

Route Map for CARBON NEUTRAL IN DUMFRIES AND GALLOWAY



Environment Champion

Councillor Dougie Campbell

Climate Change, its impacts and the actions required to tackle the causes, places significant challenges and opportunities on the council, our partners, stakeholders, and communities. We recognised the growing concerns voiced and the calls for action which influenced the council's development and adoption of its Climate Emergency Declaration in 2019. The Council's Climate Emergency Declaration included a 12-point action plan which was presented and approved by the Full Council on 27th June 2019. It was also agreed that a Cross Party Climate Emergency Working Group would be established to oversee implementation of that plan.

The Declaration was our first step on the journey to becoming a carbon neutral region by 2025 and represents a fundamental shift in our understanding as a council about what that means, and the impacts and opportunities associated with new and emerging low and zero carbon technologies that could be utilised in supporting our aspirations.

The Declaration by the council created a new framework for cross party support and a recognition that a corporate approach was required to ensure that all sections of the council operationally were engaged as well as the political leadership required to keep Climate change high on the agenda.



The creation of this strategic plan provides further demonstration of the council's desire to lead locally on tackling the causes of Climate Change, supporting its communities to adapt and change, becoming more sustainable and robust to the challenges ahead. I welcome the Strategic Plan and the actions embedded to reduce the Carbon emissions across the region, and hope that through constructive collaboration we can make a difference locally and play our part in supporting our national targets for the Scottish and UK governments

Director of Economy and Resources

Lorna Meahan

The adoption by the council of our Climate Emergency Declaration highlights the importance of Climate Change locally and promotes the role that the council is required to play, to coordinate, support and lead on regional activity to reduce our carbon emissions and support a transition to a low and zero carbon economy that maximises the opportunities locally to build on the green recovery and create a more sustainable economic model for the future.

The Strategic Plan provides oversight and direction for the council and identifies key priority areas that require immediate assistance and action to endorse the journey to a net zero carbon region. The council supports both direct and indirect activities locally through the role they play through the council's property portfolio, energy consumption, education provision and fleet, to its influence with others through strategic partnerships championing key economic sectors such as agriculture and forestry.

We acknowledge that this is an emergency, which has global implications which are magnified at a local level. Our Communities, businesses and our delivery are impacted by the effects of climate change, resolving it benefits everyone, and it is everyone's job to act on. The strategic plan represents Dumfries and Galloway Councils commitment to play its role in the fight against Climate Change.



Climate Emergency declaration and progress

On 27 June 2019 Dumfries and Galloway Council declared a Climate Emergency and set out the ambitions as follows:

“Dumfries and Galloway Council hereby declares a Climate Emergency and recognises the impact this will have on our quality of life. We recognise our responsibility to tackle climate change and fully commit to taking effective action to limit the impact on our region and its people.

We recognise the challenges ahead to tackle climate change and, whilst we have already made significant strides towards achievement of a regional net zero carbon status, we will seek to achieve this outcome by the year 2025 and, wherever possible embrace opportunities to accelerate our target date”.

Dumfries and Galloway council is committed to implementing a 12 point plan, with the aim of achieving a net zero carbon status by 2025. It covers:

- creating a new and specific council priority, a review of policy and practice across the council and embedding climate change in all policy and practice risk assessments
- understanding the impacts of climate change locally and consider adaptations for people and the environment
- using innovations and technology to reduce our impact and bring about economic development
- creation of new climate change working groups, appointment of a climate change officer and an environmental champion
- communications and cooperation with the public and other organisations on these issues
- production of this climate change Strategic Action Plan

Significant Progress has already been made towards these actions such as the Council plan’s 5th objective (Climate change). There are also important projects underway aiming to reduce emissions such as an appraisal of transport infrastructure in SW Scotland and the council plans to reduce the size of its own estate.

New Council Priority

One of the key activities outlined within the 12-point plan was the necessity to create a new corporate priority and commitments in line with the existing priorities that focused attention and resources on the climate emergency declaration and created the framework for future action and activity, this was considered as part of the mid-term review of the current council plan and adopted.

Priority: Urgently respond to climate change and transition to a carbon neutral region

Commitments:

- Encourage understanding of how the way we live and work in the region impacts on climate change
- Empower our communities and stakeholders to make significant changes to reduce emissions and adapt to a low carbon approach
- Lead on the transition to cleaner and greener technologies
- Promote and protect our region’s natural environment
- Contribute to a greener economy, maximising the region’s green energy potential

Table 1 – Alignment of council priorities and commitments against strategic action priority areas for carbon reduction

Commitment	Encourage understanding of how the way we live and work in the region impacts on climate change	Empower our communities and stakeholders to make significant changes to reduce emissions and adapt to a low carbon approach	Lead on the transition to cleaner and greener technologies	Promote and protect our region's natural environment	Contribute to a greener economy, maximising the region's green energy potential
Strategic Action					
Community engagement to encourage changes by individuals and businesses through collaboration across a wide variety of activities	√	√	√		√
Significant improvements in energy efficiency in buildings such as large scale installations of insulation including of solid walls, replacing windows and doors		√	√		√
Installing zero carbon heating systems such as heat pumps and biomass, and the possible use of hydrogen in future.		√	√		√
Changes in the way that we work and travel to reduce travelling and increased use of public transport and active travel.	√	√			
Large scale switching to electric vehicles.	√	√	√		
Significant increase in renewable generation.		√	√		√
Reducing waste	√	√		√	
Changes in agricultural methods to reduce the use of nitrogen fertilisers, changes in animal feeds, reduced intensity of livestock production and improvements in waste management.	√	√		√	
Maintaining and increasing the size of the forestry and grassland carbon sinks			√	√	

Definitions

Carbon emissions: used as a shorthand to refer to emissions of the mix of gases that cause climate change. Carbon dioxide is the most common greenhouse gas. The other gases, methane, N₂O, F-gases, can be measured in relation to it using the concept of Global Warming Potential.

CO₂e: carbon dioxide equivalent is a measure used to account for the emissions from greenhouse gases based upon their global warming potential. Therefore, CO₂e works as a single 'currency' for greenhouse gases.

Carbon removals: CO₂ removals refer to a set of techniques and natural processes that remove CO₂ directly from the atmosphere by either increasing natural sinks for carbon or using chemical engineering to remove the CO₂, with the intent of reducing the atmospheric CO₂ concentration.

Carbon offsetting: an accounting approach by which individuals/organisations can balance their carbon emissions through investment in carbon removal projects

Carbon neutral: the balancing of carbon emissions against carbon removals and/or carbon offsetting with the net result being zero, also called Net zero carbon

Further terms are explained in the glossary at the end of this document

Baseline emissions for Dumfries and Galloway council and the wider council area

The estimated baseline emissions for 2018 for Dumfries and Galloway council area and the council's own estate are represented below. The total net carbon emissions for the council area are 1,743 ktCO₂e, including both emissions and removals from land use, land use change and forestry (LULUCF) as summarised in **Figure 1**.

CO ₂ Emissions	
Residential	297
Industrial and Commercial	308
Dumfries and Galloway Council	24
Waste	22
Transport	517
Land use (including agriculture)	2,286
Total Emissions	3,463
CO ₂ Sinks	
Forest	-1,437
Grassland	-283
Total sinks	-1,719
Net CO₂ emissions	1,734

Figure 1 - Dumfries and Galloway Council area emissions baseline, 2018

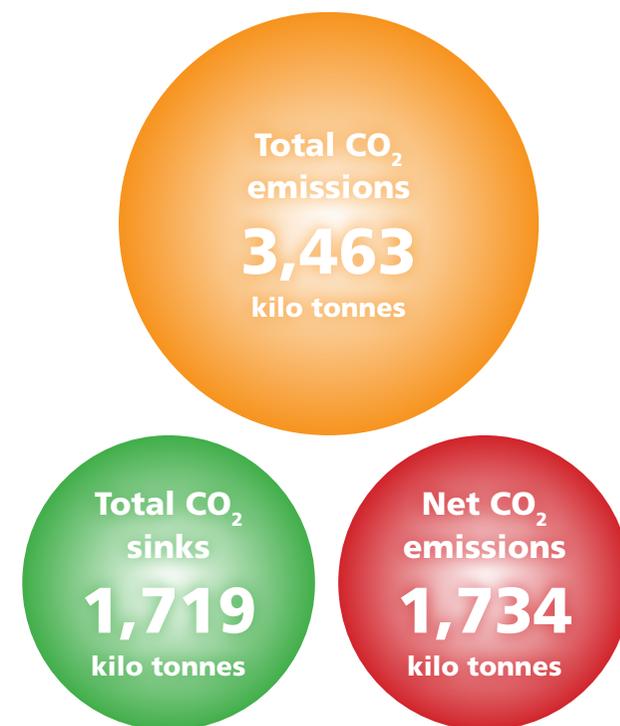


Table 2 Dumfries and Galloway council area emissions baseline, 2018

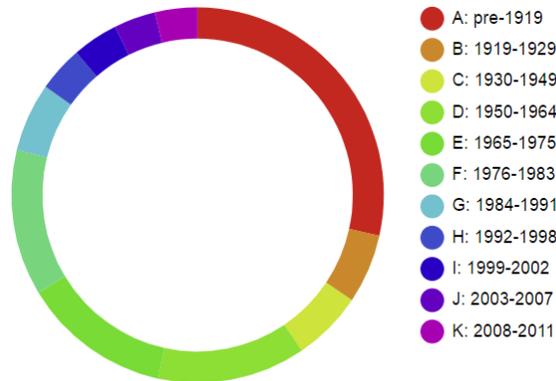
Sector	Emissions (ktCO ₂ e)
Dumfries and Galloway council	24
Residential	297
Industrial & commercial	308
Waste	22
Transport - motorway	204
Transport - non motorway	304
Transport - rail	10
Agriculture livestock	1,172
Agriculture other	248
Total emission	2,597
Net Land Use removals	- 854
Net Total	1,734

Emissions from electricity use in the industrial & commercial, residential, and council sectors account for 261 kt CO₂e of the emissions shown above. This is calculated using a UK average grid emission factor as required by standard carbon accounting rules.

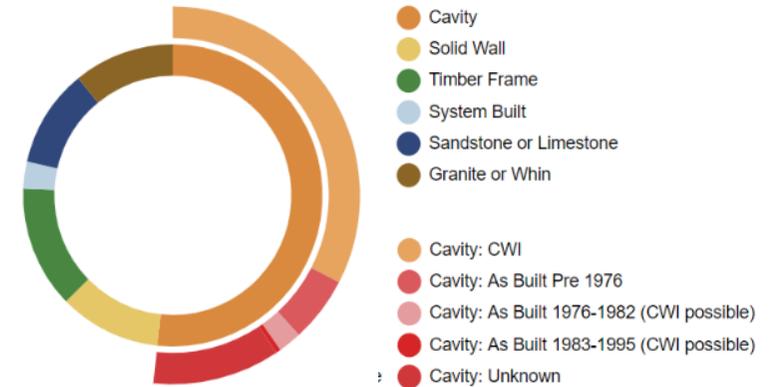
The charts in **Figure 2** show some details of the variation in current housing stock based on analysis by Parity Projects. They show the age profile of the houses, wall type profiles, the main heating fuel and the current SAP profile.

Figure 2 - Housing Profile Data from Parity Projects analysis

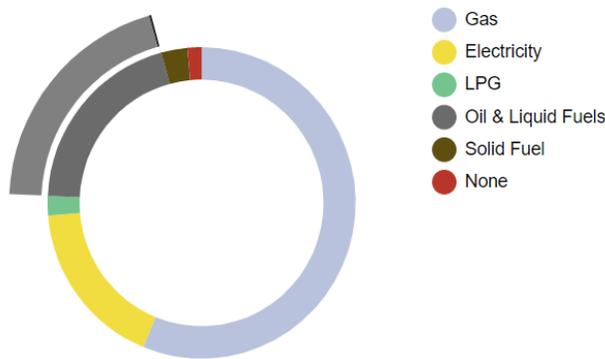
Age profile



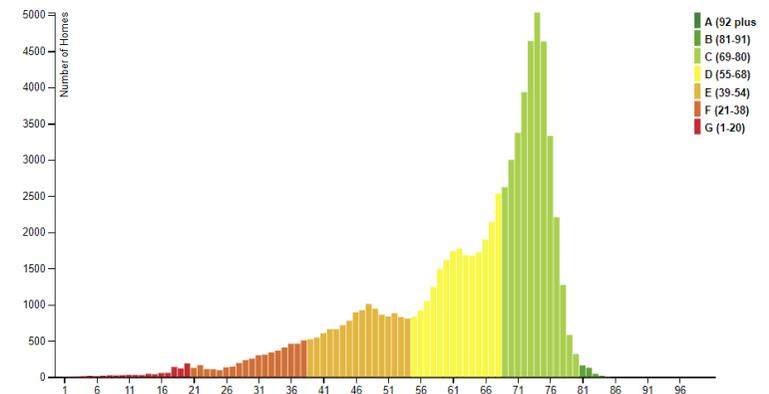
Wall structures



Main heating fuel

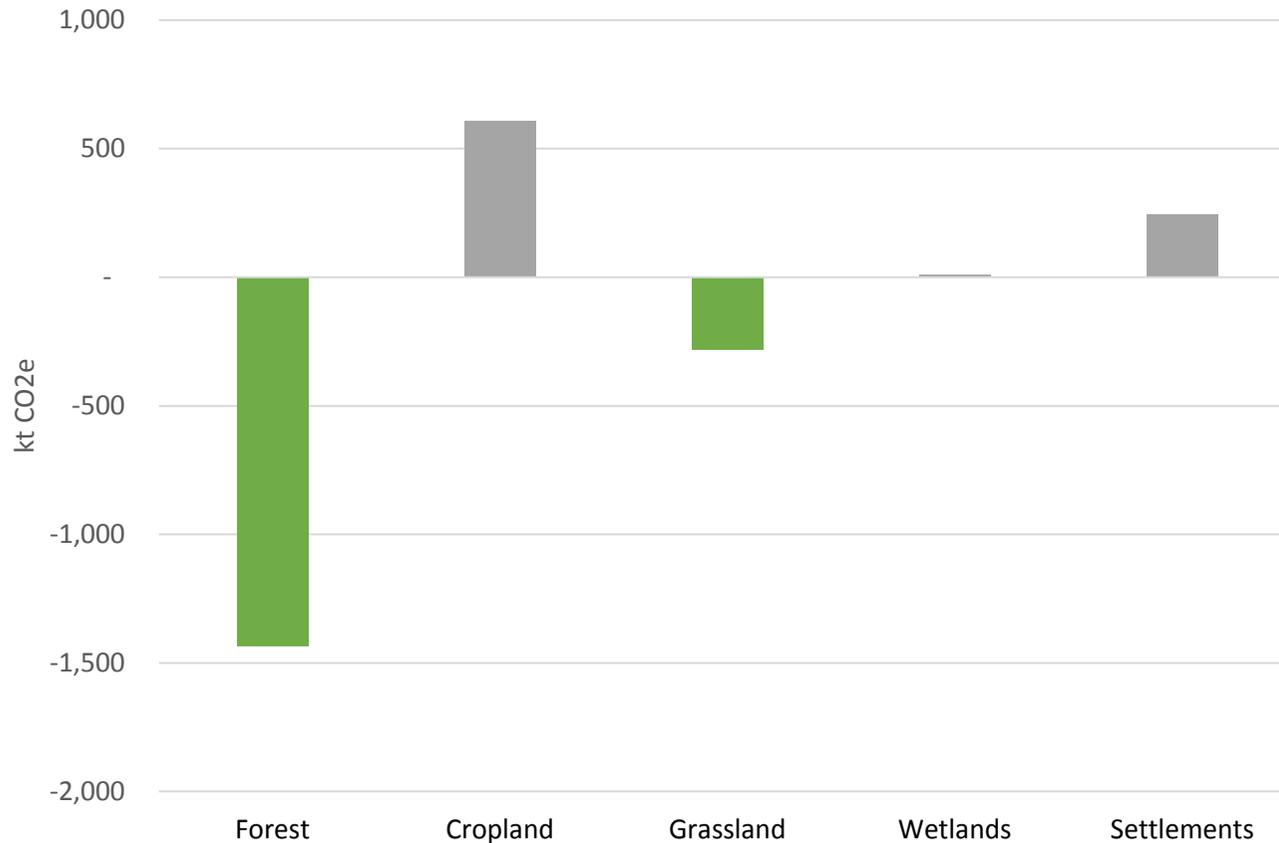


SAP profile



Agriculture emissions are a very significant proportion of the area-wide emissions, dominated by emissions from cattle. Also key is the land use, land use change and forestry (LULUCF) sector which provides a significant removal of CO₂ emissions. However, LULUCF also includes some emissions from changes in land types in settlements and from cropland (soil carbon processes). The contributions of the various LULUCF sub-sectors are shown in **Figure 3**.

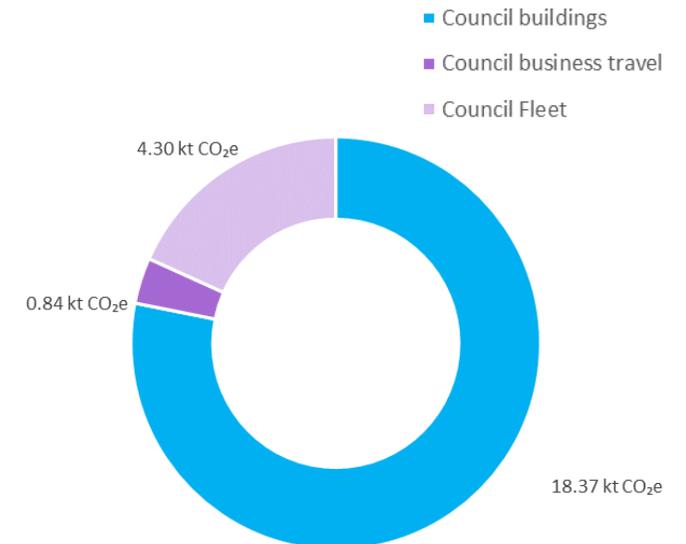
Figure 3 Dumfries and Galloway LULUCF emissions and sinks 2018/2019



The Council's own estate emissions have been calculated to be 24 kt CO₂e, 0.7% of the total area wide emissions. See **Figure 4**. The Council buildings emissions includes electricity use and fuels for heating (gas, oil and biomass). The fleet fuel use includes both road vehicles and off-road machinery. Business travel includes car use, taxis and public transport journeys. The council generated 1.3 GWh electricity from solar PV installations¹ in 2018 compared to sourcing 31.3 GWh from the electricity grid.

¹ Public Sector Climate Change Duties 2019 Summary Report: Dumfries and Galloway Council

Figure 4 Dumfries and Galloway council own estate emissions baseline, 2018/19



Uncertainties and gaps in the baseline estimates

There are significant uncertainties in some parts of the emissions baseline presented above. UK local authority data on gas/electricity consumption and road transport are based on local measurements of gas/electricity meter readings and traffic counts respectively. However, the data on fuel consumption of solid and fuel oils at the LA level is based on models rather than measured consumption².

The agriculture estimates are based on UK average emission factors per head of livestock, and it is not known how the farming practices and hence emissions rates in Dumfries and Galloway compare to the UK average. This area of work is fast moving with evolving research on livestock and techniques with new reports being commissioned on a regular basis to increase the knowledge opportunities and awareness. These reports will include specific reference to our regions agriculture that consider new methods of measuring carbon outputs and CO₂e impacts. Similarly farm landscape management to include the sequestration through hedgerows, shrubs and managed woodlands on farms and climate friendly land management techniques are evolving.

² <https://www.gov.uk/government/publications/regional-energy-data-guidance-note>



Sequestration within wetland habitats, such as in restored peatlands, is not yet included in carbon accounting in the UK but this will be accounted for in future as the revised IPCC Guidelines come into use including the wetlands supplement. Similarly, 'blue carbon', i.e. sequestration within the marine environment, is also not accounted for in current methodologies. Local action to improve blue carbon and wetland sequestration through good management of these environments is important, such as improving saltmarshes in Dumfries and Galloway, at the Wigtown nature reserve, and at restored peatland sites.

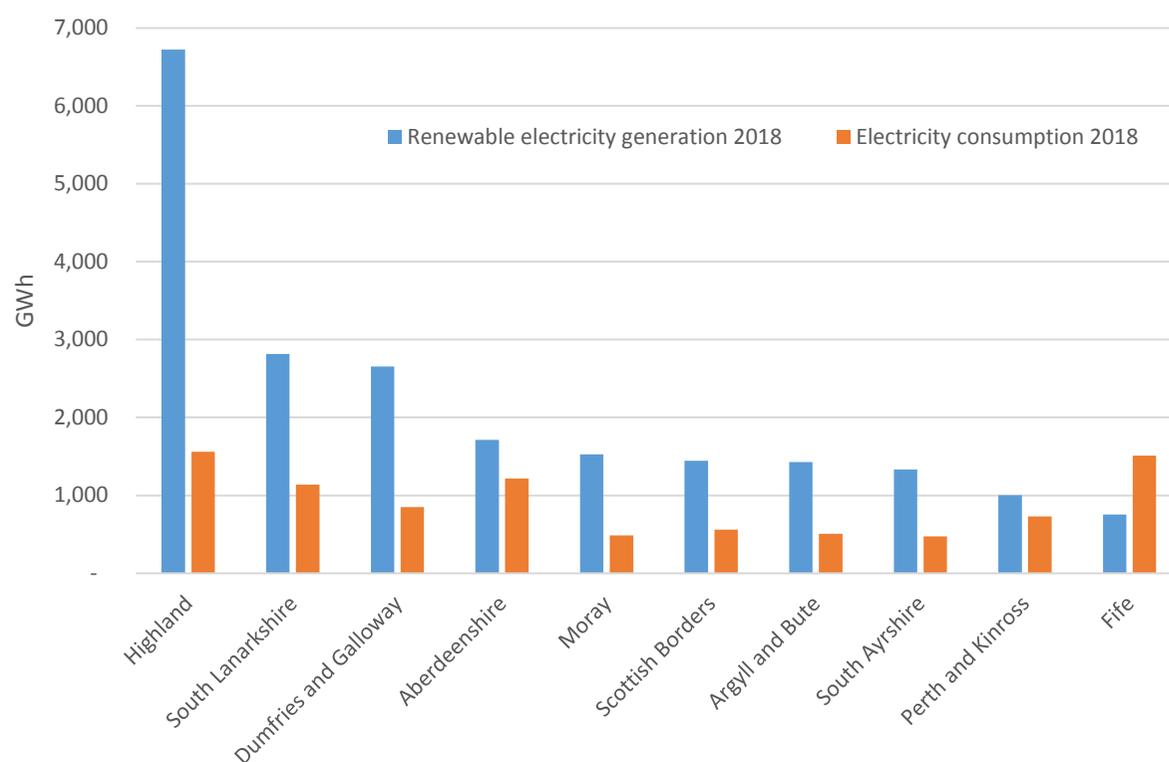
Renewables

Scotland has an ambitious target of delivering 50% of Scotland's total energy consumption for heat, transport and electricity: aiming for it to be supplied by renewables by 2030. Out of 32 local authorities in Scotland, Dumfries and Galloway is the third largest contributor of renewable energy generation³. In 2018, Dumfries and Galloway contributed 10% of the total renewable energy generated in Scotland, this is significantly higher than the amount of electricity that the district consumes⁴. **Figure 5**, shows the top 10 renewable energy producing local authorities in Scotland, compared to their total electricity consumption in 2018.

³ https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/834142/Renewable_electricity_by_local_authority_2014_to_2018.xlsx

⁴ <https://www.gov.uk/government/statistical-data-sets/regional-and-local-authority-electricity-consumption-statistics>

Figure 5 Scottish renewable energy generation compared with electricity demand



Aside from contributing to the Scottish renewable energy target, local renewable energy generation contributes to the carbon neutral target in Dumfries and Galloway in two different ways:

- When local renewable generation sites connect to the grid, they contribute to the continuing decarbonisation of the national electricity grid. This will be reflected in the Dumfries and Galloway carbon footprint via a lower electricity emission factor.

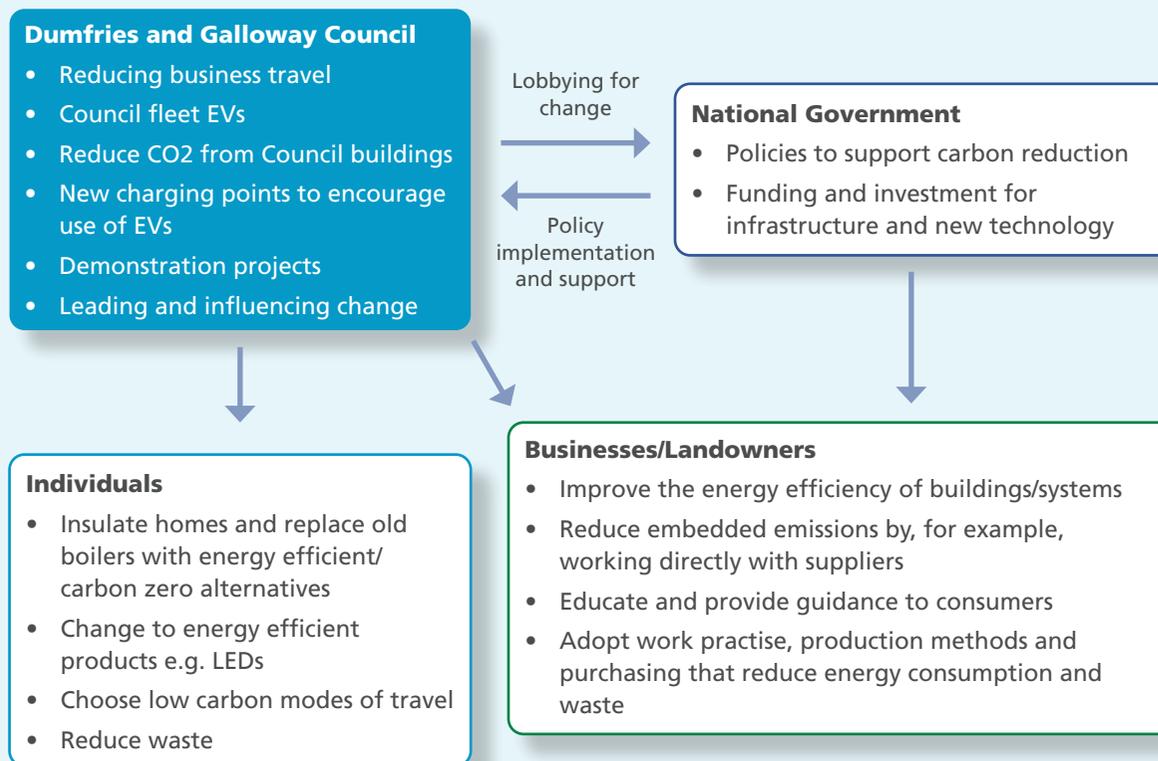
- Where renewable generation sites directly supply local buildings, buildings using this zero carbon electricity will reduce the carbon footprint associated with electricity use.

Areas of influence by the Council and Stakeholders

Dumfries and Galloway Council is directly accountable to the local community for decisions and is best placed to take swift, local action than the national government. As outlined in the 12-point plan, Dumfries and Galloway council, alongside incorporating climate change considerations into policies, will act as local leaders in educating and influencing the public and other organisations for carbon reduction. The adoption of a new Council Priority on Climate Change will “Urgently respond to climate change and transition to a carbon neutral region”. The commitment of a new priority enhances the aspirations of the 12-point plan and the requirement to make radical changes to reduce our regions carbon emissions.

As part of its leadership role, the council can encourage and support the behaviour of local businesses, other organisations and individuals. However, there are also significant emissions accounted as part of the council-wide baseline which are outside the council’s influence. In particular, the A74(M) motorway which runs through the region, and acts as a main route through Scotland.

Figure 6 Roles of organisations and individuals in reducing carbon emissions



Emission trajectories

The council commissioned Aether to model carbon trajectories to provide an evidence base for this strategy. This has involved estimation of the impact of national and local actions to reduce carbon emissions across a 10 year time horizon, taking account of current activity and considering what could be possible through an ambitious mix of carbon reduction actions across Dumfries and Galloway. **Figure 7** shows trajectories of carbon emissions for the council area to 2030, showing potential net carbon emissions (dotted line) across key emission sources assuming very significant action is taken to reduce emissions. The red line shows the business as usual (BAU) assumed emissions if further action is not taken.

This analysis shows that it will not be possible to reduce emissions far enough to reach the net zero target by 2025 when considering only emissions and removals within Dumfries and Galloway. The council will need to consider offsetting residual emissions in order to meet the target.

Figure 8 shows the emissions for the council operations, with emissions reductions resulting from significant decarbonisation to 2025.

Figure 7 Emission trajectories for Dumfries and Galloway

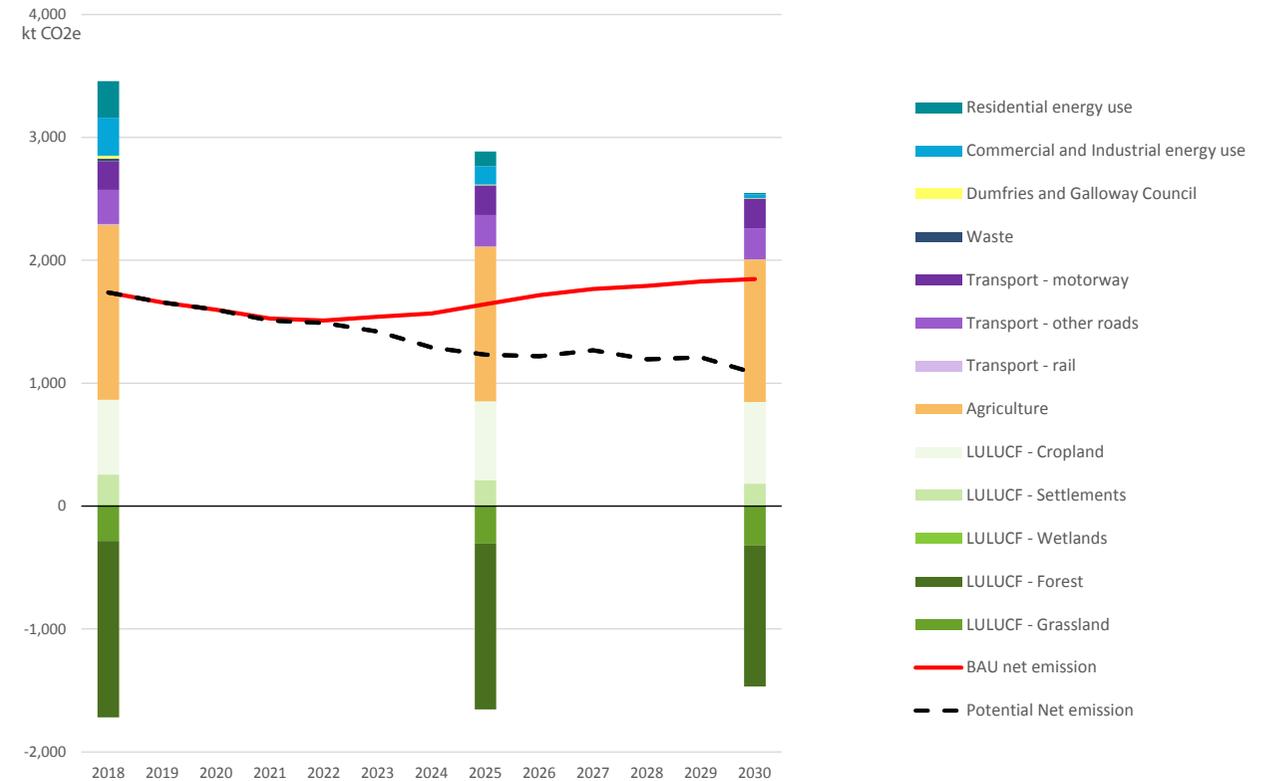


Figure 8 Emission trajectories for Dumfries and Galloway Council

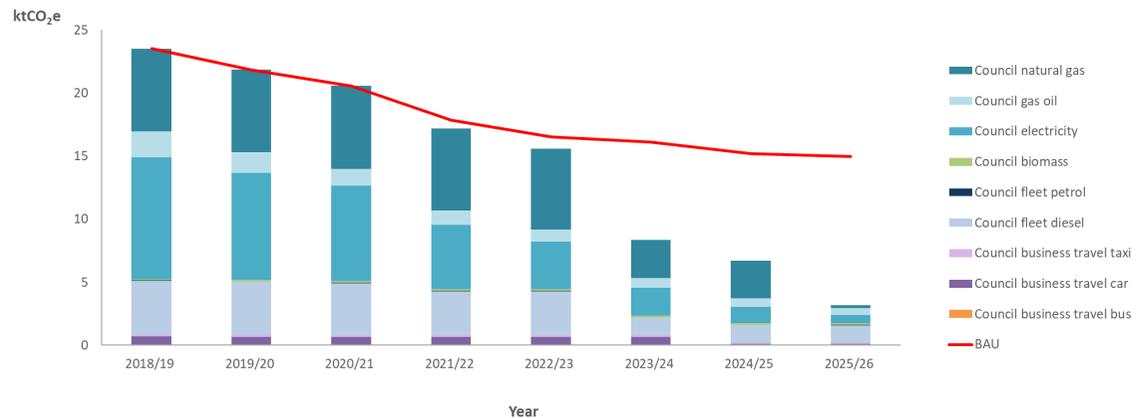


Table 3 below highlights the key priority areas for the council and region in terms of carbon reduction, whether policy decisions are needed at a council or national level to enable changes and identifies the likely local stakeholders.

Collaboration across all sectors is essential to achieving these ambitious targets, with partnership working being at the heart of this Strategic Plan.

Our communities have a major part to play and are provided with the support and encouragement of Council officers and elected members in the commitment shown in our leadership role.

We understand that both private sector and public sector funding is essential to making significant changes and some opportunities for funding are covered in more detail later in this report.

Greater progress will be achieved when we work together.

It should be noted that projected emission reductions are from a high ambition scenario, where savings are realised at an increased rate compared to national projections in some instances. For example, uptake rates of EV are assumed to be higher than those currently projected nationally, as it is recognised that this is required in order to progress towards net zero. However, Dumfries and Galloway's rural nature may in fact make achieving EV uptake, at the rate assumed, a challenge due to access to infrastructure and the prevalence of shorter journeys, which are currently more conducive to EVs.



There is a high amount of uncertainty when considering emission reductions in the wake of the COVID- 19 outbreak. Encouraging trends of increased active travel and reduced private vehicle use through to removal of commuting emissions must be locked in if rebound effects are to be avoided and emission savings are to be realised. However, the provision of key council services must be considered and whilst a post COVID-19 environment could offer opportunities for modal shift towards active travel and public transport and subsequent reduction of the council fleet, the protection of public health remains a priority. Dumfries and Galloway council will look for opportunities to make efficiencies and lock in positive changes wherever possible in a post COVID environment.

Table 3 Priorities for carbon reduction

A full set of actions and potential savings that have been quantified are presented in Appendix 1.

Priority Action Areas	National or council policy for action	Service Lead and funding sources	Stakeholders
Community engagement to encourage changes by individuals and businesses through collaboration across a wide variety of activities	Council		Council / property owners / businesses
Significant improvements in energy efficiency in buildings such as large scale installations of insulation including of solid walls, replacing windows and doors.	National govt funding required. Council to provide engagement & support	Paul McCulloch Capital Investment Strategy and external funding sources	Council / property owners / businesses
Installing zero carbon heating systems such as heat pumps and biomass, and the possible use of hydrogen in future.	National govt funding required. Council to provide engagement & support	Paul McCulloch Capital Investment Strategy and external funding sources	Council / property owners / businesses
Changes in the way that we work and travel to reduce travelling and increased use of public transport and active travel.	Council transport planning changes; National funding to support.	Douglas Kirkpatrick Capital Investment Strategy and external funding sources	Council / property owners / businesses
Large scale switching to electric vehicles.	Council transport planning changes for charging.	Gordon Bryce Capital Investment Strategy and external funding sources	Individuals and businesses - consumer demand.
Significant increase in renewable generation.	National govt funding required. Council to provide engagement & support	Paul McCulloch Capital Investment Strategy and external funding sources	Individuals and businesses - consumer demand.
Reducing waste	Council	James McLeod Capital Investment Strategy and external funding sources	Council / individuals / businesses
Changes in agricultural methods to improve carbon accounting and measuring techniques to allow for a better understanding of carbon outputs from farm businesses and the reduction in the use of nitrogen fertilisers, changes in animal feeds, reduced intensity of livestock production and improvements in waste management.	National policy to require / support change.	Simon Fieldhouse External Funding Sources	Farmers and food industry. Consumer demand.
Maintaining and increasing the size of the forestry and grassland carbon sinks	National policy to require / support change.	Simon Fieldhouse External Funding Sources	Forestry Scotland and other landowners

Embedding carbon reduction into all decisions

The commitment to embed carbon reduction into all activities and decisions across the Council is highlighted in the proactive work which has taken place since the Climate Emergency was declared. The following activities and future actions discussed within this Strategic Plan underpins the relativity of opportunity, support and enthusiasm shown by the Council who have taken swift action to address carbon reduction and endeavour to adapt to mitigate against the severe weather events experienced by the region in recent years.

Cross Party Working Group

The Cross-Party Members group was established to have regular oversight of the activities and areas of work being driven by officers that related and supported the implementation of the 12-point action plan. The members group has been an effective platform to consider the implication of the 12-point action plan and the activities and priorities required to develop a tangible plan and framework to deliver the council's aspirations.

The Cross-Party Members group has set the priorities to be considered over the next 12 months to define our regions baseline emissions, develop an appropriate corporate vision and strategy, and to consider how to provide further suitable training for officer and members to better understand the role that we can play both in a professional and personal capacity.

Officer Working Group – influence makers across the Council

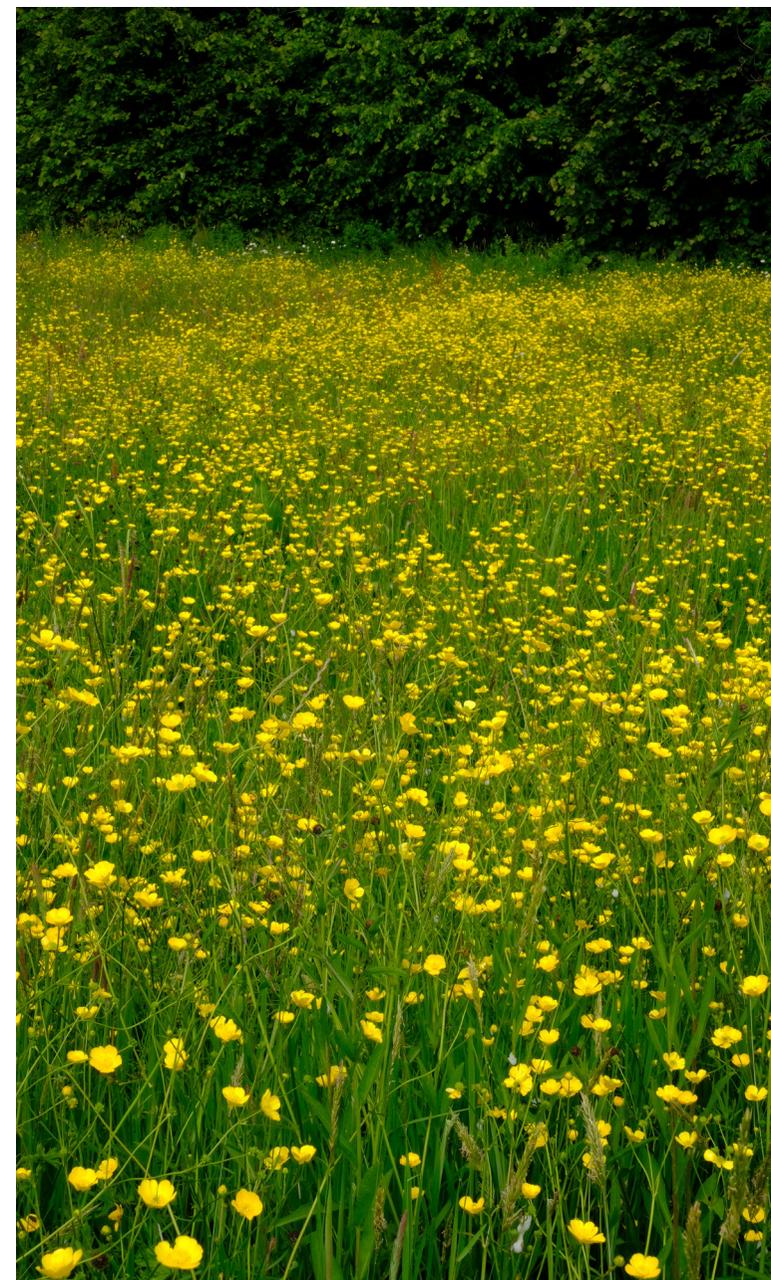
The Climate Emergency Officer Working Group was established to carry out the actions required within the 12-point plan. This group consists of council officers representing council services relevant to waste management, infrastructure, transport, education, procurement, resilience, planning, property, business & technology solutions, facilities management, communications and engagement, environment, strategic housing, policy, sustainable travel, communities,

The Officer Working Group reports to the Cross-Party Members to seek approval and agreement on the activities being carried out and to report progress towards the objectives.

Both the Cross-Party Member Group and the Officer Working Group are supported by our Director of Economy and Resources.

Impact Assessment

The Council's impact assessment relevant to reports and policy includes the requirement to consider the impacts of climate change as part of all activities and governance and is an intrinsic part of strategic operations. The previous impact assessment screening toolkit has been refreshed to include more focus and support for Environmental Sustainability, Climate change and Energy Management to reflect the adoption of the Climate Emergency Declaration.



Risk Management

With the adoption of the Climate Emergency Declaration the council has now incorporated Climate Change as part of its corporate risk register which identifies the 10 greatest risks to the Council activities which provides a strategic overview of the impacts of climate change and the mitigation being undertaken to address and control the risks linking into national and local government policy. The clarity and inclusion of Climate Change within the Council wide risk register provides the opportunity for services to consider and adapt actions and activities to take cognisance of Climate Change in their operational delivery.

Carbon Literacy Training

Dumfries and Galloway Council have committed to undertake Carbon Literacy training to place Climate at the heart of our activities; to address our Climate Emergency Declaration requirements and to enhance and enrich our region's environment to benefit those who live, work and visit.

The aim for the attendees is for them to act as ambassadors and educators for the Council's climate emergency ensuring that carbon literacy and awareness of their activities is embedded in everyday operations.

This training programme is an accredited programme recognised by the UN at COP21. Dumfries and Galloway Council has delivered the first cycle of carbon literacy training and has been recognised under the scheme with a

Bronze accreditation becoming the first non-metropolitan local authority in Scotland to receive the designation.

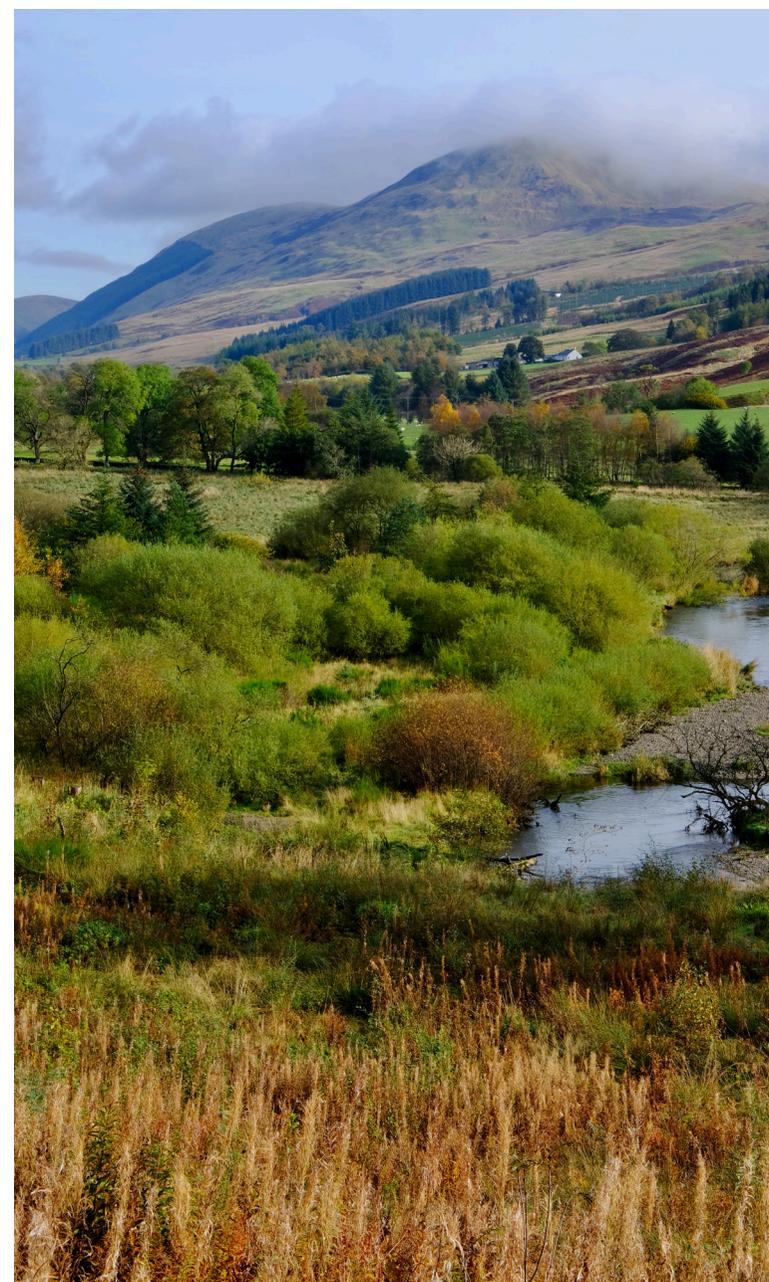
Carbon Literacy training and awareness remains an active element of the council's ability to raise awareness and understanding of the impacts of carbon emissions and the activities that can be implemented individually and collectively to support the action to address the causes of climate change.

The ambition is to ensure that all council employees have received Carbon Literacy training by 2025 to demonstrate the commitment made through the Climate Emergency Declaration to embed Carbon reduction at the heart of all out business.

Further work is required to utilise the carbon literacy training as a starting point to provide further engagement and outreach to council employees and external groups and organisations that will work closely with the council to address and support the actions required to reduce carbon emissions.

Key Performance Indicators (KPIs)

With the adoption of the fifth Council Priority as outlined below and its strategic objectives, work will now be underway through the development of business plans across the council to create new key performance indicators and targets that focus activities and resources on Climate Change and Climate related activities including mitigation



and adaption. Existing KPIs may require to be updated and amended to reflect the new priority. These KPIs will be reported through the councils corporate reporting tool Pentana and reported at key review points to the relevant service committees to allow scrutiny and accountability.

All new KPIs must be SMART and link to those areas highlighted in table 2 and Appendix 1 to allow the best opportunity to corporately monitor our activities and the impact they have on reducing the regions carbon emissions. These KPIs will assist in the annual monitoring agreed by the Economy and Resources Committee in November 2020 and the climate duties reporting required by the Scottish Government.

Citizens Panel

Highlighted within the 12-point plan adopted by the council was the establishment of a citizen's panel to focus engagement on climate change, bringing together a broad range of stakeholders and interested parties across the region to assist the council in addressing the Climate Emergency.

Work is continuing regarding the exact operating model for the citizen's panel to ensure that it is fit for purpose and addresses the ambitions laid out within the climate emergency declaration. Work will be accelerated in quarter 1 2021 to progress with the development of implementation of the citizen's panel and the operational mechanisms required to support the group through its establishment.

Engagement events / community bulletin / media / website

Engagement and communication is a vital part of ensuring that we meet with the correct people, ensure everyone has an opportunity to be part of this regional goal and communicate our progress to our stakeholders and communities.

A communications plan is being developed alongside other activities including regular updates to our web page.





Funding opportunities

Funding the path to net zero carbon by 2025 will be significant and will have immense benefits for the region. It is understood that investment is required from all sectors with support and guidance being produced by Scottish Government in due course. As Dumfries and Galloway have placed their net zero aspirations 20 years ahead of Scottish Government's, we are aware that all new and existing funding streams must be explored as they become available.

There are many funding streams available which can be considered from various sources, for example; Salix, Green Economy Fund, Scottish Renewables, Community and Renewable Energy Scheme (CARES), Home Energy Efficiency Programme for Scotland/ Area Based Scheme (HEEPS/ABS), as well as the £1 Billion Challenge launched by SEPA and the Scottish Wildlife Trust "as an ambitious initiative to pioneer, develop and showcase cutting-edge investment and funding models to help close the gap between the need for funding to protect and restore the world's vulnerable ecosystems, and the level of funding available".

The funding commitments in the Scottish Government's Program for Government are as follows. With many in the next parliament and some yet to be developed and defined:

- An additional £2 billion of infrastructure investment over the next Parliament to stimulate demand and create jobs in the transition to net zero

- £1.6bn in transforming our homes and buildings over the next Parliament
- Committing at least £95 million to decarbonise the public sector estate.
- £100m to a new Green Industry and Jobs Fund over the next five years to support businesses which provide sustainable and/or low carbon products and services to develop, grow and create jobs.
- Investing in green jobs and skills as part of the green recovery including £60m Youth Guarantee including increased opportunities for 'green' apprenticeships across public sector bodies and £25m National Transition Training Fund including focus on provision of green skills.
- £60 million to support the industrial manufacturing sector including the £34m Scottish Industrial Energy Transformation Fund and £26m Manufacturing Low Carbon Infrastructure Challenge Fund
- We will invest over £500 million over 5 years in active travel, the large majority of which will be for active travel infrastructure including reallocating road space in favour of walking, wheeling, and cycling, encouraging active travel for shorter everyday journeys.

- Building on the experience of Covid, we will work with COSLA and local government to take forward our ambitions for 20-minute neighbourhoods – the creation of liveable, accessible places, with thriving local economies, where people can meet their daily needs within a 20-minute walk.
- Investing an additional £130m to expand Scotland’s national forests and land, with 18,000 hectares of new woodland planted per annum by 2024. We will also invest a further £20m to increase nursery stocks and ensure a resilient supply for tree planting in Scotland
- an extra £150 million for flood risk management over the next five years in addition to the £42 million we spent annually.
- invest in a new £70 million fund to improve local authority collection infrastructure, making it easier for people to do the right thing by ensuring clearer information and labelling; promoting more consistent collection services; providing stronger incentives for recycling
- The Scottish National Investment Bank will launch this year with £220 million of fresh seed funding in 2020-21 as part of the £2 billion capitalisation pledge to invest in businesses and markets that are key to our net zero transition
- We will launch our Green Investment Portfolio to identify over £3bn net zero investments in Scotland to global investors.

- Continue to develop and launch the Green Growth Accelerator with local government.
- Develop tools and guidance to support a green recovery and climate and circular economy ambitions through procurement.
- Additional funding support may become available through changes to the current agri-environment schemes which are being developed in line with the post CAP reforms and Brexit process, once confirmed these new schemes will be referenced here in more detail.

In addition to the external funding sources the Dumfries and Galloway Council has the opportunity to invest additional resources both through its capital investment strategy and operational revenue budgets where opportunities are identified that will support the reduction of CO2e.





Action Plan

The actions that will be required to move towards the net zero target in Dumfries and Galloway are outlined in Appendix 1. It shows the estimates of carbon savings from each action over the next 5 - 10 years if able to achieve the targets outlined.

We will work closely within each sector to encourage and support the efforts required to achieve significant changes to operations, activities and behaviour. Each sector will develop an action plan relevant to their own sphere of influence which will provide a project plan to support the net zero target.

There are many positive activities currently being achieved across all sectors and specifically with agriculture which is the most prevalent industry across the Dumfries and Galloway region. This report highlights some case studies of carbon reduction activities being carried out.

Dumfries and Galloway Council will continue to develop carbon reduction programmes relevant to our own activities by way of innovation through travel and transport; embedding home working; enhancing digital connectivity; transitioning to zero and low carbon technologies; further developments in waste management solutions and education for all. (Case study)

Domestic solutions are being implemented by housing providers across the region with several examples of passive haus standard properties being developed. Other solutions include the use of derelict land, building within walking distance of local amenities and renewable technology solutions.

The strategic plan will be monitored as part of the ongoing methodology and mechanism to provide updates and a trajectory towards net zero.

Glossary of Terms and Acronyms

Activity: an action that leads to emissions of greenhouse gases. Examples include combustion of fossil fuels for heat, generation of electricity and transport, treatment of waste and wastewater, industrial processes. Activity data is the measure of how much of this activity is taking place and has a variety of different units e.g. kWh, passenger kilometres, tonnes of waste etc.

Carbon dioxide equivalent (CO₂e): carbon dioxide equivalent is a measure used to compare the emissions from various greenhouse gases based upon their global warming potential. For example, the global warming potential for methane over 100 years is 25. Therefore 1 tonne of methane released is equivalent to 25 tonnes of CO₂ (measured on a 100-year time horizon). Therefore, CO₂e works as a single 'currency' for greenhouse gases.

Carbon emissions: used as a shorthand to refer to greenhouse gas (GHG) emissions that are included in the Kyoto Treaty. Carbon dioxide is the most common GHG and other gases can be measured in relation to it (see CO₂e).

Carbon neutral: the balancing of carbon emissions against carbon removals and/or carbon offsetting with the net result being zero (see also net zero carbon).

Carbon reduction: an activity that reduces carbon emissions compared to a baseline scenario.

Climate Change: the large-scale, long-term shift in the planet's weather patterns or average temperatures.

Decarbonisation: usually refers to the electricity sector and refers to reducing the carbon intensity of electricity generated (emissions per kWh) by increasing efficiency of supply or changing the generation fuel mix from fossil fuel to renewables and low carbon sources.

Emission factor: the average emissions of a given GHG for particular activity. Emission factors are also expressed as the average combination of GHGs for a particular activity, in units of kgCO₂e.

Global warming: refers to the recent and ongoing rise in global average temperature near Earth's surface. It is caused mostly by increasing concentrations of greenhouse gases in the atmosphere. Global warming is causing climate patterns to change. However, global warming itself represents only one aspect of climate change.

Greenhouse Gas (GHG): a gas in our atmosphere that absorbs and emits radiation within the thermal infrared range. There are naturally occurring greenhouse gases in our atmosphere which maintain surface temperatures in a range conducive to life. However, since the industrial revolution, anthropogenic sources of GHGs have increased hugely, leading to 40% increase in atmospheric concentration of carbon dioxide. This is causing increases in surface temperatures and is the main cause of climate change. There are seven GHGs covered by the Kyoto Treaty, but the main

ones are carbon dioxide (CO₂), methane (CH₄) and nitrous oxide (N₂O), and action needs to be taken to reduce emissions of these.

Net zero carbon: the balancing of carbon emissions against carbon removals and/or carbon offsetting with the net result being zero (see also carbon neutral).

Project lifetime: anticipated lifetime of an energy efficiency technology or low carbon behaviour, used to calculate lifetime savings.

Removals: CO₂ removals refer to a set of techniques that aim to remove CO₂ directly from the atmosphere by either increasing natural sinks for carbon or using chemical engineering to remove the CO₂, with the intent of reducing the atmospheric CO₂ concentration.

Scope: a way of categorising emission sources in relation to the reporting organisation, used as a way of providing transparency in emissions accounting, making it clear the type of emission source and the level of control of the reporting organisation over the source. Three levels of scope have been defined and used on a global basis.

Sequestration: a natural or artificial process by which carbon dioxide is removed from the atmosphere and held in solid or liquid form. The uptake of atmospheric carbon by plants and the growth of wood or increase of peat volume are examples of biological sequestration. Also see removals.

Farming for a Better Climate - Crichton Royal Farm



Name	Hugh McClymont
Farm	Crichton Royal
Locality	Dumfries
Farm Type	Large dairy
Size	300ha, all rented ground
Staff	6 full time, 5 part time plus 2 contract staff

Funding

A Whole Farm Review could help identify self-funding possibilities and business opportunities.

Energy auditing may be available free-of-charge from the Carbon Trust and elsewhere. See Practical Guides on Energy Auditing, Feed in Tariff (FIT) and the Renewable Heat Incentive (RHI).

Background

I manage SRUC's Dairy Research Unit farms here at Crichton Royal near Dumfries where we are lucky to have easy worked ground with freely- draining soils. We run two dairy units within the farm. We are situated within the Lower Nithsdale NVZ. The research side of the farm means that we have a higher staffing than normal and it also alters some of our practices but we still operate as a commercial dairy farm, milking 500+ cows three times a day with yields averaging 9,000 litres. We make grass silage, maize silage and grow cereals for feeding to dairy cows. Recent investments on-farm have included additional slurry storage, a new milking parlour and new purpose built Calf Rearing Facility.

How might Climate Change affect our farm?

In terms of what Climate Change may bring us, one of my main concerns is to do with extremes in summer weather. Prolonged hot spells could mean increased ventilation requirements to minimize heat stress. This could include both passive ventilation as well as fans in some situations. Dry periods in summer

could impact our grass growth - growing maize for silage spreads the risk and gives flexibility to the systems.

All farmers are being forced to plan now for livestock disease control - Bluetongue is a good example. Because of our research activities here we already work closely with our local practice vets as well as with SAC's vets and we have an overarching Herd Health Plan as well as series of specific protocols for cow health.

Milder winters may mean that we can extend our grazing season. Milking almost entirely off grass like this would reduce our conserved forage requirements.

On the positive side, the EU "dairy zone" may move northwards meaning that Scotland's milk producers may find themselves increasingly at the forefront of production.

Turn over to find out about changes we have made that will help reduce greenhouse gas emissions - many of them help improve efficiency and hence reduce production costs too.

Case Study

Find out what other farmers are doing to improve profitability and adapt to a changing climate in our series of case studies.

There are five sets of Practical Guides covering :

- Use energy and fuels efficiently
- Develop renewable energy
- Lock carbon into soils and vegetation
- Optimise the application of fertilisers and manures
- Optimise livestock management and the storage of manure and slurry

Find further information, including links to other Practical Guides and Case Studies, at: www.farmingforabetterclimate.org

“My own personal target is to grow all our grass and crops using nutrients produced on the farm.

Ten years ago we thought we were doing a reasonable job of efficient nutrient use but now we know that we were just starting out back then.

We now recognise that, in making the N in slurry and manure work really hard for us, we are keeping our costs down but also, critically, we are reducing our farms greenhouse gas emissions. Slurry injection has been the key step we’ve taken.

Our Research programmes will always mean we have higher inputs than a conventional unit of our size but we still have the same underlying need - to produce milk profitably and sustainably and with a high degree of environmental responsibility”.

Hugh McClymont

Energy and Fuel

- Our Plate Cooler for milk, designed by SAC Specialists, is making considerable energy savings.
- When we installed our new parlour in an existing shed we renewed the translucent roof panels - this helps save energy as well as improving the environment for the cows and for the farm team
- Variable speed vacuum pumps make sense for us as they use much less energy
- We record and monitor tractor fuel use for all in-house and contractor operations and relate it back to the task being done
- My team all pay really close attention to equipment maintenance
- When we change equipment we are always looking for information about energy efficiency

Fertilisers and Manures

- Because we are in an NVZ we have to pay attention to N use. We’re very aware of getting the best value from our inputs.
- My target is to grow all the crops on the farm from farm-produced nutrients. Reductions in purchased

P&K have allowed savings but we purchase in N,P&K as animal feed. Regular Soil Testing is carried out to monitor nutrient soil balances.

- We sow grass mixes with about 4% white clover and we monitor clover content.
- 90% of the slurry we apply is shallow injected. This improves palatability and reduces N2O losses

Renewables

- A neighbouring farmer has a wind turbine - we explored this option previously but it warrants further evaluation particularly in the light of new tariff structures
- Biogas was considered but due to High Capital Investment did not progress.
- Interest in Biomass for dairy water Heating is being considered and opportunity for Solar panels on roof to be evaluated.

Locking up Carbon

- We’re careful not to leave bare soils over winter, particularly after maize but will chisel plough to minimize soil erosion.

- We bale our straw to use for bedding but we plough most of it back in later as FYM and so we boost soil C that way.
- We have about 4ha of trees on the farm and I plant 20 new hardwoods every year to replace windblown.

Livestock and Slurry

- Legumes are playing a major part of our cropping with Spring Beans as a Home Grown Protein Source.
- Because we are a Dairy Research Centre, we are constantly looking at milk production efficiency which includes genetics, feeding and management. Our stockmen are a key part of the team. We communicate our research findings and demonstrate practice at Open Days.
- Our slurry stores don’t have covers because the large additional costs didn’t represent good value for us at the time. But they were designed to take retro-fit covers if circumstances change in the future.
- We have obtained SRDP funding for a slurry separation plant to increase nutrient efficiency and ease slurry management pressures.

Farming for a Better Climate - Torr Farm



Name	Ross and Lee Paton
Farm	Torr Farm
Locality	Auchencairn
Type	Dairy
Size	389ha
Staff	2 full time, 1 apprentice

Background

Brother and sister team Ross and Lee Paton manage Torr Farm, a 389 ha organic dairy farm on the Solway coast about 20 miles west of Dumfries. The business has 170 dairy cows, mainly Holstein-Friesian and Montbelliarde, along with a few Ayrshire and Norwegian Red.

The business keeps all offspring from the dairy herd, either for breeding or finishing.

Approximately 30ha of the farm is woodland, 45ha are rough grazing and 80ha are used for growing cereals, namely arable silage, spring barley and winter wheat. The remaining land is laid to grass for grazing and silage.

Ross and Lee worked with Farming for a Better Climate as a volunteer Climate Change Focus Farm 2010 -2013; their results are covered in a separate case study.

How might Climate Change affect Torr Farm?

The Scottish climate is predicted to become warmer in the summer and wetter in the winter as a result of climate change. More extreme weather events such as storms, floods and heatwaves are also predicted. It's the weather extremes which are the main concerns for Torr, as it is a low lying coastal farm with mainly heavy soils.

Floods coinciding with sowing, silage time and harvesting will jeopardise the production of good quality home grown fodder which is critical for Torr. Wetter soils will also reduce the opportunities for grazing, possibly resulting in the cattle having to be housed for longer. Downpours at harvest time will also increase drying costs.

On the other extreme, heatwaves during the summer may reduce both crop and grass yields due to drought stress, especially on lighter soils around the farm. This would result in Torr having to purchase in extra concentrates to compensate for the potential yield reduction. Heat stress could also be an issue; Ross may have to provide increased ventilation in the sheds.

As an organic farm the threat of new or more aggressive pests and diseases in crops is also a concern.

Case Study

Find out what other farmers are doing to improve profitability and adapt to a changing climate in our series of case studies.

There are five sets of Practical Guides covering :

- Use energy and fuels efficiently
- Develop renewable energy
- Lock carbon into soils and vegetation
- Optimise the application of fertilisers and manures
- Optimise livestock management and the storage of manure and slurry

Find further information, including links to other Practical Guides and Case Studies, at: www.farmingforabetterclimate.org



"As an organic farm we are interested in reducing our impact on the environment however we are far from perfect when it comes to energy use. Being selected as one of the focus farms is a great opportunity for us. It is a fascinating programme to be involved in and we are looking forward to identifying further improvements to current farming practices."

Ross Paton

Where to start?

A free carbon audit identifies the main areas of greenhouse gas losses on the farm and helps to identify where efficiency savings can be made.

A whole farm energy audit provides a very useful starting point for assessing and benchmarking fuel and electricity use and can highlight opportunities for cash savings.

Energy and Fuel

- A whole farm energy audit has been undertaken.
- Farm staff have been keeping a record of diesel used i.e. how much and what it was used for.
- Close attention is given to vehicle and tractor maintenance to ensure they run efficiently.
- A smart meter has been fitted, this allows electricity use to be monitored on a half-hourly basis via the internet.
- Consideration is being given to replacing the existing milk plate cooler. Replacing it with a larger plate cooler will have the potential to make considerable energy savings.

Fertilisers and Manures

- As an organic farm Torr pays close attention to making the best use of the nutrients contained in the slurry and FYM that is produced.
- The slurry is analysed at least once a year to determine its nutrient status.
- All the fields on the farm have had their P, K, Mg and pH levels analysed. This information is currently being entered into

PLANET to provide a nutrient management plan for each field.

- A new slurry store will be erected this summer, providing the business with at least 6 months storage.
- Red clover is incorporated into some of the silage fields; white clover is always included in all other grass seed mixes.

Renewables

- Torr is keen to explore the feasibility of a wind turbine and a micro-hydro scheme.
- AD and biomass are unlikely to be feasible at Torr.

Locking up Carbon

- Torr has 30 ha of existing woodland.
- 5 ha of native woodland will be planted in 2011 and managed thereafter.
- Management of the existing woodlands is currently being considered.
- There is approximately 45 ha of rough grazing that is never ploughed. This land is also protected from over grazing.
- The straw is baled and is used for bedding the livestock, all the FYM

produced is applied back to the land at a later date.

- Bare soils are not left over winter therefore reducing risks of soil erosion.

Livestock Management

- Milk production efficiency is monitored closely i.e. genetics, feeding and animal health.
- Regular visits from a Dairy Specialist are undertaken and their advice is implemented.
- A health plan is drawn up annually and is regularly reviewed. The high health status of the livestock ensures improved productivity.

Need more information?

To find out which efficiency measures benefitted the farm, see the 'Improving Farm Efficiency; Findings from Torr' case study.

To keep up to date with the latest farms in the initiative and for more practical and low cost efficiency measures, visit www.farmingforabetterclimate.org and register for the free e-newsletter by emailing

climatechange@sac.co.uk

Appendix 1 Quantified actions to reduce carbon emissions

Project sub category	Project Description	First year of full impact of measures savings	2025 annual savings (tCO2e)	2030 annual savings (tCO2e)
Agriculture (in review)	Actions to reduce emissions from cattle (including manure management)	2024/25	113,884	113,884
	Actions to reduce emissions from sheep	2024/25	7,803	7,803
	Actions to reduce emissions from soils	2024/25	32,730	32,730
	Fuel efficiency	2024/25	6,644	6,644
	Restructuring agriculture for wider environmental benefits - cattle	2030/31	0	59,114
	Restructuring agriculture for wider environmental benefits - sheep	2030/31	0	6,550
	Restructuring agriculture for wider environmental benefits - soils	2030/31	0	24,672
Council buildings and streets	Energy saving awareness raising among council staff	2022/23	183	177
	Improve heating efficiency in buildings still in use Phase 1	2023/24	1,051	1,051
	Improve heating efficiency in buildings still in use Phase 2	2023/24	1,051	1,051
	Improved lighting efficiency	2022/23	104	92
	Increasing deployment of renewables	2024/25	390	345
	Reduce council office space by 20%	2023/24	1,833	1,773
	Replace remaining gas oil (in 2024) with renewable heat (biomass)	2025/26	588	597
	Replace remaining natural gas (in 2024) with renewable heat (heat pumps)	2025/26	2,767	2,767
Streetlighting dimming scheme	2023/24	520	460	

Project sub category	Project Description	First year of full impact of measures savings	2025 annual savings (tCO2e)	2030 annual savings (tCO2e)
Council transport	Behavioural change through driving style assessment for LGVs/HGVs - i.e., the remaining refuse trucks	2023/24	60	60
	Procurement of electric vehicles for council fleet Stage 1	2021/22	630	630
	Procurement of electric vehicles for council fleet Stage 2	2023/24	1,378	1,378
	Reduce pool of council vehicles	2023/24	417	417
	Replace business travel with EV pool cars	2024/25	469	469
	Travel strategy reduce remaining business mileage	2024/25	116	116
Domestic	Domestic coal phase out, replaced with electric heating	2025/26	4,149	4,384
	Domestic MSF phase out, replaced with electric heating	2025/26	2,360	2,493
	Domestic PV - Early wins	2024/25	1	0
	Domestic PV - Target SAPc	2025/26	10,311	9,124
	Domestic PV - Target zero carbon	2028/29	0	21,215
	Lower cost measures - Easy wins	2024/25	3,587	3,448
	Lower cost measures - Easy wins Phase 1	2022/23	3,587	3,448
	High cost measures - Target SAP C package	2023/24	16,179	32,282
	High cost measures - Target zero carbon package	2023/24	71,509	143,694
LULUCF	LULUCF: Stretch projections scenario Phase 1	2025/26	18,560	18,560
	LULUCF: Stretch projections scenario Phase 2	2030/31	0	3,147

Project sub category	Project Description	First year of full impact of measures savings	2025 annual savings (tCO2e)	2030 annual savings (tCO2e)
Non Domestic Buildings	Decarbonisation of industrial heat - gas oil phase out 1	2025/26	24,456	24,796
	Decarbonisation of industrial heat - gas oil phase out 2	2028/29	0	26,253
	Decarbonisation of industrial heat - MSF phase out	2025/26	145	145
	Increased renewable capacity on commercial buildings	2024/25	100	88
	Low carbon businesses, electrical appliances efficiency	2023/24	5,561	4,921
	Low carbon businesses, phase 1	2025/26	15,788	40,840
	Low carbon businesses, phase 2	2025/26	15,788	40,840
	Other methods to reduce non-domestic gas use (biogas, hydrogen mix, replacement with heat pumps)	2030/31	0	48,327
	Other methods to reduce non-domestic oil use (biogas, hydrogen mix, replacement with heat pumps)	2030/31	0	70,074
Transport	EV increase in UK car fleet (motorway traffic)	2025/26	3,916	12,236
	EV package of measures (infrastructure and encouraging uptake) (non-motorway car traffic)	2025/26	13,036	26,073
	Replacing HGVs with rail freight	2025/26	7,441	7,441
	Workplace travel measures	2022/23	370	370
	Improving active travel infrastructure	2025/26	2,635	2,635
	Cleaning the bus fleet	2025/26	4,480	4,480
	Van electrification scheme	2025/26	7,961	7,961
Waste	Increasing recycling rates	2024/25	-298	-298
	Reduction in waste to landfill (MBT and waste reduction)	2021/22	15,715	15,715