

CHAPTER 7

CLIMATE ACTION AND ENERGY

Chapter 7 Climate Action and Energy

Aim: To combat climate change and its impacts in the County by promoting and supporting policies and objectives which contribute towards a transition to a low-carbon and climate resilient future, and which focus on reducing greenhouse gas emissions and energy demands through appropriate and effective climate mitigation and adaptation measures.

7.0 Introduction

This chapter of the Plan sets out the Council's approach to climate action and energy in the County. Through a suite of policies and objectives, it aims to ensure the County transitions to a low-carbon and climate resilient future, with a particular emphasis on reducing greenhouse gas emissions and energy demands in line with national targets. In this regard, the chapter recognises and supports the important role of (inter alia) renewable energy, sustainable transport and travel, energy efficiency and conservation, integrated land-use planning, compact growth, and nature-based solutions such as green infrastructure.

As climate action and energy are cross-cutting themes in the Plan, Table 7.2 in this chapter cross-references all other chapters to identify their climate change mitigation and adaptation provisions.

7.1 Policy Context

The key legislative and policy context for climate action and energy that informed this chapter of the Plan includes (inter alia):

- The Paris Agreement 2015.
- EU Climate and Energy Package 2020.
- EU Effort Sharing Regulations and Targets.
- EU Renewable Energy and Efficiency Directives.
- EU Commission European Green Deal 2019.
- Climate Action and Low Carbon Development (Amendment) Act 2021.
- Project Ireland 2040 – National Planning Framework (NPF) and National Development Plan (NDP).
- Regional Spatial and Economic Strategy 2020 (RSES) for the Southern Region.
- Climate Action Plan 2019; To Tackle Climate Breakdown by Government of Ireland.
- Climate Action Plan 2021.
- The Climate Action and Low Carbon Development Act 2015.
- Carlow Climate Change Adaptation Strategy 2019-2024.
- Carlow County Renewable Energy Strategy 2021 (RES) (Appendix VI).

7.2 Climate Change

Climate change is recognised as a defining issue of our time and is now at the forefront of policy at an international, national, and local level. Climate refers to the average weather conditions prevailing in an area over a long period of time. Climate change refers to long-term shifts in the average weather patterns that have come to define Earth's global, regional, and local climates, such as relating to temperature, rainfall, humidity,

wind etc. The climate on earth has changed many times due to natural processes (e.g. earth’s orbit/tilt and variations in solar energy), with events ranging from ice ages to long periods of warmth. However, in terms of this current period of the planet’s history, there are growing concerns that natural fluctuations in climate are being overtaken by impacts from human activities. This is primarily due to increased greenhouse gas emissions, which includes carbon dioxide from the burning of fossil fuels such as coal, oil, gas and peat in factories, the carbon emissions from car exhausts, the methane and nitrous oxide emissions from agriculture, and emissions from land use changes such as urbanisation and deforestation. These activities have resulted in increased concentrations of heat trapping greenhouse gases in the earth’s atmosphere, which far exceed natural ranges. Ireland’s greenhouse gas emissions per person are amongst the highest of any country in the world.

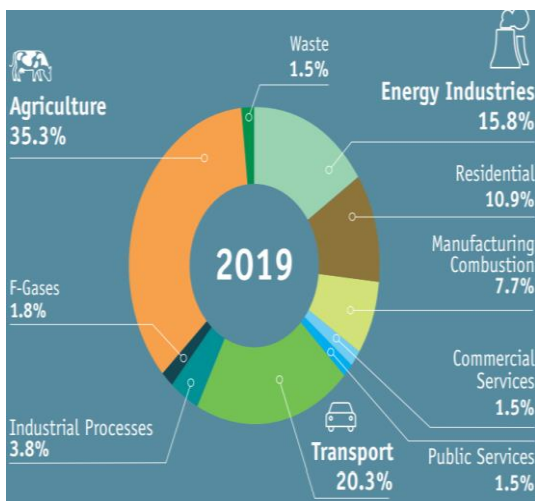


Figure 7.1: Where are Ireland’s greenhouse gas emissions coming from Source: www.epa.ie

Temperature increases have had knock on effects on Ireland’s natural environment, and some tangible indicators of this include:

- Warmer temperatures (Six of the ten warmest years occurred since 1990);
- Increase in the frequency and impact of storms;
- Increase in annual rainfall in the north and west coasts, with decreases or small increases in the south and east.
- A reduction in the number of frost days and a shortening of the frost season;
- Increase in the growing season; and,
- Evidence of greater number of animals on land and in surrounding waters suited to warmer temperatures.

Continued temperature increases (i.e. global warming) could give rise to severe adverse effects on Ireland including, increasing sea levels with coastal regions facing issues of flooding, more erratic weather conditions leading to increased rainfall and storm events as well as water shortages in summer and the potential for increased incidences of flooding, with potential for adverse effects on water quality.

There is therefore a strong level of awareness and understanding at an international, national and local level of the need to take appropriate climate action through a combination of mitigation and adaptation measures (Refer to Section 7.9).

7.3 International Context

7.3.1 Kyoto Protocol

The *Kyoto Protocol* was a landmark international agreement to which 192 countries, including Ireland, agreed to limit worldwide greenhouse gas emissions. The protocol was adopted and ratified in 1997 under the *United Nation Framework Convention on Climate Change (UNFCCC)*.

7.3.2 The Paris Agreement

Building on the Kyoto Protocol, the United Nations Climate Change Conference of the Parties (COP) serves as the formal meeting of the UNFCCC. At the 21st yearly session of the COP (i.e. COP21) held in Paris, a legally binding international treaty on climate change was agreed on 12th December 2015, known as the *Paris Agreement*.

The Paris Agreement came into force on 4th November 2016 and includes commitments from all major emitting countries to keep global temperature rises this century to well below 2°C above pre-industrial levels, while pursuing ways to limit the increase to 1.5°C. The treaty also creates a framework for the transparent monitoring, reporting, efforts and contributions of country’s individual and collective climate goals to lessen global warming.

7.3.3 United Nations 2030 Agenda for Sustainable Development

Another landmark agreement in 2015 was the *United Nations 2030 Agenda for Sustainable Development*. Adopted by all UN member states, the 2030 Agenda represents a blueprint for sustainable development for the future. At the core of the 2030 Agenda are 17 Sustainable Development Goals (SDGs), which address the environmental, economic, and social challenges that the world needs to tackle by 2030. SDG 13 refers to climate action and the need to take urgent action to combat climate change and its impacts. As a member of the UN, Ireland must display commitment to implement the global goals with associated targets and indicators.

Carlow County Council is the current local authority sector Champion for the Sustainable Development Goals (SDG). The purpose of the SDG Champions Programme is firstly to raise public awareness of the SDGs, and secondly to illustrate practical ways in which organisations and individuals can contribute to achieving the SDGs, using Champion organisations' practices as examples.



Figure 7.2: UN Sustainable Development Goals 2015 (SDG Goal 13 Climate Action)

7.4 European Context

7.4.1 EU Climate and Energy Package 2020

The EU Climate and Energy Package is a set of laws that were passed to ensure the EU meets its climate and energy targets for 2020. The package sets out three key targets:

- 20% cut in greenhouse gas emissions (from 1990 levels);
- 20% of EU energy from renewables; and,
- 20% improvement in energy efficiency.

7.4.2 EU Effort Sharing Regulations and Targets

The EU Effort Sharing Regulations 2018 set reductions for 2030 for GHG emission targets compared to 2005 levels. These range across the EU from 0% to 40% reduction in GHG emissions, factoring in a flexibility which depends on GDP per capita. The Regulations commit Ireland to reducing GHG emissions to 30% by 2030 compared to 2005 levels and includes those sectors that are not covered by the *EU's Emissions Trading System (ETS)*. Sectors not covered by the ETS include agriculture, transport (not commercial aviation), residential, non-energy intensive industry, commercial services, and waste.

7.4.3 EU Emissions Trading System (ETS)

The ETS is the EU's tool for cutting GHG emissions from large scale facilities in the power and industry sectors, and in commercial aviation. The cap seeks to ensure that carbon dioxide becomes a product and, thus, is valued at a price, which is determined by the supply and demand at the (trading) market. The target for Ireland has been set at a 30% reduction in ETS sector emissions on 2005 levels by 2030.

7.4.4 EU Renewable Energy and Efficiency Directives

Under the 2009/28/EC Directive EU member states have taken on binding national targets for their share of renewable energy in their energy consumption by 2020. The targets vary to reflect country's different starting points for renewable energy production. Ireland's target under this Directive was to source 16% of all energy consumed from renewable sources, and a 10% share of renewable energy in transport consumption.

A revised Renewable Energy Directive in 2018 (2018/2001/EU), sets a target of at least 32% for renewable energy by 2030, at EU-wide level, with a review clause for 2023 to examine the potential for an upward revision of the EU level target. Separately, a revised Energy Efficiency Directive (2018/2002/EU) also sets a target of at least 32.5% for energy efficiency EU-wide.

7.4.5 Climate and Energy Framework 2030

The EU set further targets through policies as part of the Climate and Energy Framework, which were agreed in 2018. These targets include a 40% reduction in EU greenhouse gas emissions from 1990 levels and a greater contribution from renewable energy under key policy pillars covering renewable energy, energy efficiency and emissions trading.

7.4.6 EU Governance of the Energy Union and Climate Action Regulation

To help the EU reach its 2030 climate and energy targets, this Regulation sets common rules for planning, reporting and monitoring. The Regulation also ensures that EU planning and reporting are synchronised with the ambition cycles under the Paris Agreement.

The Regulation also requires Member States to develop integrated national energy and climate plans (NECPs) based on a common

template. Ireland's draft NECP was submitted to the European Commission in December 2018. The NECP sets out estimated trajectories by renewable energy technology that Ireland projects to use to achieve the overall and sectoral trajectories for renewable energy from 2021 to 2030.

7.4.7 EU Commission European Green Deal 2019

The Green Deal sets out a roadmap for making the EU's economy sustainable by turning climate and environmental challenges into opportunities across all policy areas and making the transition just and inclusive for all with an overall target of having no net emissions of GHGs in 2050.

7.4.8 Local Authorities EU Agreements

As signatories of the European Union's Covenant of Mayors for Climate and Energy Initiative, local authorities are required to monitor at a County level, energy consumption, CO² emissions and to report on the progress of relevant action plans. The implementation of such action plans and mitigatory strategies is critical in urban areas, which contribute the largest proportion of overall emissions (70% globally) and contain the majority of services, employment areas and population levels. Carlow County Council is a signatory of the Covenant of Mayors for Climate and Energy,

www.covenantofmayors.eu

7.5 National Context

7.5.1 Project Ireland 2040 – National Planning Framework (NPF) and National Development Plan (NDP)

Both the NPF and NDP are at the top of the spatial planning hierarchy in Ireland and are the Government's high-level plan for the future development of the country, with a particular focus on strategic growth and

infrastructure. National Strategic Outcome 10 (NSOs) is to facilitate a *Transition to a Low Carbon and Climate Resilient Society*. The capital investment priorities arising from this strategy represent a major change in Ireland's delivery of climate-action objectives to achieve sufficient reductions in carbon emissions during the period to 2030.

Investment priorities include:

- Upgrading of 45,000 homes a year from 2021;
- An additional 3,000-4,500 MW of renewable energy;
- Full rollout of the Renewable Heat Support Scheme; and,
- Transition to low-emission (including electric) buses for the urban bus fleet; and a target of 500,000 electric cars by 2030.

7.5.2 The Climate Action and Low Carbon Development (Amendment) Act 2021

The Programme for Government commits to a 51% reduction in carbon emissions by 2030 with an objective to achieve a climate-neutral economy no later than 2050. These commitments are reflected in the Climate Action and Low Carbon Development (Amendment) Act 2021. This Act will support the country's transition to achieve a climate neutral economy by 2050. It sets out legally binding, clear targets and commitments to meet the national, EU and international climate goals and obligations.

7.5.3 National Adaptation Framework (NAF) – Planning for a Climate Resilient Ireland 2018

The NAF sets out the national strategy to reduce the vulnerability of the country to the negative effects of climate change and to avail of positive impacts. It outlines a whole of government and society approach to climate adaptation. Under the Framework, a number

of Government departments are required to prepare sectoral adaptation plans.

This NAF and its successors will set out the context to ensure local authorities, regions and key sectors can assess the key risks and vulnerabilities of climate change, implement climate resilience actions and ensure climate adaptation considerations are mainstreamed into all local, regional and national policy making.

7.5.4 Climate Action Plan 2019 – To Tackle Climate Breakdown

The Climate Action Plan (DCCAE) outlines the current challenges across key sectors including electricity, transport, built environment, industry, and agriculture, and outlines a co-ordinated approach towards ambitious decarbonisation targets. The objective of the plan is to enable Ireland to meet its EU targets to reduce its carbon emissions by 30 percent between 2021 and 2030 and lay the foundations for achieving net zero carbon emissions by 2050. It sets out 180 actions extending to all sectors of the economy. These targets are to be underpinned by governance arrangements including carbon-proofing policies, the establishment of carbon budgets, a strengthened Climate Change Advisory Council and greater accountability.

Section 7.5.5 Climate Action Plan 2021

The Climate Action Plan 2021 provides a detailed plan for taking decisive action to achieve a 51% reduction in overall greenhouse gas emissions by 2030 and setting a path to reach net-zero emissions by no later than 2050. The Plan also builds on measures

and technologies set out in the 2019 Plan and builds on them in order to deliver greater ambition.

The Plan will put Ireland on a more sustainable path; cut emissions; create a cleaner, greener economy and society; and protect from the devastating consequences of climate change. It lists the actions needed to deliver on climate targets and sets indicative ranges of emissions reductions for each sector of the economy. The Plan will be updated annually to ensure alignment with our legally binding economy-wide carbon budgets and sectoral ceilings.



Figure 7.3: Climate Action Plan – to tackle Climate Breakdown

7.5.5.1 Decarbonisation Zones

Under the Climate Action Plan 2021, a requirement has been placed on the Council to develop a Decarbonisation Zone (DZ) in the County, that will become the focus for a range of climate mitigation, adaptation, and biodiversity measures. This follows from Action 165 in the previous Climate Action Plan 2019. This requires consideration of not just energy, but transport, spatial planning, the natural environment, and community engagement. The criteria for selecting a DZ has been set out by the Department of Housing Local Government and Heritage, and guidance on how to develop a DZ has been issued by the Climate Action Regional Office (CARO). The Department have defined a DZ as a “*spatial area identified by the local authority, in which a range of climate mitigation, adaptation and biodiversity measures and action owners are identified to address local low carbon energy, greenhouse gas emissions and climate needs to contribute to national climate action targets*”. The DZ must include a broad outline of implementable projects with potential outcomes for delivering reductions in carbon emissions. These outcomes must meet the

Government’s targets for carbon emissions reductions, and namely a 7% reduction in greenhouse gas emissions from 2021 to 2030. To be an effective demonstrator, the DZ must cover either (a) urban areas and agglomerations with a population not less than 5000 persons, or (b) rural areas with an area of not less than 4km².

7.5.6 Investing in the Transition to a Low-Carbon and Climate-Resilient Society 2018-2027 and Climate Action Fund

The 2018 investment strategy outlines the Government’s commitment to achieving a low carbon and climate resilient future by 2050. To achieve this, actions must be undertaken to reduce greenhouse gas emissions, and resilience entails reducing vulnerability to climate change impacts which are happening now, and what might occur in the future. Project Ireland has committed to an investment of €22 billion towards climate action over the coming decade, with the National Development Plan allocating a further €8.6 billion for investments in sustainable mobility.

The *Climate Action Fund* was launched in 2018, with €500 million supporting the

delivery of projects necessary to achieve the low carbon, climate-resilient transition.

7.5.7 Support Schemes

A number of specific support schemes are in operation to support Ireland’s transition to a low carbon future. These include;

- The *Renewable Electricity Support Scheme (RESS)* supporting renewable electricity projects in Ireland with a primary focus on cost effectiveness.
- The *Support Scheme for Renewable Heat (SSRH)* with the goal of increasing the share of renewable sources in the heat and thermal sector.
- The *National Home Retrofit Scheme* aimed to facilitate home upgrades in the delivery of energy efficient upgrades and renewable energy usage.

7.6 Regional Context

7.6.1 Regional Spatial and Economic Strategy 2020 (RSES) – Southern Regional Assembly

The Southern Regional Assembly supports the implementation of the Government’s Climate Action Plan 2019. The RSES identifies three priority areas for action to address climate change and to bring about a transition to a low carbon economy. The three priority areas include:

- Decarbonisation** To develop a Regional Decarbonisation Plan to provide a framework for action on de-carbonisation across all sectors.

Resource Efficiency

To utilise the Earth's limited resources in a sustainable manner while minimising impacts on the environment.

Climate Resilience

Aims to reduce the vulnerability of the environment, society and economy to the current and future risks posed by climate change.

7.6.2 Climate Action Regional Offices (CAROs)

Carlow County Council is one of 17 Local Authorities located within the Eastern and Midlands Climate Action Region (CARO). The Eastern and Midland CARO is one of four regional climate action offices set up in 2018 in response to Action 8 of the 2018 National Adaptation Framework (NAF) – Planning for a Climate Resilient Ireland. The objective of these offices is to drive climate action at both regional and local levels.

The composition of the four Climate Action Regions has been determined by the geographical and topographical characteristics, vulnerabilities and shared climate risks experienced across local authority areas. The CAROs are key to enabling local authorities develop and roll out climate action strategies at a local level, and in a coordinated response to national and regional policy.

7.7 Local Context

7.7.1 Carlow Climate Change Adaptation Strategy 2019-2024

The Carlow Climate Change Adaptation Strategy guides the process of the Council's climate adaptation planning. This is the first step in increasing knowledge and understanding of the changing climate, growing resilience, and enabling effective responses to the threats posed by climate change. It features a range of actions across key thematic areas, including:

- Local Adaptation Governance and Business Operations
- Mobility
- Community Health and Wellbeing
- Infrastructure, Built Environment and Landuse Development
- Clean Energy
- Economic Development
- Natural Resources and Cultural Infrastructure
- Water and Resource Management.

Collectively, these thematic areas address the Council's vision of fulfilling a leadership role in learning about and responding to the impacts of climate change, fully engaging with the risks and opportunities of a changing climate and building a resilient future.

7.7.2 Carlow County Renewable Energy Strategy 2021 (RES)

A Renewable Energy Strategy (RES) for the County has been prepared alongside this Plan and is incorporated as Appendix VI. The RES includes a comprehensive assessment and spatial evaluation of the County to identify the most suitable locations for renewable energy technologies, taking account of available natural resources, environmental

considerations, impacts on local communities and quality of life.

The RES provides a robust policy position for the consideration of renewable energy in land-use planning and will allow the County to maximise its contribution to achieving EU and national targets through the optimum use of natural resources.

The RES is underpinned by an agreed vision, as follows:

“To encourage and support the transition of Carlow to a sustainable county through community engagement, energy efficiency and the sustainable development of renewable energy, whilst providing environmental and economic benefit at a local and national level, and in accordance with all relevant planning and environmental considerations”.

Climate Action – Overarching Policies

It is the policy of the Council to:

CA P1: Promote and support the implementation of European, national, regional, and local objectives for climate change adaptation and mitigation as detailed in the following documents and taking into account all other provisions of the Plan (including those relating to land-use planning, sustainable travel and transport, and flood risk management and drainage);

- Climate Action Plan 2021;
- National Adaptation Framework (NAF) – Planning for a Climate Resilient Ireland 2018;
- Any new National Mitigation Plan adopted during the lifetime of this Development Plan;
- Relevant provisions of any Sectoral Adaptation Plans prepared to

comply with the requirements of the Climate Action and Low Carbon Development Act 2015, including those seeking to contribute towards the National Transition Objective, to pursue, and achieve, the transition to a low carbon, climate resilient and environmentally sustainable economy by the end of the year 2050;

- Any Regional Decarbonisation Plan prepared on foot of commitments included in RPO 90 of the Regional Spatial and Economic Strategy (RSES) for the Southern Region;
- Carlow County Council Climate Change Adaptation Strategy 2019-2024; and,
- Carlow County Renewable Energy Strategy (Appendix VI).

CA P2: Support the transition of the County to a competitive, low carbon, climate-resilient and environmentally sustainable economy by 2050, by way of reducing greenhouse gases, increasing renewable energy, and improving energy efficiency.

CA P3: Co-operate with and support the work of the Eastern and Midlands Climate Action Regional Office (CARO).

CA P4: Support the National Dialogue on Climate Action in an effort to increase awareness of climate change, behavioural change, and adaptation and mitigation actions, and in doing so provide an ongoing platform for planning climate resilience with a focus on personal responsibility at all levels.

CA P5: Promote and encourage positive community and / or co-operative led

climate action initiatives and projects that seek to reduce emissions, improve energy efficiency, enhance green infrastructure and encourage awareness on climate change issues.

CA P6: Encourage innovation and facilitate the development of pilot schemes that support climate change mitigation and adaptation measures.

Climate Action – Overarching Objectives

It is an objective of the Council to:

CA O1: Consider a variation of the County Development Plan within a reasonable period of time, or to include such other mechanism, as may be appropriate, to ensure the County Development Plan will be consistent with the approach to climate action recommended in the revised Development Plan Guidelines when adopted or any other relevant guidelines.

CA O2: Identify and develop a Decarbonisation Zone (DZ) in the County in accordance with the Climate Action Plan 2021 and criteria and guidance issued by the Department of Housing, Local Government and Heritage and the Climate Action Regional Office (CARO).

CA O3: Implement the Council's current Climate Change Adaptation Strategy 2019-2024, and any subsequent or updated Strategy.

CA O4: Prepare a Climate Action Plan to include both mitigation and adaptation measures, and which will be updated every five years.

CA O5: Raise public awareness of issues associated with climate action and climate change mitigation and adaptation.

7.8 Carlow’s Energy Profile

The County’s energy profile has been calculated in the RES using data from the Sustainable Energy Authority Ireland (SEAI), 3CEA, and the CSO. In 2019, Carlow accounted for 1.2% (151 Ktoe¹ or 1.76TWh²) of national energy consumption, and per head of population, the County’s average energy consumption is marginally higher than the national average.

Transport is the largest consumer of energy in Carlow and nationally. The transport sector accounts for 35% of Carlow’s total final energy consumption. Despite private car consumption being 1.2% higher than the national average, the percentage of energy consumed by transport in Carlow is lower than the national average due to the fact that energy for aviation and navigation was not considered to be consumed in Carlow. Use of rail transport in Carlow is limited, with the

Dublin to Waterford InterCity line passing through Carlow, and also Muine Bheag.

Industry and Commercial/Public Services consume 27% and 13% of energy respectively in Carlow. Nationally, industry and services consume 19% and 14%, this is reflective of a significant industrial base in Carlow.

The residential sector is the third largest consumer of energy in Carlow, making up 24% of the total energy consumption. Average energy consumption by dwelling in Carlow is 6% higher than the national average as dwellings in Carlow are older, are less well insulated, are reliant on oil as a fuel source and have lower BER ratings. This explains the larger percentage of energy consumed by the residential sector in Carlow compared to 23% consumed by the sector nationally.

The agriculture sector in Carlow consumes 2% of energy, similar to the 2% consumed by this sector nationally. This is due to Carlow’s rural landscape and the high proportion of land devoted to agriculture.

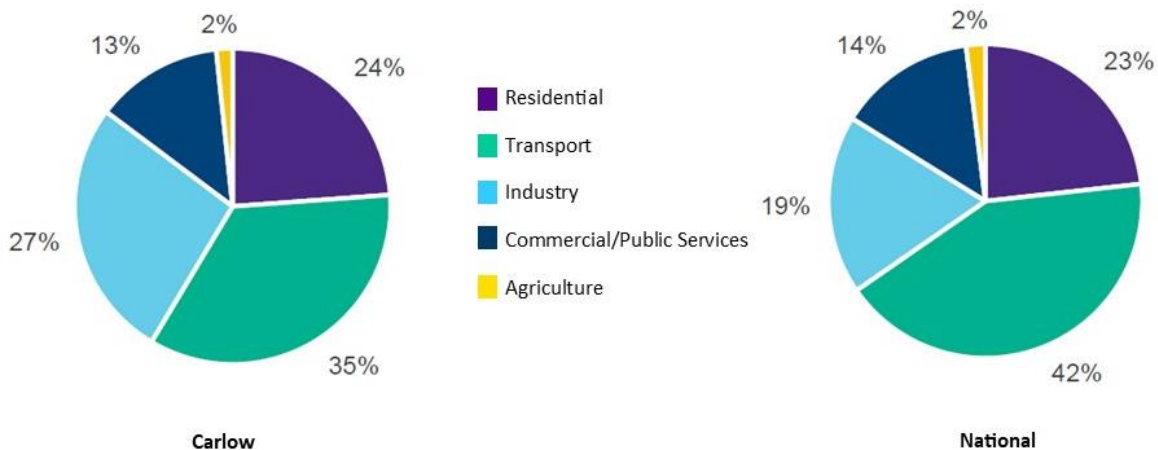


Figure 7.4: Carlow and National Energy Consumption 2019 (%) by Sector (Source: 3CEA and SEAI)

¹ Kilotonne of oil equivalent (ktoe) is the approximate amount of energy that can be extracted from one tonne of crude oil.

² Terawatt Hour (TWh) is a unit of energy representing one trillion (1 000 000 000 000) watts for 1 hour. Terawatt hours are often used as a measure of largescale energy production or consumption.

7.8.1 Carlow’s Energy Consumption by Mode

Figure 7.5 shows that heating accounts for the largest consumption of energy by mode in the county.

Around 42% of energy is used in heating applications, the majority of which is in the residential sector. This is significantly higher than the national average and due to the reliance on oil as a fuel source and lower BER ratings. Around 36% of energy is used in transport applications, which is lower than the national average. This is due to the fact that energy for aviation and navigation was not considered to be consumed in Carlow. Carlow has an urban and rural population with approximately 65 people per kilometre. The rural population of Carlow is therefore highly dependent on private vehicle travel.

Approximately 21% of energy is used in electrical applications in Carlow, which is marginally higher than the national figure. These differences are explained by the industrial and commercial employment in Carlow in comparison to the national average.

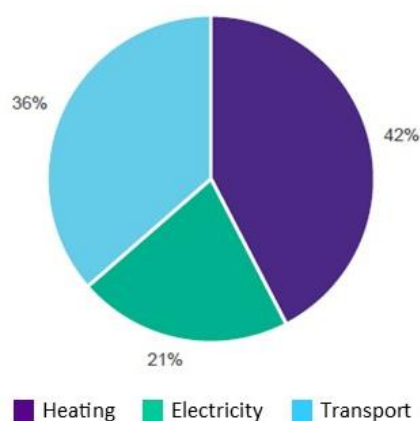


Figure 7.5: Carlow Energy Use (%) by Mode 2019
(Source: 3CEA and SEAI)

Energy Consumption – Policies

It is the policy of the Council to:

EC P1: Promote and support initiatives aimed at reducing the level of energy consumption across all sectors in the County.

7.9 Climate Change Mitigation and Adaptation

The impacts and risks of climate change can be reduced and managed through mitigation and adaptation actions.

Climate mitigation describes actions to reduce the likelihood of climate change occurring or to reduce the impact if it does occur. This can include reducing the causes of climate change (e.g. emissions of greenhouse gases) as well as reducing future risks associated with climate change. Development Plans can seek to improve sustainable mobility through land use planning, having the potential to seek reductions in existing levels of GHG emissions and limit future increases. Other beneficial effects arising from climate mitigation include contributions towards reductions in energy consumption, increases in alternative energy usage, maintenance / improvement of air quality and reductions /limits in noise emissions.

Climate adaptation is the principle of dealing with the negative effects arising from climate change. The aim is therefore to reduce the vulnerability of our environment, society and economy and increase resilience. Adaptation involves taking steps to adjust human and natural systems in response to existing and anticipated impacts and to take advantage of new opportunities that may arise.

Climate adaptation brings opportunity through green growth, innovation, jobs, and ecosystem enhancement as well as

improvements in areas such as water and air quality. One of the key issues for land-use planning in the context of climate adaptation is the consideration of flood risk. Strategic Flood Risk Assessment (SFRA) facilitates the

appropriate zoning of areas that are at elevated risk of flooding and the integration of flood risk management provisions into Development Plans. (Refer to Chapter 6)

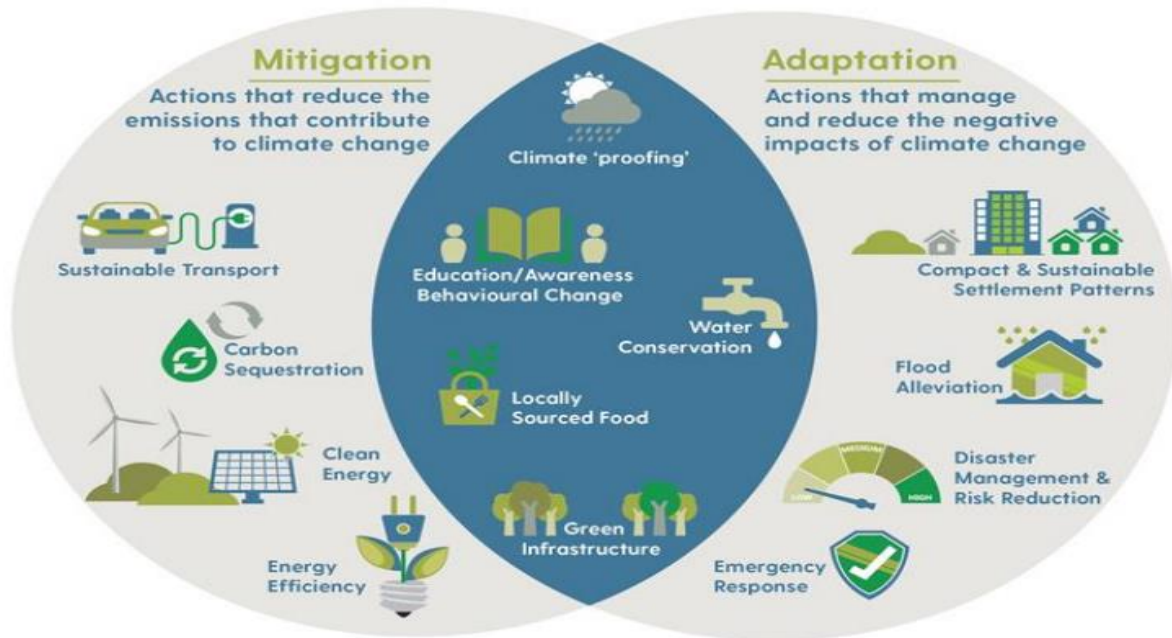


Figure 7.6: Mitigation and Adaptation Actions (Source: Eastern and Midland Climate Action Regional Office - CARO)

7.10 Climate Change Mitigation in Carlow

7.10.1 Renewable Energy

Renewable energy (RE) is that which is derived from natural resources that are not depleted when used and are alternatives to fossil fuels. Where sufficient quantities of renewable resources exist, technologies can be employed for their exploitation, producing electricity, heat, or transport fuel. The processes in which these resources are converted to usable forms of energy do not release harmful pollutants or greenhouse gases, such as carbon dioxide (CO²).

County Carlow has an abundance of natural resources that can be harnessed in a sustainable manner, without negatively impacting on the environment. There is

potential for a range of renewable energy technologies, including:

- Wind energy;
- Solar energy;
- Bioenergy (biomass, biogas, biofuel);
- Geothermal energy;
- Hydropower; and,
- Waste-to-energy.

The potential for each renewable energy type in Carlow is dependent on the abundance of the natural resource available, along with environmental and infrastructural constraints and facilitators. The scale of developments can range from micro to large-scale, providing energy for a single dwelling, a commercial property, or being exported to the electricity grid for distribution. Renewable energy technologies can also be successfully co-located, or located alongside installations for

energy storage, conversion, and grid stability. This approach can help enable greater penetration of renewable energy on the national grid, as well as integration of renewable electricity with transport and the gas grid. Renewable energy development decreases reliance on fossil fuels and imports, reducing greenhouse gas emissions and improving security of supply.

Renewable Energy – Policies

It is the policy of the Council to:

RE P1: Encourage and facilitate the production of energy from renewable sources, such as from wind, solar, bioenergy, hydroelectricity, and geothermal, subject to compliance with proper planning and environmental considerations.

RE P2: Support the co-location of renewable energy technologies on a case-by-case basis subject to compliance with planning and environmental criteria.

Renewable Energy – Objectives

It is an objective of the Council to:

RE O1: Seek to achieve a minimum of 130MW of renewable electricity in the County by 2030, by enabling renewable energy developments, and through micro-generation including rooftop solar, wind, hydro-electric and bioenergy combined heat and power (CHP).

7.10.2 Infrastructural Facilitators

The availability of supporting infrastructure can facilitate or constrain renewable energy developments. The type, scale and location of installations will depend on the proximity to the required infrastructure and the available

capacity. Key supports include the national electricity grid, gas infrastructure, water supply and wastewater facilities, transport, and energy storage. Where necessary, infrastructure may need to be upgraded or constructed, however, this increases the complexity, cost, and duration of renewable energy projects.

Infrastructural Facilitators – Policies

It is the policy of the Council to:

IF P1: Support the development, reinforcement, renewal, and expansion of key supporting infrastructure to facilitate renewable energy developments, subject to compliance with proper planning and environmental considerations.

7.10.3 Overview of Renewable Energy Types

Renewable energy types with the greatest potential for realisation throughout the County have been addressed in detail in the RES (Appendix VI) and are summarised in the following sections.

7.10.3.1 Wind Energy

Site suitability is an important factor in determining the suitability of wind farms, having regard to possible adverse impacts associated with, for example, residential amenities, landscape, including views and scenic routes, wildlife, habitats, designated sites, protected structures or bird migration paths, and compatibility with adjoining land uses. The Council is required to achieve a reasonable balance between responding to overall positive Government policy on renewable energy and enabling the wind energy resources of the County area to be harnessed in a manner that is consistent with proper planning and sustainable development.

Onshore wind energy is the largest contributor to total renewable energy generation in the County, which reflects the national status of wind energy contribution. There is currently an installed capacity of c. 5.8 MW of onshore wind power in the County. The level of wind energy penetration in the County is relatively low, representing less than 0.1% of the installed national capacity.

The challenges to the development of onshore wind include the local wind speed resource, noise limits, specifications for shadow flicker and spatial requirements relating to setback distances and environmental constraints. The 2006 Wind Energy Development Guidelines are in the process of being updated, with the publication of the Draft Wind Energy Development Guidelines (DCCAE, December 2019). The draft guidelines require a setback distance from residential properties of four times the turbine tip height, with a minimum requirement of 500 metres.

The County RES includes a calculation of the available wind resource having regard to the Draft Wind Energy Development Guidelines (DCCAE, December 2019) and its specific planning policy requirements. The analysis, illustrated by the map at Figure 7.7, takes account of:

- Wind Speed;
- Environmental, Heritage and Amenity constraints;
- Available area > 5 km² - taking into account the spatial requirements for large wind farm development;
- Separation distances from housing – taking into account the setback distance of 500m from all sensitive receptors as per the Draft WEDGs 2019.

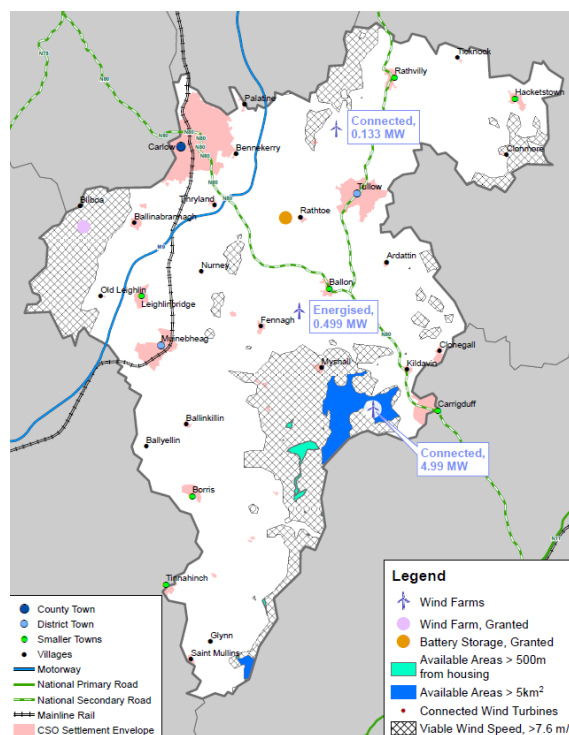


Figure 7.7: Wind Energy Opportunities and Constraints

The technical mapping exercise undertaken for the County RES also highlights that no significant conflicts arise in relation to the wind strategy designations for neighbouring counties, namely Laois, Kilkenny and Wexford. This ensures a consistency of approach with neighbouring counties, and ultimately a more co-ordinated wind energy strategy across the region. It is also relevant to note in this regard that the technical mapping exercise for wind opportunities and constraints in the county is a tool which flags areas of having a higher or lower concentration/distance from various sensitive receptors.

The Landscape Character Assessment (LCA) for Carlow included as Appendix VII to this Plan, groups and maps the landscapes of the County into four major Landscape Character Areas, and includes detailed recommendations for their management, protection, and conservation. The Landscape Character Areas were subject to a more detailed analysis to give recognition to specific landscape features through the further identification of Landscape Types. It is

these specific features that often contain more significant and sensitive landscapes that are highly valued for scenery and amenity and include a large number of protected views, prospects and scenic routes. This includes the Uplands Landscape Type as identified in Figure 6 of the LCA, where the elevated

terrain is more visually sensitive and has the highest landscape sensitivity rating of 5, out of a rating scale of 1 to 5. Therefore, windfarm development in the more elevated Uplands Landscape Type will not normally be permissible (See Figure 7.8).

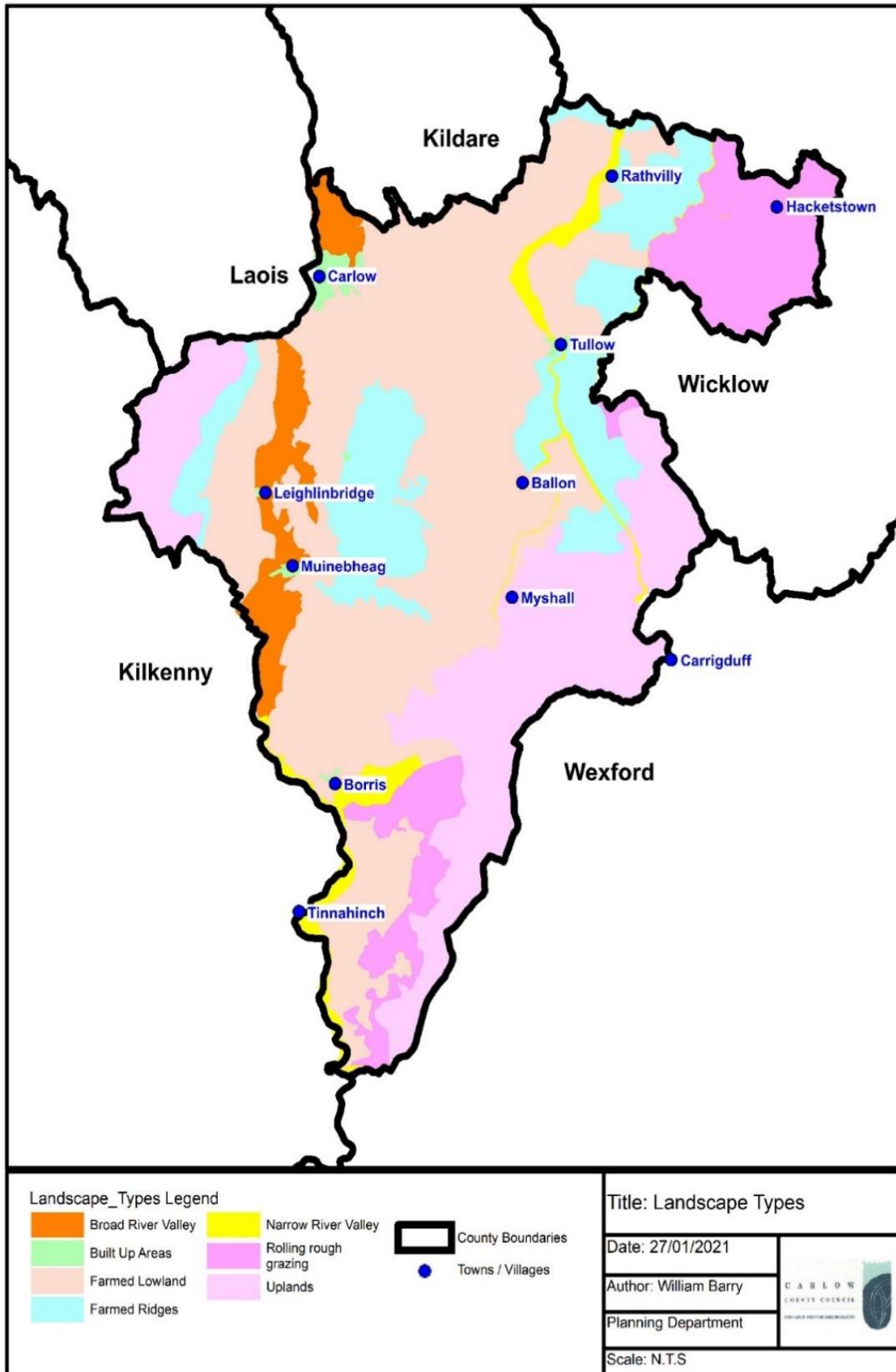


Figure 7.8 Landscape Character Types

Wind Energy – Policies

It is the policy of the Council to:

WE P1: Have regard to the Department of the Environment, Heritage and Local Government’s Guidelines for Planning Authorities on Wind Energy Development (or any update to this document).

WE P2: Support the re-powering of existing wind farms when they come to the end of their operational life, and extensions to existing wind farms, subject to compliance with proper planning and environmental considerations.

WE P3: Support community led wind energy developments or developments with innovative models for community ownership.

WE P4: Wind farm development will not normally be permissible in the Uplands Landscape Type as shown in Figure 6 of the Carlow County Landscape Character Assessment included as Appendix VII to this Plan. This provision shall not apply to micro energy generation and community energy projects as provided for in Section 7.10.3.5, where deemed appropriate and subject to compliance with proper planning and environmental considerations.

Wind Energy – Objectives

It is an objective of the Council to:

WE O1: Increase the penetration of wind energy generation in County Carlow at appropriate locations and scale and subject to compliance with proper

planning and environmental considerations.

7.10.3.2 Solar Energy

Solar energy technology harnesses the energy radiated from the sun that reaches the earth as visible light. Solar energy can be used to produce electricity, heat or hot water. There are two main categories of technologies that are suitable for installation in Ireland, solar thermal and solar photovoltaic (PV). In 2019 solar PV energy provided 0.07% of Ireland’s electricity generated, producing 21 GWh³. In Ireland, solar thermal is generally considered to be suitable for smaller scale applications such as domestic hot water or to meet part of the demand in larger buildings.

Solar photovoltaic (PV) technology exploits solar energy to produce electricity. Ground-mounted solar arrays, or solar farms, can deploy solar PV technology on a small, medium, or large scale. Solar farms export the generated electricity to the grid and therefore the proximity to grid infrastructure must be considered. Other factors contributing to the suitability of a site include the solar resource, slope of the land, accessibility, and the potential for over shading.

No commercial scale solar projects are in operation within County Carlow. However, there are a number of solar developments permitted with a total export capacity of c. 29.49 MW.

There are currently no national guidelines in place to guide the location or scale of solar farms. Constraints may arise in relation to landscape impacts, protection of natural heritage or archaeology, or in relation to protecting the high value agricultural land suitable for tillage.

³ SEAI Energy in Ireland 2020 Report

7.10.3.3 Bioenergy

Bioenergy is energy derived from biological sources, typically organic matter from plants and animals and their by-products. It can be categorised as biomass, biogas, and biofuels.

Biomass refers to land and aquatic vegetation, organic waste, and photosynthetic organisms. Depending on the conversion technology employed, biomass can be converted directly to heat and electricity, or used to make biogas or biofuel. Solid biomass tends to be converted directly to heat and electricity by combustion, while wet biomass is digested to form biogas or fermented to produce biofuel. The main types of solid biomass used in Ireland for direct combustion are forest thinnings, sawmill residues, waste wood, willow, miscanthus, straw, residual municipal solid waste (MSW) and tallow.

Biogas, formed from biomass, can be combusted in boilers to produce heat, or in combined heat and power plants, typically gas engines, to provide both heat and electricity. Anaerobic digestion (AD) is the process used to produce biogas. Grass silage, domestic and industrial food waste, and pig and cattle slurry provide the feedstock for the process. The biomass is broken down anaerobically in biodigester plants to produce the biogas which can be combusted to create heat or used to generate electricity.

Biofuels can be produced from biomass which can be used as a renewable alternative to fossil fuels for transport. The success of bioenergy projects is heavily dependent on the availability of the resources. Carlow's large agricultural industry presents opportunities for the provision of straw and animal manure and silage. A common failure factor for bioenergy plans is competition for land use, particularly food crop production. There is reluctance to use edible plants or good quality arable land for energy crop

production. Therefore, success is more likely when harnessing residue from existing industries, such as forest materials and animal by-products.

Bioenergy – Policies

It is the policy of the Council to:

- BE P1: Support proposals for commercial scale bioenergy plants on lands which are in industrial / enterprise use or zoned for such purposes, including on brownfield sites or sites in or adjacent to these areas.
- BE P2: Support the installation of district heating schemes powered by biomass fuel sources.
- BE P3: Ensure that any commercial bioenergy plant is close to the point of demand and is served by public roads with sufficient capacity.
- BE P4: Support the development of biogas (Anaerobic Digestion) plants at suitable locations, including on-farm facilities.

Bioenergy – Objectives

It is an objective of the Council to:

- BE O1: Support and encourage the development of bioenergy opportunities, facilities, and associated enterprises having regard to the effects of land use change.

7.10.3.4 Micro Hydroelectric Power

Hydroelectric power is the generation of electricity through harnessing the energy in the flowing water of a stream or river. The key factor for success or failure of micro hydroelectric power is site selection. Site

selection must consider the environmental impact, the resource availability, and the proximity to the required infrastructure. One of the key failure factors for hydropower development plans is the environmental and landscape impact during construction and operation. Hydropower installations operate by disrupting the flow of the watercourse, which may impact on biodiversity in the area. The visual amenity of the area is also impacted during construction, and to a lesser extent during operation.

Potential locations within Carlow were identified by the SEAI for micro hydroelectric power installations. There is theoretical potential for a total installed capacity of approximately 2 MW throughout the County. This resource was mapped by the SEAI from comprehensive information identified in the then Department of Energy's 1985 report "Small Scale Hydro Electric Potential of Ireland". As such, the identified sites in Carlow outlined are indicative of micro-hydropower potential only. Any proposal for hydro-power development would however, need to be subject to a feasibility or technical study, as well as detailed environmental assessment and subject to the outcomes of the planning process at the project level.

Micro Hydroelectric Power – Objectives

It is an objective of the Council to:

HP O1: Support the development of micro-hydroelectric generation opportunities, where demonstrated technically viable and subject to compliance with proper planning and environmental considerations including provisions of the Habitats Directive.

7.10.3.5 Micro Energy Generation and Community Energy

Micro energy generation is the domestic and community use of small-scale solar PV and solar thermal, wind, Combined Heat and Power (CHP) and Ground Source Heat Pump (GSHP) technologies to generate heat and electric power in a domestic, commercial, or agricultural setting.

Micro energy generation can be used to meet all the energy needs of a home, business, or community, or can be a supplement to grid connected energy. Micro generation allows homes, business, and communities to lower their carbon footprint and to reduce the cost of energy imported from the grid. Micro generation technologies can be combined to form a hybrid power solution that can offer superior performance and lower cost than a system based on one generator. Energy storage can be combined with micro generation technologies to allow for the supply of energy during periods of low generation.

Micro Energy Generation and Community Energy - Policies

It is the policy of the Council to:

MG P1: Encourage the retro fit of domestic and commercial buildings with micro generation technologies to improve the environmental performance of buildings.

MG P2: Actively promote the use of micro-renewable technologies throughout the County for all redevelopment / extension / expansion projects.

Micro Energy Generation and Community Energy - Objectives

It is an objective of the Council to:

MG O1: Support and facilitate micro-renewable energy installations at appropriate locations and scale, and subject to compliance with proper planning and environmental considerations.

7.10.3.6 Geothermal Energy (Ground Source Heat Pumps)

Ground-source heat pumps (GSHPs) exploit geothermal energy to provide space heating and cooling. The heat pumps utilise the low temperature geothermal resources closer to the surface, which act as a heat source during heating and a sink into which excess heat is released during cooling. Geothermal energy offers a reliable resource as the temperature of the earth below a certain depth, typically ten metres, is relatively stable. In recognition of the important role geothermal energy plays in decarbonising the energy sector, the Geological Survey of Ireland (GSI) has published ‘An Assessment of Geothermal Energy for District Heating in Ireland’. This document supports and complements a simultaneous 2020 publication by the Department of Environment, Climate and Communications entitled ‘Geothermal Energy in Ireland, A Roadmap for a Policy and Regulatory Framework’.

Ground-source heat pumps are potential replacements for conventional oil, coal or gas boilers and can be used in both domestic and non-domestic applications. GSHPs can be categorised based on their collector types; closed-loop systems and open-loop systems⁴.

⁴ A closed-loop system consists of a closed loop of pipes buried in the ground, through which a heat transfer fluid circulates. The fluid extracts heat from, or releases heat to, the ground as

The RES uses GSI Geothermal Suitability Maps to determine the most suitable type of ground source heat collector for use with heat pump technologies in the County. The suitability maps assign a rating from 1 to 5 for each type of heat collector/cooling system and show that there is a shallow geothermal solution for heating or cooling for every location in Carlow.

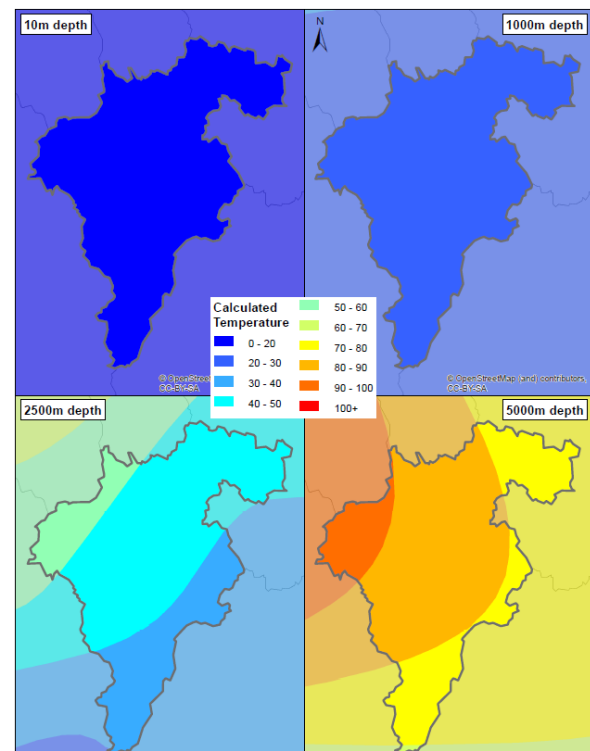


Figure 7.10: Geothermal Maps for County Carlow

required. An open-loop system extracts groundwater from a well or borehole through a vertical configuration and transfers it to a heat exchanger for energy extraction. The water is then re-injected to the source or discharged elsewhere.

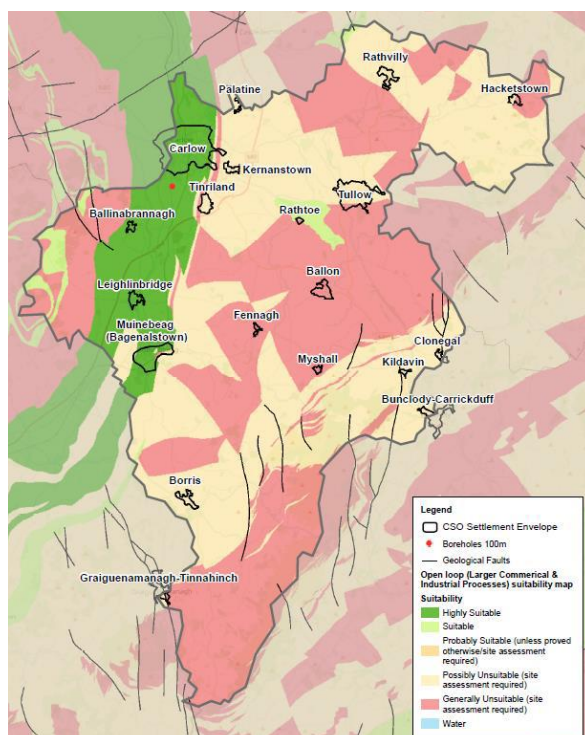


Figure 7.11: Geothermal Resource – Open Loop Larger Commercial and Industrial Suitability

Geothermal Energy – Policies

It is the policy of the Council to:

- GT P1: Facilitate large and smaller scale geothermal energy generating developments both standalone and in conjunction with other renewable energy projects, subject to compliance with proper planning and environmental considerations.
- GT P2: Promote the use of geothermal heat pumps for space heating and cooling as well as water heating in domestic, commercial, and recreational buildings, subject to the protection of water quality and any other relevant planning and environmental considerations.

⁵ Captive fleets have centralised fuelling points and fuel purchasing options

7.10.3.7 Renewable Transport

Transport accounts for 41 % of total energy consumption in Co. Carlow. The County’s rural landscape, dispersed population, and lack of public transport have led to high levels of private car ownership. According to the 2016 Census, 84% of households in Carlow were in possession of one or more motor cars, compared to 82% nationally. It is estimated that private car energy consumption accounted for 43.5% of total energy consumed in the transport sector in Carlow in 2016, compared to 41% nationally.

Under the EU Renewable Energy Directive 2009/28/EC Ireland is obliged to achieve a minimum target of 10% renewable energy in the transport sector by 2020. In 2019, renewable transport in Ireland stood at 8.9%, 99% of which came from bioenergy, including biodiesel and biomethane.

Reducing reliance on traditional fossil fuels is of utmost importance for Carlow to meet the 10% RES-T target and to move towards carbon neutrality. This can be achieved through the adoption of electric vehicles and the use of alternative transport fuels, primarily biofuels. Biofuels for use in public transport or ‘captive fleets’⁵ can have a significant impact on the reduction of GHG emissions.

The Government has set a target of 950,000 electric vehicle (EVs) on the road by 2030. ESB is responsible for the rollout of EV charging points across the county. The e-cars Charge Point Map available at www.esb.ie shows the locations of these charging points. Of a total of 1,100 public, standard, and fast charging points in the country, 19 charging points are currently located in the County.

In Carlow, 95% of dwellings are detached, semi-detached and terraced houses, making them suitable for EV ownership as the majority of them would be capable of charging an EV from the house. However, more public charging points are required to allow for the widespread uptake of EVs. This Plan promotes the further installation and expansion of the charging point network throughout the County.

In 2009 the government published **Smarter Travel - A Sustainable Transport Future: A new Transport Policy for Ireland 2009- 2020**. This document outlines a number of energy efficiency and conservation measures that can be adopted in Carlow to reduce the transport energy use in the County. Such measures include the use and improvement of rural/urban public transport services, promotion and prioritisation of walking and cycling, promotion of car sharing, and reduction in overall travel demand. Due to the high level of private car use, there is potential to reduce transport energy consumption in Carlow by switching from conventional internal combustion engine vehicles to electric vehicles.

Renewable Transport – Policies

It is the policy of the Council to:

- RT P1: Promote and facilitate the installation of charging points for Electric Vehicles at suitable public locations throughout the County.
- RT P2: Promote renewable transport options in County Carlow for both private cars and commercial vehicles.

RT P3: Encourage and support the use of low carbon energy sources for public transport and other transport fleets.

Renewable Transport– Objectives

It is an objective of the Council to:

- RT O1: Develop renewable energy solutions for the vehicle fleet operated by Carlow County Council.
- RT O2: Seek to achieve 13.4% of transport energy from renewable resources in the County by 2030, through a gradual shift to electric vehicles, a greater use of blended biofuels, and the conversion of commercial vehicles and public transport to low-carbon alternative fuels.

7.10.3.8 Renewable Heat

In Carlow in 2019, heat energy accounted for 29% of total energy consumption in the County. 62% of this consumption took place in the residential sector, with the rest occurring in industry and services⁶.

Carlow's residential sector is highly dependent on oil, with 47% of dwellings using oil for space and water heating in 2016. 6% of dwellings used solid fuels⁷. The heating sector in Carlow is influenced by a dispersed rural population.

Ireland is obliged to achieve a minimum target of 12% of heat to come from renewable sources by 2020 under the EU Renewable Energy Directive 2009/28/EC. As of 2019, this figure stood at 6.3%. Ireland's low share of renewable heat is a key reason for a

⁶ Carlow Energy Model

⁷ CSO.
<https://www.cso.ie/en/releasesandpublications/er/dber/dome sticbuildingenergyratingsquarter42016/>

failure to meet 2020 renewable energy targets.

Nationally, renewable heat is dominated by biomass in industry. There has been an increase in the use of renewable heat in the residential sector with the uptake of air-source heat pumps. Renewable heat technologies include solar thermal for water heating and heat pumps – both ground source and air-source - for space and water heating.

7.10.3.9 District Heating

District heating is one of the most efficient and cost-effective ways to heat apartments, homes and mixed-use developments.

District heating networks can be based on a variety of technologies and renewable energy sources, such as combined heat and power (CHP), bioenergy, geothermal or energy from waste. Such schemes work particularly well in built-up urban areas where there is a near constant demand. The use of a renewable energy solution to provide heating and hot water to houses and businesses contributes to sustainability as it reduces demand for and consumption of energy while using a renewable form of fuel. Towns such as Carlow and Tullow offer potential for DH due to the higher heat densities.

Carlow's large biomass resource is an excellent resource to provide low carbon, cost attractive fuel for a DH system. The biomass can be harvested close to the system, resulting in low transport costs. Large industries in Carlow, potentially have waste heat from industry that could be used in individual DH systems or incorporated into a larger DH system.

Renewable Heat – Policies

It is the policy of the Council to:

- RH P1: Support and facilitate the installation of district heating (DH) technologies in new developments.
- RH P2: Facilitate the development of combined heat and power plants (CHP) for district heating in industrial zoned areas.
- RH P3: Support the use of renewable heat in residential and commercial developments, such as heat pumps.
- RH P4: Encourage the use of renewable heat solutions as part of the design and planning process for new developments and refurbishments.

Renewable Heat – Objectives

It is an objective of the Council to:

- RH O1: Reduce dependency on fossil fuels for domestic and commercial heating by encouraging the use of renewable heat solutions through the development management process.
- RH O2: Achieve 24% heat from renewable resources in the County by 2030 through greater use of bioenergy, district heating systems, and electrical heat pumps in the commercial/industrial sector, and through greater use of bioenergy and by retrofitting dwellings with electrical heat pumps in the household sector.

7.11 Energy Storage

Heat and power demand vary constantly and must be matched with sufficient generation. While methods of conventional generation using fossil fuels can be scaled to match demand, renewable energy technologies typically have more variable outputs, dependent on the availability of resources. As more renewable energy is introduced to the network, grid stability becomes a challenge. If generation from renewables is low during a period of higher demand, fossil fuel plants must be scaled up to compensate. In contrast, during times of high renewable energy production, there may be insufficient demand to allow for full exploitation of the resource, leading to a wasted opportunity to generate more clean energy.

One solution to the challenges faced due to the variability of renewable energy is energy storage. This involves storing the excess energy produced during times of low demand to be used at a later stage when demand is higher. The electrical energy is typically converted to a more easily and economically stored form, such as potential or thermal energy, and converted back to electrical energy as required. Emphasis is being placed on the development of energy storage technologies, with some viable options available. Developing energy storage in Carlow would allow the County to maximise the potential of its natural resources.

7.11.1 Battery Storage

Battery storage has increased in Ireland in part by intermittent energy sources such as solar and wind. It involves converting the electrical energy to chemical energy. ESB offer an opportunity for large businesses to

install battery storage on-site, a method of demand-side storage. This provides a back-up power supply and reduces costs by charging the battery during periods of low electricity prices. Batteries can also be employed on the generation side of the network, creating hybrid systems with renewable energy technologies to store excess generation. There is currently one permitted battery storage facility in the County at Kellistown that will help balance the energy supply for the benefit of the local region and economy.

Energy Storage – Policies

It is the policy of the Council to:

ES P1: Promote the use of efficient energy storage systems and infrastructure that support energy efficiency and reusable energy system optimisation, subject to compliance with proper planning and environmental considerations.

7.12 Energy Efficiency and Conservation

Generating energy through renewable energy sources must be complemented by efforts to reduce energy demand and waste. Energy efficiency and conservation are therefore of vital importance if the County is to achieve a carbon neutral future.

Energy efficiency involves using less energy to perform the same task. Although less energy is consumed, the same standard of product or service is achieved, thus it is the energy waste that is reduced. Ireland has a target of 20% energy savings through efficiency by 2030 and a more ambitious target of 33% in the public sector alone⁸. The sector with the greatest potential for energy efficiency savings is the

⁸ <https://www.seai.ie/about/irelands-energy-targets/> and DCCA National Energy Efficiency Action Plan for Ireland 2017-2020

residential buildings sector, followed by transport, commercial buildings, and industry.

The main opportunities for energy efficiency in buildings are LED lighting, roof and solid wall insulation, efficient glazing, efficient appliances, and heating systems such as heat pumps or efficient boilers with heating controls. Industry can benefit in the long term from investing in the installation of Combined Heat and Power technology (CHP). Energy efficiency in the transport sector is driven by EU regulations and modal shifts⁹.

Energy conservation is behaviour that results in the use of less energy. Conservation is usually reliant on changes in human behaviour and increased awareness or smart monitoring and control technology. Although retrofit and energy efficient installations are vital if targets are to be achieved, it has been reported that to date, most of the savings have come from lower cost energy conservation measures¹⁰.

The Council will in conjunction with key stakeholders continue to participate in initiatives to contribute to the energy efficiency and conservation goals of the County. The Council has already exceeded energy efficiency targets in Department group energy performance arising from initiatives such as installation of PV Panels at Tullow Area Office.



Figure 7.12: PV panels on roof of Tullow Area Office

Energy Efficiency and Conservation - Policies

It is the policy of the Council to:

- EE P1 Increase awareness of the environmental, financial, social, and practical benefits of being energy efficient.
- EE P2 Encourage consideration of energy efficiency and low-carbon design solutions when carrying out pre-planning discussions for major residential, commercial, and industrial development.
- EE P3 Support energy efficiency and conservation education in partnership with local, regional, and national organisations

Energy Efficiency and Conservation - Objectives

It is an objective of the Council to:

- EE O1: Support the implementation of national energy efficiency standards and to support and facilitate energy conservation and efficiency, including through:

⁹ <https://www.seai.ie/resources/publications/Unlocking-the-Energy-Efficiency-Opportunity-Summary-for-Policymakers.pdf>

¹⁰ DCCAE National Energy Efficiency Action Plan for Ireland 2017-2020

- Improved building design;
- Promoting smarter travel; and,
- Raising awareness/benefits of energy conservation.

EE O2: Reduce CO² emissions by 30% from 2020 baseline figures by 2030 for the public sector in the County, by building awareness and motivating behavioural change, engaging with SEAI and government programmes for energy efficiency, investing in energy efficiency improvements, and by switching to low-carbon transport modes such as walking, cycling and public transport.

7.13 Climate Change Adaptation in Carlow

7.13.1 Integrated Land Use and Transport

To contribute towards the reduction of car dependency and associated carbon emissions in the County, the Plan promotes an integrated approach to land-use and transportation which aligns with the Core Strategy and directs future development into existing towns and villages. This also accords with the overall objectives of the NPF and the RSES, by supporting compact urban growth, the consolidation of existing settlements, and the prioritisation of the development of brownfield lands across the Settlement Hierarchy in the County. It will also encourage and support public transport, cycling and walking, as viable alternatives to the private car.

Delivering compact growth is acknowledged as being a crucial aspect in achieving a greater uptake of sustainable modes of transport. This reduces the reliance on the car by facilitating easier access to public transport corridors and encourages cycling and walking. An analysis of appropriate brownfield and infill opportunity sites with potential capacity to deliver new housing was completed for

Carlow Town (Key Town), and for the Small Towns in the Settlement Hierarchy that include Borris, Ballon, Leighlinbridge, Rathvilly, Hacketstown, and Carrickduff.

The development of a quality bus system as an alternative to the private car is an essential element of integrated land use and transport planning. Bus Eireann and private service providers operate public bus services in Carlow. The delivery of a Carlow Town Bus Service in conjunction with the NTA is an objective of this Plan which will seek to connect the majority of residential areas within the town to the main employment, retail, health and education destinations. The provision of new direct pedestrian / cyclist paths to the bus stops from residential areas will shorten the distance, therefore improve the accessibility for residents living in these areas to the town bus network, thereby also supporting the development of the '10 – minute Town' concept.

Promoting compact growth and greater integration of policies for land use and transport planning will help reduce the demand for commuter travel and support more efficient development patterns and travel. The Plan acknowledges that as we strive to adapt to climate change it is important that future development patterns reduce our carbon footprint, protect our environment, and promote more sustainable ways of living.

Integrated Land Use and Transport – Policies

It is the policy of the Council to:

LU P1: Actively implement policies that support and encourage integrated land use and transportation, sustainable compact growth and mobility, and maximise such opportunities through development location, form, layout and design, so

as to secure climate resilience and reduce greenhouse emissions.

7.13.2 Urban and Rural Regeneration

The regeneration of urban and rural areas can greatly enhance the climate resilience of towns and villages in the County. In particular, urban and rural regeneration focuses on reorganising and upgrading the existing built environment, as opposed to planning new greenfield development. Under the assessment process for the Government’s Urban and Rural Regeneration Fund, project proposals that assist in the transition to a competitive, low carbon, climate-resilient and environmentally sustainable economy, receive additional weight.

7.13.3 Project Carlow 2040 – A Vision for Regeneration

It is a key objective of this Plan to seek the implementation of Project Carlow 2040 “A Vision for Regeneration”. In line with the NPF and RSES, the Strategy offers a sustainable approach to urban regeneration which has been tailored for Carlow Town and focuses on six intervention areas containing public realm projects and development opportunities in and around the town centre. The intervention areas integrate to form one cohesive regeneration strategy for the town.

The Strategy recognises that Carlow Town has the opportunity to adapt to climate change measures through its physical urban regeneration. This can be achieved through the following;

- Development Change
 - **Spatial:** Focusing development on the core of Carlow Town.
 - **Movement and Air Quality:** Becoming aware of our impact on the climate and making a positive change for the future.

- **Health and Wellbeing:** Placing an emphasis on healthy living through urban design practices.

- Environmental Assets

- **Green and Blue Infrastructure:** Increase use of the River Barrow and River Burrin as green and blue areas for leisure and amenity and also as sustainable industries.

The Strategy promotes a number of green and blue infrastructural interventions in Carlow Town. This is to be achieved through the incorporation of nature-based solutions such as rainwater harvesting, green walls and the use of solar energy, as well as the greening of parking spaces on Barrack Street. The Strategy aims to position Carlow Town as an exemplar in environmental and sustainable measures. Carlow Town will provide the opportunity for amenity and recreation spaces along the riverfront while providing sustainable public realm spaces and routes within the Town Centre. These measures will support Carlow’s position as UN Sustainable Development Goal Champion.



Figure 7.13: Greening of parking spaces

The Strategy has also incorporated features within the public realm that aim to reduce overall car numbers and allow for more urban green space for walking, cycling and exercise. The vision for Carlow in 2040 is to be more environmentally conscious and move towards a more sustainable way of living. This will require a noticeable reduction in car usage,

the promotion of walking and cycling, a greater use of outdoor space, increased use of public transport, changing how we shop and adaptation towards alternative forms of construction and manufacturing.



Figure 7.14: Reduce car numbers to create more urban green spaces for walking



Figure 7.15: The regeneration of underutilised land with river frontage.

Urban and Rural Regeneration – Policies

It is the policy of the Council to:

URR P1: Actively implement policies that support and encourage urban and rural regeneration, so as to secure climate resilience and reduce greenhouse emissions.

Urban and Rural Regeneration – Objective

It is an objective of the Council to:

URR O1: Leverage all available funding streams which will support and deliver urban and rural regeneration outcomes which seek to secure

climate resilience and reduce greenhouse emissions.

7.13.4 Nature-Based Approaches and Green Infrastructure

Concerns regarding climate change have highlighted the importance of nature-based approaches such as green infrastructure. The term green infrastructure gives greater recognition to the natural environment as an asset that provides a range of benefits, including protecting us against climate change, for example by alleviating floods and storing carbon.

There is a need to proactively develop green infrastructures and ecological connectivity and address fragmentation, which will have the dual function of enhancing biodiversity and improving resilience and adaptation to climate change.

The Council's Climate Change Adaptation Strategy 2019-2024 identifies a number of objectives and actions for which green infrastructure and nature-based solutions have a role to play. This includes the incorporation of green infrastructure, including urban greening into the design, planning and construction of roads, community, and public realm projects, and as a mechanism to promote biodiversity, reduce habitat fragmentation, and for carbon offset.

Within County Carlow there are opportunities to expand and strengthen the green infrastructure network and to further explore its integration into both public and private developments in the future. It is an Objective of the Council under Objective GI. O1 in Chapter 9 to prepare a Green Infrastructure Strategy for the County in accordance with international best practice and in partnership with key stakeholders and the public. The Strategy will identify key green

infrastructure aims and objectives for Carlow, taking account of the priority projects identified in this Plan and it will provide for the delivery of these projects including the provision of appropriate funding mechanisms.

Nature-Based Approaches and Green Infrastructure – Policies

It is the policy of the Council to:

NB P1: Actively promote and encourage nature-based approaches and green infrastructure solutions as viable mitigation and adaptation measures to reduce greenhouse gas emissions, increase the adaptive capacity of ecosystems and optimise the multifaceted benefits through:

- Conservation, promotion, and restoration of the natural environment;
- Integrating an ecosystem services approach and promote healthy living environments through enhanced connection with nature and recreation/amenity;
- Enhancing biodiversity in urban and rural settings;
- Assist with water and flood risk management; and
- Carbon storage or sequestration.

7.13.5 Flood Risk Management

It is expected that climate change will have significant impacts on flooding and flood risk in Ireland due to rising sea levels, increased rainfall in winter, more heavy rain days and more intense storms. Met Éireann has predicted that in Ireland, autumn and winter seasons may become wetter, with a possible increase in heavy precipitation events of approximately 20%. The number of very intense storms is projected to increase over the North Atlantic Region, and the winter

track of these storms may extend further south and over Ireland more often. There is therefore a requirement for flood management to adapt to a changing climate and associated flood risk.

7.13.6 Sustainable Urban Drainage Systems (SuDS)

Climate change and urbanisation will together present challenges for urban drainage, particularly in relation to more frequent rainfall events and incidences of urban (pluvial) flooding. The implementation of SuDS may assist in offsetting the impacts of climate change and increasing climate resilience. SuDS provide areas within the built environment where the natural processes of rainwater interception, storage and infiltration can take place, offering a more sustainable approach to the management of urban storm water runoff than impermeable surfaces, and conventional underground pipe and storage-based solutions. Unlike conventional drainage systems, SuDS systems can also contribute to green infrastructure, providing additional benefits for recreation and biodiversity.

In recognition of the importance of SuDS, and to reduce the potential impact of existing and predicted flood risks and to improve biodiversity and amenity value, the Council is preparing a new SuDS policy/guidance document which will be adopted during the lifetime of this Plan. It is an objective of the Council to require all development where viable (including extensions to existing development) proposals to incorporate SuDS measures. (Refer also to Chapter 6).

This Plan is informed by the Strategic Flood Risk Assessment (SFRA) (Refer to Chapter 6 and Appendix III) and guided by robust policies and objectives in relation to Flood Risk Management, designed to ensure that future development, in areas at risk of

flooding shall conform to ‘The Planning System and Flood Risk Management Guidelines for Planning Authorities’ (2009).

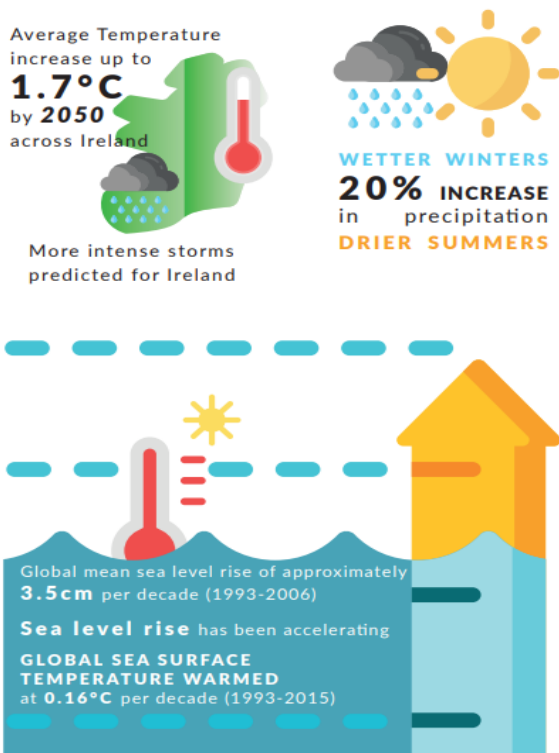


Figure 7.16: Current and future flood change risks (Source: OPW Flood Risk Management – Climate Change Sectoral Adaptation Plan)

The SFRA acknowledges that with climate change, the frequency, pattern and severity of flooding is expected to change and become more damaging, so the likely impact of climate change on flooding has also been appraised. The strategic land-use planning decisions taken within this Plan have therefore been fully informed by the findings of the SFRA.

The Carlow Climate Change Adaptation Strategy 2019-2024 acknowledges climate change impacts on flooding and flood risk. Flood management is identified as one of nine thematic areas in the Strategy for which adaptation goals, objectives and actions have been assigned.

Table 7.2: Incorporation of Climate Change Mitigation and Adaptation in the CDP

Chapter	How policies, objectives and related provisions contribute to climate change mitigation and adaptation.
Chapter 1 Introduction	<ul style="list-style-type: none"> ▪ Climate change is identified as one the cross-cutting themes of the Plan.
Chapter 2 Core Strategy and Settlement Strategy	<ul style="list-style-type: none"> ▪ Focuses on the delivery of consolidated, compact, and sustainable growth across the Settlement Hierarchy. ▪ Promotes an ecosystems services approach in the preparation of lower-level plans, strategies and development management, with reference to flood and climate regulation, and the management of renewable and non-renewable resources. ▪ Identifies climate action and the need to carbon proof policies to reduce the impacts of climate change to settlement and travel patterns, energy use and the protection of green infrastructure.
Chapter 3 Housing	<ul style="list-style-type: none"> ▪ Supports compact growth and the regeneration and renewal of under-utilised lands. ▪ Requires that housing delivery consider design in terms of being informed by potential implications of climate change, together with the need to improve energy efficiency of buildings / schemes.
Chapter 4 Enterprise and Employment	<ul style="list-style-type: none"> ▪ Recognises that addressing the impacts of climate change and global warming can drive innovation and stimulate economic growth in the County. ▪ Promotes the development of low carbon and green tech businesses and industries throughout the County. ▪ Supports the development of industries that create and employ green technologies and encourage the uptake of measures to facilitate the transition towards a low carbon economy and circular economy.
Chapter 5 Sustainable Travel and Transportation	<ul style="list-style-type: none"> ▪ Aims to support the transition to a lower carbon-based climate resilient future with an integrated land use and transportation framework. ▪ Supports integration of land use and transportation, sustainable modes of transport, and encourages levels of development with mixed uses within walking distance of public transport. ▪ Seeks to influence overall travel demand and achieve a modal shift through land use planning, optimising choices to make sustainable travel choices. ▪ Recognises that a high-quality transport network which is effective, accessible, and responsive to technological change, reduces the contribution of transport to climate change. ▪ Recognises that the rail network in the County has a crucial role to play in mitigating climate impacts. ▪ Recognises the importance of walking and cycling in minimising environmental impacts. ▪ Seeks to ensure connectivity for pedestrians and cyclists is maximised in new communities and improved in existing areas.

Chapter	How policies, objectives and related provisions contribute to climate change mitigation and adaptation.
	<ul style="list-style-type: none"> ▪ Seeks to reduce walking and cycling distances to areas of employment, community services, schools, shops, public transport and other community facilities. ▪ Seeks to deliver improvements to the public transport network / services and associated infrastructure, to ensure that public transport services provide an attractive and convenient alternative to the car. ▪ Support Government targets for electric vehicles on roads by facilitating the roll-out of Electric Powered Vehicle Recharging Parking Bays. ▪ Supports the roll-out of alternative low emission fuel infrastructure. ▪ Seeks to improve efficiency of public lighting assets to minimise electricity usage.
<p>Chapter 6</p> <p>Infrastructure and Environmental Management</p>	<ul style="list-style-type: none"> ▪ Seeks to to maintain good air quality standards through the integration of land use and planning, and the promotion of measures which seek a reduction in fossil fuel-based energy sources. ▪ Seeks to ensure flood risk management activity is examined to determine actions required to embed and provide for effective climate change adaptation as set out in the OPW Climate Change Sectoral Adaptation Plan Flood Risk Management. ▪ Requires that all development proposals incorporate SuDS. ▪ Promotes the use of green infrastructure. ▪ Requires the use of energy efficient lighting in all new development proposals. ▪ Supports the circular economy and encourages transition from a waste management economy to a green circular economy.
<p>Chapter 7</p> <p>Climate Action and Energy</p>	<ul style="list-style-type: none"> ▪ Outlines the approaches to, and provides the policy context for, climate change mitigation and adaptation in the County.
<p>Chapter 8</p> <p>Community Development</p>	<ul style="list-style-type: none"> ▪ Promotes the development and maintenance of sustainable communities in the County, which respond to the needs of all residents. ▪ Promotes the use of universal access and design in the built environment, including the public realm. ▪ Supports the optimisation of community facilities by facilitating co-location and shared use. ▪ Encourages the siting of community facilities within residential, town and village centre areas. ▪ Promotes the location of new educational facilities within or close to existing settlements, and in areas accessible by walking, cycling and public transport. ▪ Promotes the clustering of educational facilities and seeks to ensure that new schools are located and designed so as to facilitate walking and cycling. ▪ Encourages the provision of childcare facilities in residential and major employment areas, and as a integral part of new residential developments.

Chapter	How policies, objectives and related provisions contribute to climate change mitigation and adaptation.
	<ul style="list-style-type: none"> ▪ Supports the integration of healthcare facilities into new and existing communities, within existing settlements, and convenient to pedestrian and cycle paths and public transport.
<p>Chapter 9</p> <p>Landscape and Green Infrastructure</p>	<ul style="list-style-type: none"> ▪ Includes measures to protect and maintain the overall integrity of the county's landscape by recognising its capacity to sustainably integrate and absorb development. ▪ Recognises and promotes the role of green infrastructure in the landscape as a natural resource capable of delivering a wide range of environmental benefits, including climate change adaptation. ▪ Seeks to identify, protect, and maintain existing and planned green infrastructure assets in the county. ▪ Requires all new development to contribute to the protection and enhancement of existing green infrastructure. ▪ Promotes walking and cycling trails to enhance accessibility to green infrastructure. ▪ Supports the role of SuDS alongside green infrastructure.
<p>Chapter 10</p> <p>Natural and Built Heritage</p>	<ul style="list-style-type: none"> ▪ Aims to protect, conserve and manage natural and built heritage to ensure it contributes to the future sustainable development of the county. ▪ Seeks to protect the natural heritage of the county in recognition of its importance as a non-renewable resource and natural resource asset. ▪ Recognises the wider environmental benefits of woodlands, trees and hedgerows as pollution filters and carbon sinks. ▪ Promotes measures to up-grade the energy efficiency of historic buildings in accordance with DEHLG <i>'Advice Series'</i>. ▪ Takes account of the need to protect and improve riverine floodplains in relation to building resilience to climate change. ▪ Promotes awareness and the appropriate adaptation of the County's architectural and archaeological heritage to deal with the effects of climate change. ▪ Recognises the need for climate planning for inland waters and riparian zones in accordance with Inland Fisheries Guidance <i>'Planning for Watercourses in the Urban Environment'</i>. ▪ Acknowledges the important contribution of wetlands in sequestering pollutants and reducing the effects of climate change by acting as carbon storage.
<p>Chapter 11</p> <p>Tourism and Recreation</p>	<ul style="list-style-type: none"> ▪ Supports sustainable travel in the tourism sector by the promotion of public transport use and by facilitating, where appropriate, proposals to improve access for existing tourism sites and facilities and visitor attractions throughout the County. ▪ Seeks to direct tourist-based development into existing settlement where appropriate. ▪ Takes into account the need to protect the natural heritage of the county upon which tourism is based.

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	<ul style="list-style-type: none"> ▪ Seeks to facilitate open space to be planned on a multi-function basis incorporating ecosystem services, climate change measures, green infrastructure and SuDS.
<p>Chapter 12</p> <p>Urban Design and Placemaking</p>	<ul style="list-style-type: none"> ▪ Provides for the consideration of climate change mitigation and adaptation measures in the design of the built environment. ▪ Promotes and supports the planning of developments on a multi-functional basis to include ecosystem services, climate adaptation measures and green infrastructure. ▪ Recognises and promotes the role of good urban design and placemaking in adapting to climate change, including support for compact growth and urban regeneration, and an emphasis of health and wellbeing in the County's towns and villages. ▪ Requires the incorporation of adaptable, multi-functional, and sensitive design solutions which support the transition to low carbon and climate resilient towns and villages.
<p>Chapter 13</p> <p>Rural Design Guidelines</p>	<ul style="list-style-type: none"> ▪ Aim of rural design guide is cognisant of the need to transition to a low carbon climate resilient future. ▪ Promotes the use of design features/principles in new rural houses, extensions and renovations, which facilitate a transition to a low carbon climate resilient future. ▪ Seeks to ensure that rural housing is informed by best practice principles for energy efficiency and climate adaptation. ▪ Promotes the reuse/adaptation of existing structures over the construction of new builds. ▪ Recognises the significant energy impacts of rural housing. ▪ Promotes sustainable energy approaches and technologies in rural housing, including the use of renewable energy, the achievement of high BER energy ratings, NZEB, and the maximisation of solar gain.
<p>Chapter 14</p> <p>Rural Development</p>	<ul style="list-style-type: none"> ▪ Recognises the need to sustainably manage land and resources. ▪ Supports investment in infrastructure and to facilitate innovation in rural economic development and enterprise through the diversification of the rural economy into new sectors and services, including ICT based industries and those that address climate change, carbon reduction and sustainability. ▪ Supports the concept of Smart Town and Villages by promoting the implementation of climate and energy projects at a local level and climate friendly mobility solutions. ▪ Seeks to support and facilitate changes to farming practices that will help adapt to climate change. ▪ Recognises the potential for rural area to be harnessed for renewable energy projects. ▪ Seeks to support a bio-economy feasibility study for the Region as per RPO 57 in the RSES to identify areas of potential growth to inform investment in line with

Chapter	How policies, objectives and related provisions contribute to climate change mitigation and adaptation.
	<p>the national transition objective to a low carbon climate resilient and circular economy.</p> <ul style="list-style-type: none"> ▪ Requires all applications for industrial and enterprise development to submit a carbon footprint calculation and demonstrate how new buildings and processes / activities will seek to achieve the targets set out in the Climate Action Plan 2021 or any amendments to these targets. ▪ Supports remote working, co-working and home-based economic activity. ▪ Recognises the role of forests and woodlands in rural areas in climate change management and carbon sequestration. ▪ Recognises that local supplies of aggregates for development within the county are vital in the drive to reduce our carbon footprint and to transition towards a more sustainable society.
<p>Chapter 15</p> <p>Town and Village Plans</p>	<ul style="list-style-type: none"> ▪ Supports sustainable and compact growth across the county’s network of towns and villages, and which is at an appropriate scale, size and character of these settlements. ▪ Includes provisions to address vacancy in existing built-up areas and promotes the use of previously developed brownfield and infill opportunity sites, in addition to the redevelopment of existing sites and buildings. ▪ Encourages infill development in towns and villages as an alternative to one-off housing in the rural countryside. ▪ Seeks to promote and facilitate the development of walkways and cycleways at appropriate locations to encourage sustainable travel and improved pedestrian connectivity. ▪ Supports the provisions of strong linkages to settlement cores and requires that new development addresses connectivity through footpaths and cycleways where appropriate. ▪ Promotes the retention of existing trees and hedgerows.
<p>Chapter 16</p> <p>Development Management Standards</p>	<ul style="list-style-type: none"> ▪ Sets out provisions and requirements in relation to Appropriate Assessment, Strategic Environmental Assessment, Ecological Impact Assessment, and Flood Risk Assessment. ▪ Flooding risk assessment must address climate change, residual risk, avoidance of contamination of water sources and any proposed site-specific flood management measures. ▪ Includes specific section addressing Climate Action and Energy. ▪ Sustainable building practices are encouraged for all new development proposals, and design and layout criteria which minimise energy use, including by passive solar design, energy efficient building design and emission reduction measures. ▪ The use of sustainable design elements are required for development at initial design stage, including the identification of green infrastructure, to ensure development and buildings can adapt to potential impacts of climate change. ▪ An Energy Statement must be submitted for all applications of 1000+sqm commercial / business development or applications of 30+ residential units to demonstrate what energy efficiency and carbon reduction design measures are being considered.

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	<ul style="list-style-type: none"> ▪ Applicants are required to explore the potential for urban greening, including high quality soft landscaping and the use of nature-based solutions in the design of buildings e.g. living/green walls, rain gardens, and planting for urban cooling. ▪ The role of wind and solar energy as renewable energy resources is acknowledged. ▪ Soft landscaping and planting is required for all planning applications, including the use of native species, and the retention of existing trees and hedgerows. ▪ Hard landscaping must have regard to the use of SuDS. ▪ Development proposals must consider potential ecological impacts on natural heritage and green infrastructure. ▪ Recognition is given to the provision of accessible public open space for residential development as a key part of high-quality green infrastructure. ▪ Relevant guidelines for residential must be consulted with, including the <i>Guidelines for Planning Authorities on Sustainable Residential Development in Urban Areas, DEHLG, (2009)</i>, the <i>Urban Design Manual: A Best Practice Guide, DEHLG, (2009)</i>, the <i>Sustainable Urban Housing: Design Standards for New Apartments, DHPLG, (2018)</i>, and the <i>Urban Development and Building Height Guidelines, DHPLG, (2018)</i>. ▪ Buildings of increased height will be considered in appropriate locations in accordance with the <i>Urban Development and Building Heights Guidelines published in 2018</i>. ▪ Residential development must be designed with permeable layouts and to give priority in order of pedestrian, cyclist, public transport and car. ▪ The requirement for sustainable travel and transport is addressed, including (inter alia) adherence to publications such as the <i>National Cycle Manual, Smarter Travel, Permeability Best Practice Guide, and Achieving Effective Workplace Travel Plans Guidance for Local Authorities</i>. ▪ The provision of EV charging facilities and cycle parking for development proposals.