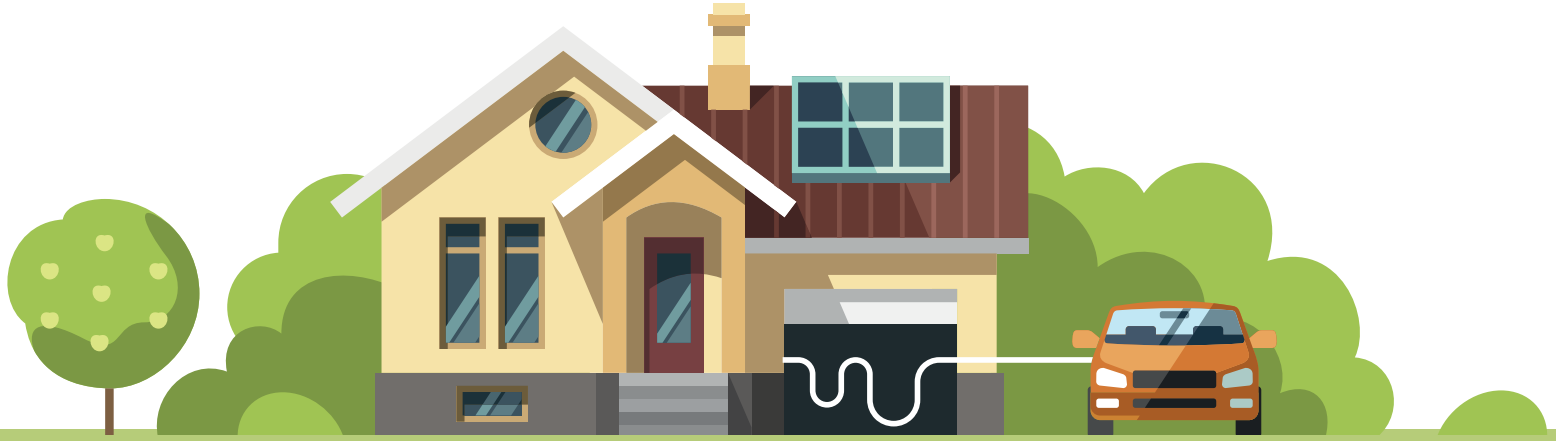
- A high-speed internet connection.
- A room or space with a wall length of at least 1.8m, capable of accommodating a desk and shelving.
- Good internal daylight, reducing the need for artificial lighting.
- Consider north facing home offices to avoid glare.

Green-blue infrastructure

The Biodiversity SPD and Active Travel SPD both refer to green-blue infrastructure. Green-blue infrastructure, such as parks, open spaces, waterways, and the connections between them, is central to Colchester's climate change adaptation and resilience. Green-blue infrastructure can improve the resilience of habitats and vulnerable species in a changing climate and help to reduce flood risk. Green-blue infrastructure reduces the environmental impact of development in terms of carbon emissions, air, soil, light, noise, and water, while also improving air, soil, and water quality. Green-blue infrastructure can also deliver a range of related benefits by improving opportunities to walk and cycle, which in turn reduces carbon emissions, and improving the health and wellbeing of local communities.

According to Natural England, good green-blue infrastructure has five key characteristics. It is:

1. **Multifunctional –** Whilst traditional grey infrastructure typically has one key function, green-blue infrastructure offers a range of functions. For example, increased tree coverage may provide flood protection, reduce heat, promote biodiversity, and provide aesthetic value.
2. **Varied –** Varying green and blue spaces is particularly important for wildlife in the context of a changing climate and has a positive impact on human health.
3. **Connected –** Promoting connectivity addresses fragmentation, enabling the movement of people and wildlife through green networks and strengthening resilience.
4. **Accessible –** For people to experience and (re-) connect with nature, green-blue infrastructure must be inclusive, safe, welcoming, well-managed and accessible for all.
5. **Responding to a local area's character -** An area's natural, historical, and cultural landscape makes a place distinctive and helps people recognise and connect to their local environment. Green-blue infrastructure should preserve and maintain the existing character of an area and enhance it by strengthening existing characteristics.



Trees can provide additional shading to buildings and public realm. Deciduous trees allow for sunlight and solar gains to reach the buildings in winter when the leaves fall, while providing shading in summer. The size and age of trees can make the amount and longevity of shading difficult to predict. Therefore, shade from trees should not be relied upon as an overheating mitigation measure, they simply supplement the overall building design. When designing external spaces consider how much sunlight will be received on planted areas and select appropriate species to suit. The Council require major applications to submit a tree canopy cover assessment and have adopted guidance to explain this requirement.

Green and blue infrastructure helps to cool the surrounding environment naturally and reduces the urban heat island effect. Water bodies are known to cool the air and can contribute to a cooler microclimate on the site. Trees outside a building can provide some shade, but they should not be depended on as the sole source of solar shading.

Chapter 5: Renewable and low carbon energy

Solar farm proposals with a generating capacity of greater than 50MW, under the Planning Act 2008, are classified as a Nationally Significant Infrastructure Project (NSIP) requiring a Development Consent Order (DCO). Smaller solar farm proposals with a generating capacity of below 50MW can be determined by the relevant Local Planning Authority (LPA) through the normal planning application process.

The Government Energy White Paper (2020) states that onshore wind and solar will be key building blocks of the future generation mix, along with offshore wind and sustained growth in the capacity of solar and onshore and offshore wind will be needed in the next decade to ensure the country is on the path to a low-cost, clean electricity system by 2050. The Climate Change Committee's Sixth Carbon Budget (The UK's path to Net Zero, December 2020) report highlights that a portfolio of zero and low-carbon energy generating technologies will be needed to meet future electricity demands including expanding new solar generating technology capacity by 3,000MW on average every year to 2030 and beyond.

The National Planning Policy Framework (NPPF) (2021) states that "The planning system should support the transition to a low carbon future in a changing climate, taking full account of flood risk and coastal change. It should help to: shape places in ways that contribute to radical reductions in greenhouse gas emissions, minimise vulnerability and improve resilience; ... and support renewable and low carbon energy and associated infrastructure." The purpose of the planning system is to contribute to the achievement of sustainable development as defined in the NPPF. Achieving sustainable development means that the planning system has three overarching objectives, which are interdependent and need to be pursued in mutually supportive ways. These are economic, social and environmental objectives.

Policy DM25: Renewable Energy, Water, Waste and Recycling of Colchester's adopted Local Plan states:

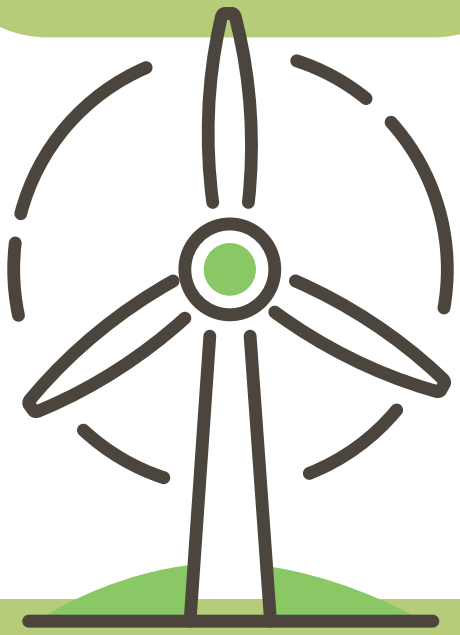
"The Local Planning Authority will support proposals for renewable energy projects including micro-generation, offshore wind farms (plus land based ancillary infrastructure) solar farms, solar panels on buildings, wind farms, District Heating Networks and community led renewable energy initiatives at appropriate locations in the Borough, which will need to be subject to a Habitats Regulations Assessment and if necessary an Appropriate Assessment, to help reduce Colchester's carbon footprint.

Renewable energy schemes with potential for adverse effects on internationally or nationally designated nature conservation sites, sites or nationally designated landscapes (Dedham Vale AONB) and heritage assets, will only be supported in exceptional circumstances, where it can be demonstrated that the designation objectives for the area will not be compromised, that adverse impacts can be adequately mitigated or where it can be demonstrated that any adverse impacts are clearly outweighed by the social and economic benefits provided by the energy proposal.

All applications for renewable energy proposals should be located and designed in such a way to minimise increases in ambient noise levels. Landscape and visual impacts should be mitigated through good design, careful siting and layout and landscaping measures. Transport Assessments covering the construction, operation and decommissioning of any wind farm or solar farm proposal will be required and should be produced at the pre-application stage so acceptability can be determined and mitigation measures identified. A condition will be attached to planning consents for wind turbines and solar farm proposals to ensure that the site is restored when the turbines or panels are taken out of service."

Policy ENV1 (Environment) states:

"Development proposals that have adverse effects on the integrity of habitats sites, Sites of Special Scientific Interest or significant adverse impacts on the special qualities of the Dedham Vale Area of Outstanding Natural Beauty (including its setting) (either alone or in-combination) will not be supported."



Support for renewable energy

Planning applications for renewable energy schemes in appropriate locations will be supported by the Council. It is accepted that there will be an impact, as there is with any development, but any adverse impacts can be minimised and mitigated. Large scale renewable energy schemes are Environmental Impact Assessment (EIA) development and so large-scale applications are accompanied by an Environmental Statement (ES), which fully considers environmental impacts. ES often recommend appropriate conditions to secure any necessary mitigation. The principle of renewable energy will not be questioned by the Council. The Council has declared a climate emergency and renewable energy schemes will contribute to reducing carbon emissions across the city. A solar farm generating 49.99 megawatts (MW) could generate enough power to provide electricity to over 16,000 homes. Renewable energy schemes play a major role in reducing carbon emissions across the city, contributing to the climate emergency and supporting the sustainable development objectives in the NPPF, and will be supported in principle.

Whilst the climate emergency declaration of net zero emissions by 2030 relates to the Council as an organisation, the Council in declaring a climate emergency in July 2019, acknowledged that urgent action is needed to limit the environmental impacts produced by the climate crisis.

As stated in the Council's Climate Emergency Action Plan 2022/23, "Energy is linked into all parts of our lives, from powering our individual homes to larger businesses. Energy demand, particularly for electricity, is increasing as people look to decarbonise their lifestyles and electrify their heating and vehicles. To support this demand, extra energy supply is required and the Council, through its wholly owned energy company Colchester Amphora Energy Limited, is looking to generate more renewable energy."

Biodiversity benefits

Solar farms can deliver significant biodiversity net gain. To maximise environmental benefits, the Council encourages all solar farm proposals to deliver biodiversity net gain of at least 50% and an increase in tree canopy cover of at least 50%.

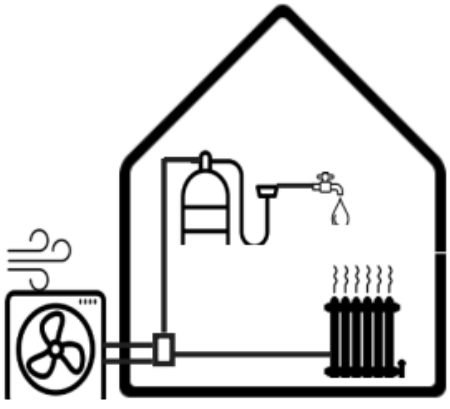
The Council's ambition is that all development should achieve an energy balance on-site. This means that renewable energy generation should be equal to or greater than the development's operational energy consumption (or energy use intensity) over the course of a year. For clarity this means both regulated and unregulated energy use, but excludes the energy used for electric vehicle charging.

The aim should be to provide net zero or low carbon heating systems for heating and hot water so that new development does not connect to the gas grid. This is the direction we need to take to build sustainable, future proofed buildings. Net Zero carbon buildings do not burn fossil fuels for energy. Net Zero carbon in operation can only be achieved by increasing renewable electricity generation. Solar PVs represent a mature and easy to use technology and heat pumps are an efficient low carbon heat source. Solar Thermal is the process of capturing energy from the sun via the use of solar panels, to heat water for use in the home. Solar thermal offers much lower heating costs than traditional gas or electric-powered heating systems and produces fewer CO2 emissions.

Generating electricity onsite, at the point of use, provides cheap electricity close to demand that can offset electricity consumption at full retail price; directly powers building systems or charge electric vehicles from rooftop solar energy; and immediately decarbonises electricity supplies (rather than having to wait for the UK grid to decarbonise). It is also more efficient in terms of the grid because very little energy will be lost through transmission and distribution because it's a short distance from generation to where it is used.

Heat pumps

Heat pumps are an energy efficient means of heating. They can achieve CO2 emissions reduction when powered by a less carbon-intensive electricity grid. Heat pumps can provide both space heating and domestic hot water and can serve individual homes and buildings or communal heating systems. They are a solution for all building types at all scales when buildings are designed to high energy efficiency standards. For major development, consideration should be given to installing a communal heating system, or heat network, rather than individual heat pumps for every building. Heat pumps need to be sensitively located so as not to cause detriment to public and residential amenity.



A typical air source heat pump system. The heat pump is located on external wall gathers heat from surrounding air. The heat pump alternates between providing space heating and hot water in the dwellings.

Solar photovoltaics (PV)

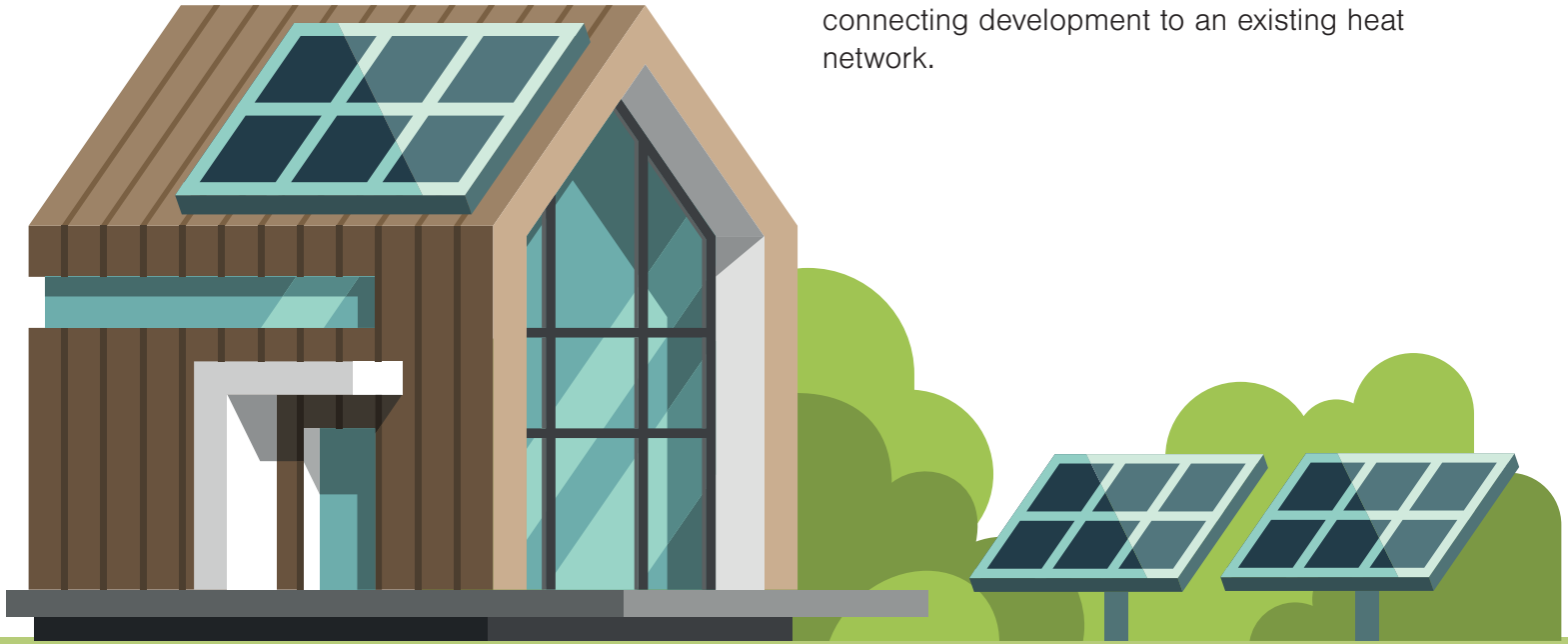
Solar photovoltaics (PV) are ideally suited to buildings. Solar photovoltaic (PV) panels generate electricity when exposed to sunlight. They are the most appropriate form of renewable energy generation for a building as they are a simple, mature, and durable technology and can be installed on both roofs and suitable facades. Solar photovoltaics should be considered at the very earliest of design stages in order that the roof shape and orientation is optimised to maximise solar photovoltaic output and returns for occupants.

Heat Networks

A heat network is a way to distribute heat from heat source(s) via underground pipes to multiple buildings. Heat can be generated, e.g. from a heat pump, or recovered, e.g. energy from waste. In the UK, heat networks are predicted to provide 18% of heat demand by 2050. The Council is delivering the Northern Gateway heat network. The Northern Gateway heat network will use an open loop ground source heat pump as the primary heat source to provide a low carbon heat solution to 200 houses, 450 flats, 35,000 m^2 of office space and 9,000 m^2 of healthcare facilities. The project is the first of its kind to be used on this scale in the UK, using a confined chalk aquifer, and will deliver 5.5 GWhrs of heat a year with 75% of hot water for heating and washing being generated by the heat pump.

At the time of writing this SPD, the government is consulting on heat network zones. These are areas where heat networks would be optimal to install based on heat demand in the area, density of the heat demand and potential sources of low carbon heating.

The Council encourages applicants to consider installing a heat network and/or connecting development to an existing heat network.



Chapter 6: Net Zero Carbon Buildings (the LETI approach)

The Low Energy Transformation Initiative (LETI) was established in 2017 to support the transition of London's built environment to net zero carbon, providing guidance that can be applied to the rest of the UK. LETI is a network of over 1,000 built environment professionals who are working together on the path to a zero carbon future. LETI believe that to meet our climate change targets all new buildings must operate at net zero carbon by 2030 and all buildings must operate at net zero carbon by 2050. In order to achieve this, LETI believes that by 2025, all new buildings must be designed to deliver net zero carbon.

The Council encourages all new buildings to be built to net zero carbon standards as defined by LETI and should seek to achieve LETI's Key Performance Indicators (KPIs). LETI's three core principles and KPIs are outlined below. Energy use targets are more transparent and robust than carbon reductions targets and are the best way to ensure zero carbon is delivered in practice.

This policy approach to net zero carbon based on energy metrics has now been accepted by the Planning Inspectorate through the examinations into Cornwall and Bath and North East Somerset Local Plans. LETI's definition of net zero carbon means whole life carbon. Whole life carbon is formed of operational and embodied carbon.

Operational carbon is the emissions from the energy consumed by a building associated with heating, hot water, cooling, ventilation, and lighting systems as well as equipment such as fridges, washing machines, TVs, and cooking. For buildings, embodied carbon is the carbon emissions emitted from producing a building's materials, their transport and installation on site as well as their disposal at end of life.

The diagram shows the KPIs for residential but LETI have developed KPIs for a wide range of uses and these are set out in the LETI Climate Emergency Design Guide.

For LETI, a net zero carbon building in operation means a building which does not burn fossil fuels, is 100% powered by renewable energy and achieves a level of energy performance in-use in line with our national climate change targets. There are 3 core principles:

1 - Energy efficiency

Buildings should use energy efficiently. The lower the energy demand of the building, the easier it is to achieve net zero in use. Space heating demand expresses the amount of energy the building needs for heating and is impacted by site and orientation, window design, form, building fabric, materials and detailing, and ventilation.

Energy Use Intensity (EUI) expresses the total amount of energy a building uses and can be measured in-use through the energy meter) with kWh/m2.yr as a unit. It is impacted by the space heating demand, the choice of heating system, ventilation system, lighting, cooking, appliances, and equipment. LETI believe that EUI should replace carbon emission reductions as the primary metric used in policy, regulations, and design decisions.

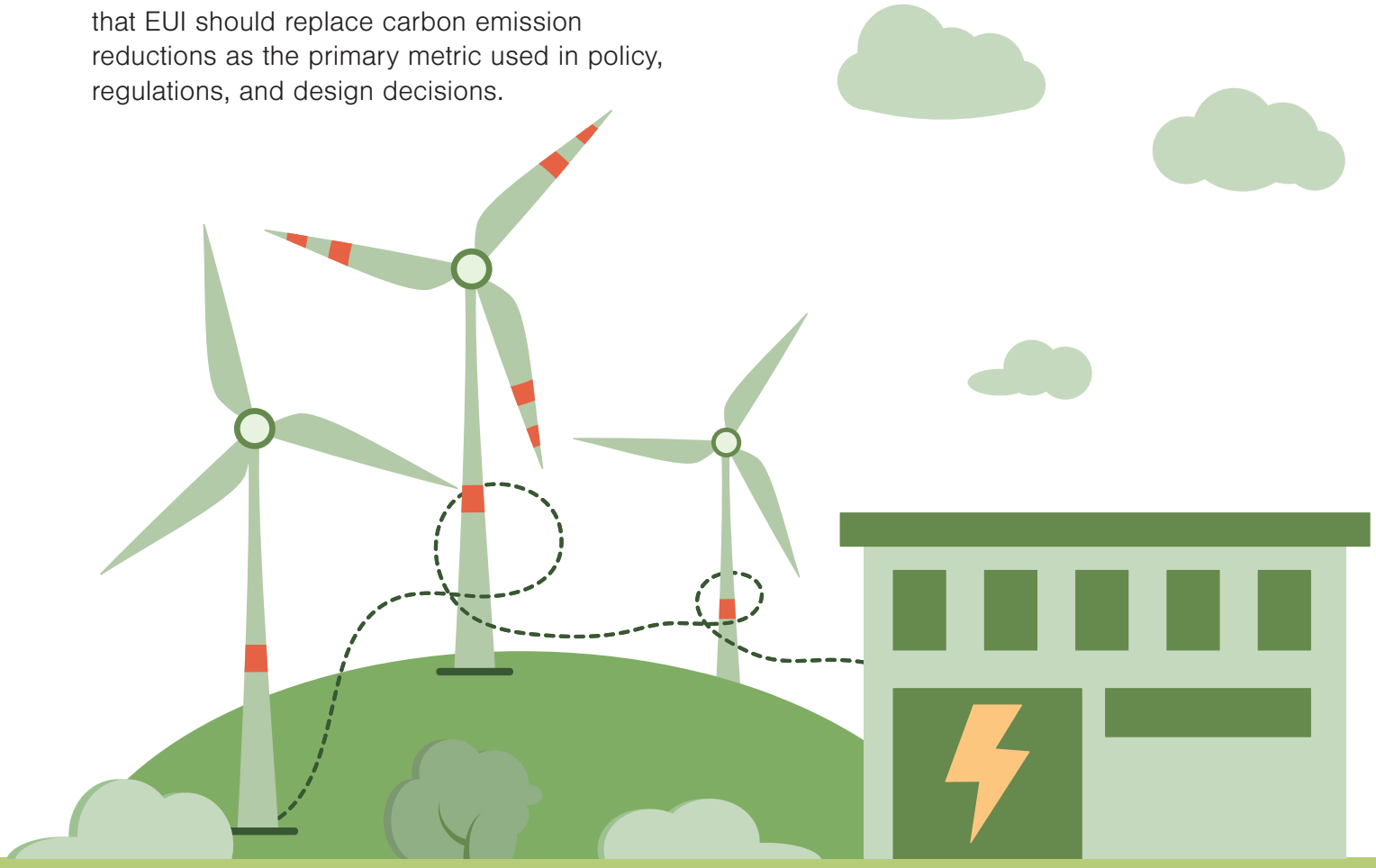
2 - Low carbon heating

All new buildings should be built with a low carbon heating system and must not connect to the gas network.

3 - Renewable energy generation

In new buildings, annual renewable energy generation should be at least equal to the residual total energy use of the building (the EUI) (i.e. the regulated and unregulated energy use but excluding EV charging). If this is not possible on-site, it should be demonstrated that the equivalent of 120 kWh/m2 (footprint)/ yr of renewable energy is generated across the development.

The diagram, below, produced by LETI and included in their Climate Emergency Design Guide, summarises the LETI approach to net zero carbon.



Net Zero Operational Carbon

Ten key requirements for new buildings

By 2030 all new buildings must operate at net zero to meet our climate change targets. This means that by 2025 all new buildings will need to be designed to meet these targets. This page sets out the approach to operational carbon that will be necessary to deliver zero carbon buildings. For more information about any of these requirements and how to meet them, please refer to the: UKGBC - Net Zero Carbon Buildings Framework; BBP - Design for Performance initiative; RIBA - 2030 Climate Challenge; GHA - Net Zero Housing Project Map; CIBSE - Climate Action Plan; and, LETI - Climate Emergency Design Guide.

Low energy use

1. Total Energy Use Intensity (EUI) - Energy use measured at the meter should be equal to or less than:
   - **35 kWh/m²/yr** (GIA) for residential[1]

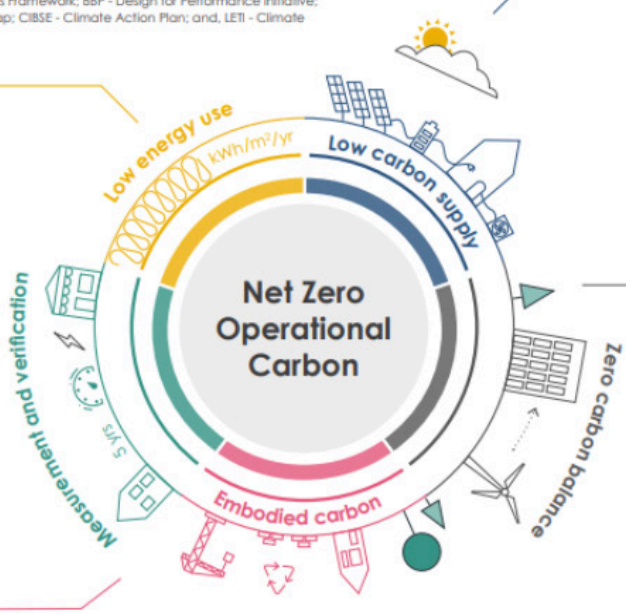
   For non-domestic buildings a minimum DEC B (40) rating should be achieved and/or an EUI equal or less than:
   - **65 kWh/m²/yr** (GIA) for schools[1]
   - **70 kWh/m²/yr** (NLA) or **55 kWh/m²/yr** (GIA) for commercial offices[1,2]
2. Building fabric is very important therefore space heating demand should be less than **15 kWh/m²/yr** for all building types.

Measurement and verification

3. Annual energy use and renewable energy generation on-site must be reported and independently verified in-use each year for the first 5 years. This can be done on an aggregated and anonymised basis for residential buildings.

Reducing construction impacts

4. Embodied carbon should be assessed, reduced and verified post-construction.[3]



Low carbon energy supply

5. **Heating and hot water should not be generated using fossil fuels.**
6. The average annual carbon content of the heat supplied (gCO_2/kWh) should be reported.
7. On-site renewable electricity should be maximised.
8. Energy demand response and storage measures should be incorporated and the building annual peak energy demand should be reported.

Zero carbon balance

9. A carbon balance calculation (on an annual basis) should be undertaken and it should be demonstrated that the building achieves a net zero carbon balance.
10. Any energy use not met by on-site renewables should be met by an investment into additional renewable energy capacity off-site OR a minimum 15 year renewable energy power purchase agreement (PPA). A green tariff is not robust enough and does not provide 'additional' renewables.

Notes:

Note 1 – Energy use intensity (EUI) targets
The above targets include all energy uses in the building (regulated and unregulated) as measured at the meter and exclude on-site generation. They have been derived from: predicted energy use modelling for best practice; a review of the best performing buildings in the UK; and a preliminary assessment of the renewable energy supply for UK buildings. They are likely to be revised as more knowledge is available in these three fields. As heating and hot water is not generated by fossil fuels, this assumes an all electric building until other zero carbon fuels exist. [kWh targets are the same as kWh$_{(e)}$]. Once other zero carbon heating fuels are available this metric will be adapted.

Note 2 – Commercial offices
With a typical net to gross ratio, 70 kWh/m² NLA/yr is equivalent to 55 kWh/m² GIA/yr. Building owners and developers are recommended to target a base building rating of 4 stars using the BBP's Design for Performance process based on NABERS.

Note 3 – Whole life carbon
It is recognised that operational emissions represent only one aspect of net zero carbon in new buildings. Reducing whole life carbon is crucial and will be covered in separate guidance.

Note 4 – Adaptation to climate change
Net zero carbon buildings should also be adapted to climate change. It is essential that the risk of overheating is managed and that cooling is minimised.

Developed in collaboration with: London Energy Transformation Initiative; UKGBC; BBP Better Buildings Partnership

Developed with the support of: Good Homes Alliance; RIBA Architecture.com; CIBSE

Calculations should be carried out using predictive energy modelling tools, such as Passivhaus Planning package (PHPP) or equivalent.

Post occupancy monitoring should be undertaken on a percentage of homes (e.g. 30%) and be spread across phases for a period of 5 years to demonstrate the energy performance standards and aid learning, innovation and skills development in the design and construction industry. The post occupancy evaluation should include qualitative (occupant satisfaction questionnaires) and quantitative data (energy monitoring to review against targets set).

Measuring and reporting of upfront embodied carbon emissions is encouraged on major development proposals using a recognized standard methodology such as RICS. Developments should be designed to reduce embodied carbon emissions and best practice targets should be aimed for. LETI sets out some KPI for upfront embodied carbon emissions (building life cycle stages A1-A5); this includes the following elements: substructure, superstructure, MEP, facade & internal finishes.

Chapter 7: Electric Vehicles

The guidance in this chapter is taken from the Essex Design Guide. Further guidance on electric vehicle charging is expected in the emerging Parking Standards guidance document.

A ban on the sale of diesel and petrol cars and vans is expected to come into force in 2030, so it is important to ensure drivers can easily switch to other modes or where this is not conveniently feasible and make use of alternative fuel vehicles. All new cars and vans will be required to be fully zero emission at the tail pipe by 2035.

To support transition to electric vehicles, motorists must be able to charge them.

The support and use of electric vehicles in residential developments provides a number of benefits and layouts should therefore give consideration to how charging infrastructure can be integrated:

- Decreased air pollution in the vicinity due to the lack of exhaust emissions.
- Decreased noise pollution.
- Opportunity to provide ancillary services to the local power grid, enabling the use of higher share of variable renewable energy and potentially avoiding costly grid reinforcements.

Electric vehicles still contribute to congestion. Less private travel is therefore by far the most effective way to reduce transport emissions, but where journeys are necessary then these need to be decarbonised as far as practically possible.

Types of Chargepoint

There are three types of charging equipment, each with an associated charging time and typical application.

Type of chargepoint	Typical power output	Typical charging time	Typical application
Standard	<7kW	4-7 hours	Residential, workplace
Fast	7-22kW	2-4 hours	Retail, leisure, public
Rapid	>22kW	30-45 minutes	Public, fleet, strategic highway network

The majority of charging currently occurs at home, usually overnight when electricity is cheapest. For residential developments the standard 3-7kW chargepoints are sufficient to provide a full charge overnight. The same chargepoints are suitable for employee parking spaces where cars would typically be parked during office working hours.

Fast chargepoints are suitable for public and retail car parks, leisure centres, visitor car parks and other amenities where drivers can top-up their battery while visiting the location for other reasons.

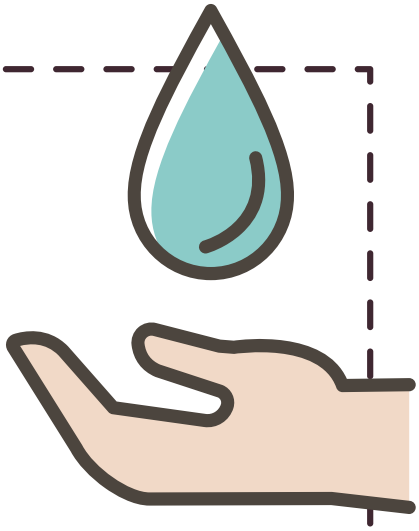
Rapid chargepoints can provide up to 80% power in about 30 minutes, and are best suited for transport hubs (for example, airports, taxi ranks etc.), electric vehicle (EV) charging hubs and along the strategic highway network, where a quick charge is essential.

Number of Chargepoints

For housing developments with garages and/or dedicated off-street parking, each new dwelling should be fitted with a standard (3-7kW) chargepoint.

For housing developments with no off-street parking, 10% of the unallocated parking bays should have an active (i.e. wired and ready to use) chargepoint. A further 10% should have the necessary underlying infrastructure (i.e. cabling and ducting) to enable quick, simple installation at a later date when there is sufficient demand.

Chapter 8: Water efficiency measures



Reducing the risk of drought is crucial in adapting to a changing climate. There is a need for a significant reduction in personal water consumption.

The Environmental Improvement Plan (2023) states that sustainable drainage systems (SuDS) will become mandatory in all new developments by 2024. SuDS, which include a range of eco-friendly measures such as ponds, reed beds and shallow drainage channels, will be required in all new developments in order to reduce the risk of flooding, storm overflow discharges and pollution caused by surface water runoff.

The Colchester Water Cycle Study (WCS) concluded that, allowing for the planned resource management of Anglian Water Services South Essex Resource Zone, Colchester would have adequate water supply to cater for growth over the plan period. However, the WCS identified that there are long term limitations on further abstraction from the raw water resources supplying the Borough and that there is a drive to ensure the delivery of sustainable development for Colchester. Hence there are key drivers requiring that water demand is managed for all new development in order to achieve long term sustainability in terms of water resources.

Policy DM25 of the Section 2 Local Plan requires residential developments to meet the Building Regulation optional higher water efficiency standard of 110 litres per person per day, as set out in Building Regulations part G2. To reduce the demand for water, all development proposals should include water efficiency measures. Applicants should submit a water efficiency calculator report to demonstrate compliance with the policy requirement for 110 litres per person per day water efficiency standard. Applicants should consider reducing water use to the lower water efficiency standard of 80 litres per person per day.

To reduce water demand, water use should first be minimised through efficient fittings. Rainwater harvesting systems and water reuse systems further reduce water usage and the incorporation of these systems should be considered in all new developments.

There are simple measures that can easily be included in new buildings, and retrofitted to old, to help reduce householders' water usage often at little or no cost to the developer. For example: aerated and low flow showerheads reduce the flow and amount of water but don't compromise on pressure; dual flush toilets; A rated appliances.

A rainwater harvesting system allows residents to collect, filter and store rainwater within an underground tank. When stored underground, the rainwater captured remains clean and fresh. Rainwater harvesting also helps manage surface water. As a minimum, all homes should be provided with a water butt.

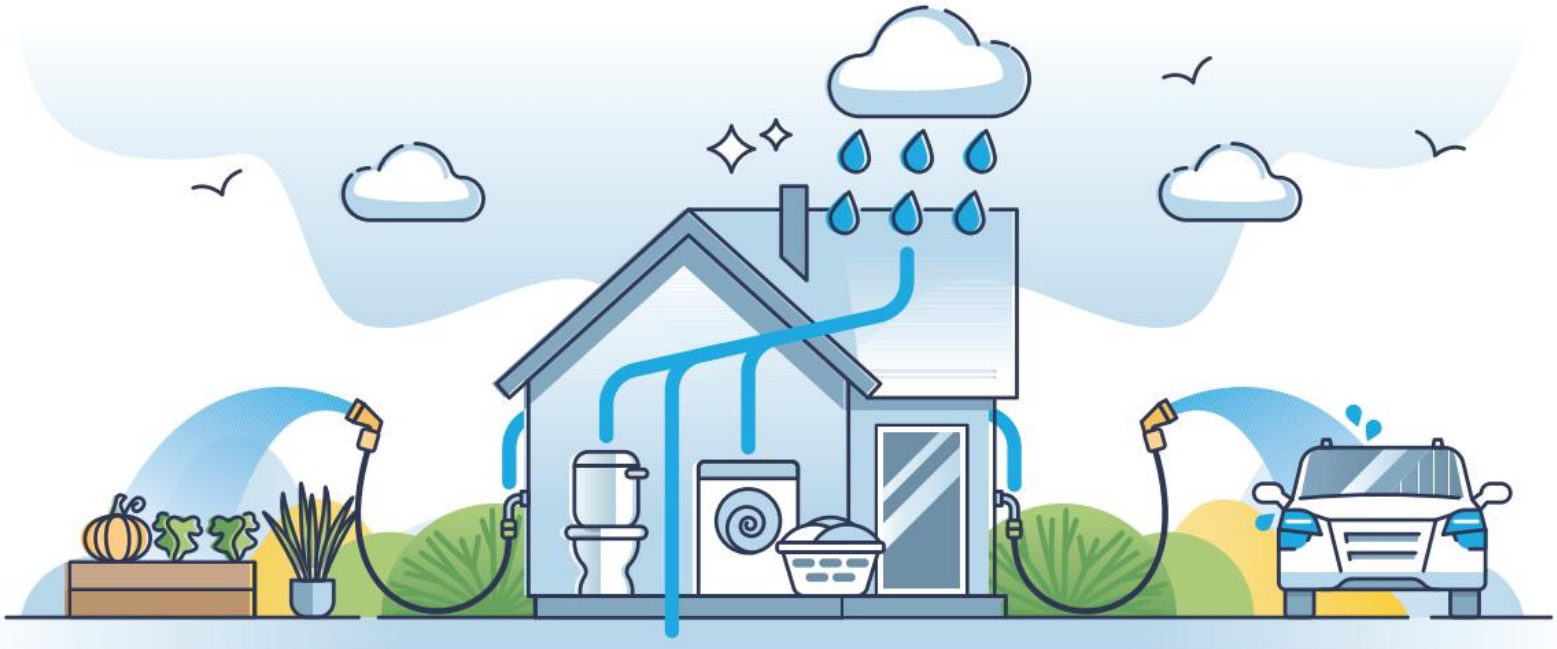
Water re-use, or greywater recycling, collects, processes and stores greywater for subsequent re-use as non-potable water, ie for toilet-

flushing, clothes-washing machines, and irrigation. Greywater is the wastewater from showers, baths and wash-hand basins.

Green-blue infrastructure can contribute to making areas less vulnerable to flood risk whilst ensuring development doesn't increase flood risk to third parties. Through its key role in sustainable drainage, drought mitigation, flood and water stress reduction, providing opportunities for attenuation or infiltration that can help to recharge aquifers, and maintaining levels in watercourses or other blue infrastructure features. The incorporation of sustainable drainage systems (SuDS), that mimic natural drainage and encourage its passive infiltration and attenuation, will be required in all new developments. To avoid increased flood risk and make effective use of existing and planned drainage infrastructure, rainwater should be managed as a valuable resource rather than a waste product. A multi-functional approach to the delivery of SuDS provides multiple benefits such as the provision of public open space and increase biodiversity. The Council has adopted the Essex County Council SuDS Design Guide as SPD and development proposals should demonstrate how they have complied with this.

There is a target for 75% of water bodies to be 'good' status by 2027. Currently only 7% of water bodies in Essex are 'good' status. SuDS are important for water quality benefits and it is important that the SuDS management train or 'treatment train' is followed.

Essex County Council are preparing an Essex Water Strategy and applicants should have regard to this.



Chapter 9: Householder applications

The existing housing stock contributes a significant amount to carbon emissions across the country. All homes will need to decarbonise over the next decade. The Council has agreed to set a target for the Council's housing stock to reach net zero emissions by 2050, and for all homes within the Council's housing stock to achieve an Energy Performance Certificate (EPC) C by 2030.

Extensions and refurbishment works offer opportunities for improving the environmental performance of a home. Improving the energy efficiency of your home can save you money and make your home more comfortable. Undertaking works as part of an extension can be a cost effective way of improving your home. The guidance in this chapter should be considered as part of all householder applications.

In 2020, the Council prepared a householders guide to sustainability and energy efficiency improvements. The LETI Climate Emergency Retrofit Guide sets out what a best practice and exemplar retrofit looks like to support our national transition to net zero carbon.

Energy Hierarchy

The energy hierarchy should be followed, which is:

1. reduce the need for energy at home,
2. install different types of energy efficiency measures and
3. install renewable energy measures.

Following sustainable design principles such as orientation to maximise natural daylight, avoiding overheating and natural ventilation will help you reduce energy demand.

Any new appliances should be energy efficient.

Orientation

When designing extensions, there is an opportunity to orient them to the south to maximise natural daylight and sunlight into your house and take advantage of passive solar gain (absorbing the sun's heat energy to warm internal spaces). However, it is important to consider that rooms facing south should be designed with shaded glazing to exclude high-angle summer sun and good ventilation to help with natural cooling during high temperatures.

Airtightness

Where airtightness is improved through replacement of windows or doors, mechanical ventilation with heat recovery should be installed to reduce the risk of condensation building up which can lead to damp, mould and poor indoor air quality.

Building fabric and materials

Existing buildings can be retrofitted to improve thermal performance. Care should be taken to select the right materials to ensure moisture can pass freely through the building element and not get trapped. More information on this can be found in the Forest of Dean, Cotswold and West Oxfordshire District Councils' Net Zero Carbon Toolkit. By selecting insulation with some thermal mass (e.g. wood fibre board) temperature variations throughout the day can be moderated.

Work from home

In a post Covid-19 society, more people will be working from home and this trend is likely to continue as our digital infrastructure continues to develop. If your home does not currently have a room or space for working from home consider incorporating a work from home space into your extension.

Renewable and low carbon energy

All existing buildings should replace fossil fuel based systems with low carbon heat alternatives as a matter of priority.

Air Source Heat Pumps use heat from the air outside (even when its freezing) to heat your home via radiators, underfloor heating or to heat water in a storage tank for use in the kitchen or bathroom. Air Source Heat Pumps can be retrofitted into existing buildings if there is a suitable location for the outdoor unit. Heat pumps are suited to underfloor heating and larger radiators. However, existing radiators may be sufficient if the building is moderately energy efficient. If the existing building has poor energy efficiency, improvements should also be made to the building fabric, as part of a considered whole house retrofit plan. If a gas boiler is being replaced during an extension or refurbishment replace with an Air Source Heat Pump.

Solar photovoltaic (PV) systems turn sunlight into electricity through the 'solar cells' they contain - this electricity can be used to power home appliances. To install solar PV, your roof should face south and have between 2-5 sq.m of available space free of shading.

Listed buildings and conservation areas should seek the advice of the Conservation Officer.

Consider installing a charging point for electric vehicles to help support sustainable movement.

There are financial incentives available for installation of renewable energy technologies. These change over time and so are not listed in this SPD. Up to date information can be found on the Energy Saving Trust website.

Water efficiency measures

To reduce water demand, water use should first be minimised through efficient fittings. Rainwater harvesting systems and water reuse systems further reduce water usage.

There are simple measures that can easily be included in new bathrooms and kitchens, but that can also be added to existing. Anglian Water Services include water saving information on their website.

Consider installing a rainwater harvesting system, which collects, filters and stores rainwater within an underground tank, or a greywater recycling system, which collects, processes and stores greywater (wastewater from showers, baths and wash-hand basins) for subsequent re-use as non-potable water, ie for toilet-flushing, clothes-washing machines, and irrigation. If you do not have a water butt in the garden, consider investing in one as a way of collecting rainwater which can be used for watering the garden.

Chapter 10: Conclusion

As the Climate Change Committee report: Net Zero – The UK's contribution to stopping global warming says, a major ramp up in policy effort is required. Climate change affects us all and we should all play our part in mitigating and adapting to climate change. This SPD sets out how the development industry can play its part.

Paragraph 8 of the NPPF makes clear that mitigating and adapting to climate change is a core planning objective. New development should be planned for in ways that avoid increased vulnerability to the range of impacts arising from climate change (through adaptation measures including the planning of green infrastructure), and help to reduce greenhouse gas emissions through location, orientation, and design.

The Essex Climate Action Commission recognise that the natural world is our best ally in reversing climate change – it is key to absorbing and storing carbon. Risks from already changing weather systems – more flooding, over-heating, soil degradation, subsidence and water shortage can be tackled by making space for green infrastructure and nurturing our natural world. By transforming Essex into a net zero county, it can become a sustainable, thriving place to live, work and play and many of the measures proposed have multiple benefits.

Through declaring a climate emergency, it has become a priority of Colchester City Council to spur urgent action to reduce our carbon footprint and promote sustainable urban environments and economies.

It is everyone's duty to do what they can to stop this existential threat to our planet.

This SPD is ambitious – it recommends that development proposals go further than adopted planning policies. The SPD sets out how applicants can successfully integrate a best-practice approach towards the climate emergency in their development proposals. The Council recommends that applicants follow the good practice set out in the Net Zero Carbon Toolkit. The Toolkit contains the very latest design approach and good practice within the field of net zero buildings. With the advent of extremely high energy costs the ongoing, relatively low running costs of net zero homes may become a sales point.

The Council's ambition is that all development should achieve an energy balance on-site and should seek to achieve LETI's Key Performance Indicators (KPIs). Achieving an energy balance on-site means that renewable energy generation should be equal to or greater than the development's energy consumption (or energy use intensity) over the course of a year. The aim should be to provide renewable or low carbon heating systems for heating and hot water so that

new development does not connect to the gas grid. Rather than a focus on carbon reduction, the Council supports the metric of energy use rather than a carbon reduction target. The Council supports the LETI approach, which is best practice and is inline with climate change targets.

This SPD sets out the direction we need to take to build sustainable, future proofed buildings. New buildings in Colchester city should reflect the direction of travel and be future proofed so that people and businesses can save money and people can live, work, and play in more liveable and comfortable buildings. LETI believes that to meet our national climate change targets, by 2025 all new buildings must be designed to deliver net zero carbon.

Climate change affects us all and we should all play our part in mitigating and adapting to climate change and creating communities and buildings that are resilient.

Further reading and references

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