Action Plan of the CLEAN project:

Technologies and open innovation for low carbon regions

A pathway towards a net zero smart energy system

for Ireland's Border, Midland & West (BMW) region

(Final Draft July 3 2020)

PP1 – ERNACT

Contents

1 Executive Summary

This Action Plan is the result of the Interreg Europe funded CLEAN project, led by ERNACT, and executed in the in the Irish Border Midland & West (BMW) region. In particular, ERNACT worked closely with the local authorities in the north west area of the region, in Donegal which adjoins Northern Ireland

Motivation has been drawn from the good practices and discussions with the CLEAN project partners, especially through participation by regional stakeholders in staff exchanges, study visits and interregional seminars. As a result, local authorities in the region have established firm partnerships and jointly agreed to progress energy related programmes and projects towards targets set by their government, and in line with EU targets.

These partnerships will be maintained to support a coordinated approach to deliver on regional critical energy reduction priorities by improving measures in the policy instrument, *Border, Midland and Western Regional Operational Programme 2014-2020*.

This policy instrument seeks to add value to wider investment programmes in targeted high growth and innovative sectors to help create new quality jobs through innovation. One of its five main thematic objectives is to support a shift towards a low-carbon economy by supporting effective energy, intelligent management systems and the use of renewable energy in public infrastructures and housing and reducing fuel poverty. It also promotes the development of low-carbon emission strategies.

This Action Plan will incorporate specific measures that support new projects to help improve this policy instrument. This will include actions to (1) develop a centralised, reliable, robust and validated regional energy open data repository that is accurate, complete and accessible; (2) introduce new approaches to reduce fuel poverty, including financial instruments. An emphasis will be placed on measures that encourage the use of local energy services and products, e.g., through approaches such as “open innovation”.

The expected impact of the Actions proposed are both qualitative and quantitative. Action 1: Energy Open data will allow for (a) more accurate establishment of energy efficiency baselines; (b) more accurate monitoring and impact evaluation of policy initiatives and measures; (c) higher quality evaluation of energy policy options and measures; (d) more rapid implementation of energy policy as a result of relevant high-quality energy data; (e) enhanced capacity in local authorities to reach their low-carbon goals; (f) enhanced regional capacity to implement new energy efficiency and renewable energy solutions; (g) easier capture of ongoing energy usage trends in the region. Action 2 - New Approaches to Fuel Poverty will allow for (a) more energy efficient homes as a result of householders accessing new fuel poverty schemes; (b) Reduce incidents of fuel poverty.

They will also serve as exemplars for other regional actors, strengthen regional collaboration on energy and climatic issues, and provide an evidence-base for further European Structural Funds targeted at intensifying renewable energy and energy efficiency measures.

2 General Information

- **Project acronym:** CLEAN
- **Partner organisation:** ERNACT EEIG
- **Other partner organisations involved (if relevant):** N/A
- **Country:** Ireland
- **NUTS2 region:** Border, Midland & Western
- **Contact person:** Juanita Blue
    - **Email:** juanita.blue@ernact.eu
    - **Phone number:** +353 (0)74 91 68212

3 Policy context

The Action Plan aims to impact:

☒ Investment for Growth and Jobs programme

☐ European Territorial Cooperation programme

☐ Other regional development policy instrument

Name of the policy instrument addressed:

Border, Midland and Western Regional Operational Programme 2014-2020

(CCI number: 2014IE16RFOP001)

4 Action Plan: A pathway towards a net zero smart energy system

4.1 Background & Approach

This Action Plan is the output of the process started by the INTERREG Europe CLEAN project in coordination with local authorities in the north west area of the Irish Border, Midland and Western (BMW) region.

The 'CLEAN' project or Technologies and Open Innovation for Low-Carbon Regions project is an Interreg Europe funded project that addresses the challenge of how best to meet EU energy efficiency targets for buildings in Europe's regions. The CLEAN project is led by ERNACT, or European Regions Network for the Application of Communications Technology, with close cooperation from the following partners:

- Association of Local Authorities in Västernorrland (Sweden)
- Fomento de San Sebastián (Spain)
- Municipality of Iasi (Romania)
- Naples Agency for Energy and Environment (Italy)
- Utility cooperative of collective interest les 7 Vents (France)
- Development Agency of Savinjska Region (Slovenia)
- Regional Council of North Karelia (Finland)
- Region of Crete (Greece)

These regions have worked together between 2017–2021 to improve the capacity of their policy instruments to increase energy efficiency.

The general logic, sequencing and approach followed was the classic Interreg Europe one, viz:

1. Selection of good practices from other CLEAN regions appropriate to the BMW context.
2. Undertake study visits based on what needs to be improved in the BMW's own policy instrument and territorial context (e.g., border with Northern Ireland).
3. Undertake staff exchanges based on the results of the Study Visits. Staff exchanges will enable in-depth assessment of specific good practices.
4. Establishes Baseline as a basis for the Regional Action Plan (RAP) itself.
5. Develop the RAP based on the good practices, study visits and staff exchanges and carbon emissions baseline.

The Action plan has been drafted as a main CLEAN project output that defines actions that aim to improve the capacity of the Irish Border, Midland and West (BMW) regional policy

instrument for supporting a shift toward a low carbon economy in all sectors. The document has been drafted by the project's Lead Partner, ERNACT.

The Regional Action Plan and the actions herein have been developed though exchange of knowledge with project partners and input from regional stakeholders including:

- North West Regional Assembly (BMW Managing Authority)
- Donegal County Council (Local Authority in Ireland)
- Derry & Strabane District Council (Local Authority in Northern Ireland)
- Sustainable Energy Authority of Ireland (Ireland's national sustainable energy authority)
- SONI -- System Operator for Northern Ireland (electricity system operator for Northern Ireland)
- Climate Action Regional Office (Irish Government offices to help drive climate action at both regional and local levels.)
- Eirgrid and NIE Networks (electricity distributers & providers)
- Letterkenny Institute of Technology (university)
- SSE Enterprise (supplier of energy infrastructure construction services)
- Siemens (supplier of energy systems)
- Atlas World Energy Management and Renewable Energy Solutions (energy consultants)
- WSP (energy consultants)

The Action Plan appends two annexes included to support the background, knowledge transfer and actions described herein.

1. Annex 1: includes a detailed description of the different activities and meetings involving the local stakeholders to (1) drive forward economic, environmental and social regeneration and prosperity in the Region, (2) define measures that encourage the use of local energy services & products and (3) quantify the expected impact to be included in this action plan.
2. Annex 2: Contains extracts from the baseline report related to housing which formed input into the Action Plan, Good Practices & Staff Exchanges

During Phase 1 of CLEAN, representatives from ERNACT and its key local authority partners took part in staff exchanges in North Karelia and Naples.

These staff exchanges transferred knowledge regarding energy efficiency measures and initiatives implemented. These were augmented by using the good practices documented in the project.

In particular, the following good practices have been used when defining the Action Plan:

1. Energy Smart Housing Association (Västernorrland, Sweden)

There are twelve co-op housing associations participating in this good practice who receive guidelines on how to structure their energy-related work by analysing energy statistics and statements to establish a point from which improvements can be made, this baseline then catalyses the identification of cost-saving measures. The good practice arranges educational courses, provides members with information and guidance, as well as assistance from an energy & climate advisor. The result is energy optimisation for the property and more energy-efficient day-to-day life for the residents.

How this contributes to the action plan?

This good practice from Västernorrland highlighted the requirement for a starting-point to reduce carbon emissions in the region. The foundation for systematic reduction in energy consumption lies in identifying a baseline which can be improved upon. In this example, energy statistics have been gathered and compiled to create a baseline that identifies current energy trends and aids in identifying and prioritising feasible energy improvements. Well-aggregated statistics also provide opportunity to assess effectiveness of implemented measures for dissemination and future work. This good practice provides a framework to explore how open data can propel energy efficiency & management techniques and community engagement to improve over-all energy consumption in all categories of buildings. This knowledge prompted completion of the baseline across the region that examined all significant sources of greenhouse gas emissions. It also highlighted the importance of high-quality energy-related data that is accurate, complete and accessible.

2. Energy Efficiency Programme for Hospitals (Napoli, Italy)

This good practice was produced by Naples Agency for Energy and Environment and Campania Region. It targets older buildings in a bid to develop bio-climatic architecture through a proper use of energy. It aims to reduce energy consumption in public buildings or in buildings designated for public-use (residential and non-residential). It promotes conservation of resources by allocating them in the improvement of health services. This good practice is innovative because it must be accompanied by an energy audit, which identifies key sources of high-energy use. This will highlight specific actions that will reduce and optimize energy-consumption in the buildings.

How this contributes to the action plan?

This good practice from Naples documents the restructure and redevelopment of older buildings (50 years or older) already in existence. In an effort to control climate and other environmental factors, hospitals consume large amounts of energy and are a key representative example of power-hungry commercial and municipal buildings. This example funded infrastructural projects for modernisation of older public buildings and installations to optimise energy efficiency by evaluating and updating features such as the building envelope, thermal floor insulation of the floor, wall covering, replacement of fixtures and replacing cooling/heating & lighting systems. The built environment in the BMW region has many buildings that are over 50 years old that currently house government, educational, commercial, retail and health organisations. The baseline indicated that commercial buildings are the second largest contributor to carbon emissions in the region (26% of total emissions). This programme has influenced the Region's Action Plan by demonstrating that older existing structures can be assessed and renovated to optimise energy efficiency and therefore reduce carbon emissions by default. It has prompted the exploration of challenges and solutions associated with an aged built environment. Energy efficiency improvements in existing and dated infrastructure will have a great impact in reducing future carbon emissions and inspiring further conversions with a view toward net-zero in 2045.

3. Climate and Energy Programme of North Karelia 2020 (North Karelia, Finland)

This good practice from the North Karelia region addressed climate change mitigation and adaptation to implement the climate targets set out in the European Union and Finland. Following the Kyoto Protocol, the visions and targets presented in the regional programme aimed far beyond the target year of 2020, seeking sustainable long-term solutions to meet the requirements of governing authorities. The programme was designed with inclusion of all the actors in the region, calibrating and defining a common vision of the desired future. The good practice focused on the sectors of energy production and consumption, transport, community structure and land use planning, construction, waste management, agriculture and forestry.

How this contributes to the action plan?

This good practice demonstrated the North Karelia Region's success and determination in energy self-sufficiency and use of renewable energy. Through these sustainable options, North Karelia had already exceeded the EU and National climate targets. The region embraced climate change targets as an opportunity to develop innovative pilots and new

business opportunities. This good practice influenced the Action Plan's bid to impact the *Investment for Growth and Jobs programme.* This can be achieved by maximising on opportunities presented by regional climate targets, encouraging exploration of the new economic prospects presented. This can be executed in parallel with identification of local renewable energy resources and 'New Approaches to Fuel Poverty'. It also demonstrated that energy self-sufficiency could create new business and address the issue of fuel poverty by facilitating local and affordable options for all actors in the region. The overall knowledge gained from North Karelia's Climate & Energy Programme was to consider solutions that are sustainable and benefit the local community in the long-term, reaching beyond the target years defined by governing bodies.

4.2 Baseline

A baseline study was conducted, as part of the process of developing the Action Plan, in the North West area of the BMW region. Its overall aim was to summate all the significant sources of greenhouse gas emissions arising from the area.

The study allowed for:

- Informed annual carbon reduction targets to be set for the north west, which are aligned with the long-term goal to decarbonise and become a "Net Zero" region by 2045;
- Organisations within the region to understand the impact of any local measures taken to reduce carbon emissions and to prioritise those which are likely to have the largest impact at lowest cost.

The main local authority in the region with responsibility for implementing energy policy is Donegal County Council. County Donegal shares a long land border with Northern Ireland. This has major implications for energy reduction efforts in the wider area due to significant crossborder transport flows, energy use in connected public infrastructure and geographic imperative to reduce consumption of fossil fuel supplies. Consequently, Derry City & Strabane District Council have been closely involved in the development of this action plan.

Conducting the data harvesting phase of the baseline study highlighted a severe lack of accessible open data relating to carbon emissions at both county and regional level. A large proportion of the data required to produce an accurate and reliable report was unavailable or in raw/unusable formats. Investigators faced many challenges in gathering this data, often having to revert to basic investigative methods.

If this data were available and easily accessible, it would have a very positive impact on carbon emission reduction activities in the region. Energy-usage open data would contribute to the Regional Operational Programme's thematic objective to support a shift towards a low-

carbon economy by providing a resource that acts as a foundation from which all actors in the region can pursue effective energy, intelligent management systems and community engagement and fuel poverty reduction.

4.3 Actions description

The aim of this Action Plan is to reduce carbon emissions produced by the built environment in the BMW region. The implementations will incorporate specific measures that support new projects to help improve the policy instrument by:

1. Developing a centralised, reliable, robust and validated regional energy-usage data repository that is accurate, complete and accessible. This innovative Open Data measure will facilitate evidence-based planning, policy implementation and monitoring.
2. Introducing new approaches to reduce fuel poverty, including financial instruments.

The plan, overall, will (i) provide accurate data for future assessments; (ii) educate communities, commercial and government stakeholders; (iii) improve energy efficiency in public sector-owned buildings; (iv) promote the use of local renewable energy sources in line with the Regional Energy Strategy to 2045; and (v) contribute to the formulation of monitoring framework indicators.

Fulfilment of the Action Plan will be achieved with cooperation and collaboration by local authorities, communities and other actors.

The target groups include local authority, commercial enterprises and the community in order to establish a collaborative ecosystem working to reduce carbon emissions.

The main outputs will include (a) development of a centralised 'Open Energy Data' repository; (b) open access to energy-usage data by all actors in the region; (c) promotion of energy efficiency in the built environment; (d) development of supply chains for renewable energy sources; (e) informed and empowered communities; (f) reduced fuel poverty; (g) enhanced air quality; (h) decarbonisation.

4.3.1 Action 1: Energy Open Data

The CLEAN project has offered many invaluable benefits including the exchange of experience between the partners and also the knowledge shared via documented good practices from each region. This Action was originally based on the good practice from Västernorrland that demonstrated a requirement to identify a starting point when seeking to reduce carbon emissions and improve energy efficiency to meet local, regional, national and European targets. Whilst conducting the Carbon Emissions Baseline Study, it was identified that the region suffers from a lack of organised and accessible energy data. The challenges faced

during the study highlighted a salient need for Open Data in this area so that all actors in the region may make informed decisions regarding carbon emission reduction and energy efficiency, whilst also addressing thematic objective four (support the shift towards a low-carbon economy in all sectors) of the policy instrument.

Open Data is data that anyone can access, use and share. Governments, businesses and individuals can use open data to bring about social, economic and environmental benefits. Open energy data is one of the European Data Portal's (EDP) most popular data domains due to its implications in the energy and environmental sector. With growing awareness of topics such as climate change and renewable resources and initiatives to increase energy efficiency, governments around the world are introducing directives and targets focusing on energy data. One example is the European Union Renewable Energy Directive, which aims to increase the use of renewable energy throughout Europe with energy data.

Although some energy-usage statistics are available through the Sustainable Energy Authority Ireland (SEAI), these statistics are incomplete, outdated, lack regional/county categorisation and cannot be considered comprehensive. In the 2020 Special Report "*Energy efficiency in buildings: greater focus on cost-effectiveness still needed*" produced by the *European Court of Auditors* it was highlighted that Ireland did not have mechanisms to collect data that would facilitate calculation of average simple payback time of supported energy efficiency investments funded by EU initiatives. This clearly demonstrates that national improvements are needed in energy-related data collection and storage.

Development of an Open Energy Data Repository to serve Regional actors would provide multiple benefits to local authority, the community and private enterprise just to name a few. This would allow feasible targets to be set and achieved in consideration of an accurate baseline, in line with *Thematic Objective 4* of the policy instrument. Facilitation of access to open energy data at regional level would provide opportunity for the North West to set an energy precedent that other regions could follow and allow the region to lead by example.

The need for this action is based on a challenge experienced by many regions in the CLEAN project, particularly when developing their Regional Action Plans (RAPs). The challenge related to the absence of relevant, comprehensive, accessible and up-to-date energy efficiency-related data in a number of regions. As previously described, this need and challenge was acutely experienced in the Irish Border, Midland and West (BMW) region. This development is also in line with the *Regional Spatial and Economic Strategy* (objectives 143 & 144) to a) encourage, pilot and collaborate with stakeholders to adopt technologies that improve energy and resource sustainability across the region; and b) encourage the adoption of digital technologies and service platforms across the region to improve asset management and service delivery.

"Open Data" is an approach, applied in the regional energy environment, that can help overcome the above problem. This action aims to test this approach by implementing it in the Irish BMW region. Easy access to up-to-date energy data by policy makers and those implementing it is a fundamental prerequisite for the effective functioning of EU energy policy instruments in all EU regions, particularly for: establishing energy efficiency baselines; choosing the best policy instruments, measures and tools; measuring progress and results of implementation; enabling innovation in new energy services.

While there are various models of Open Data, in the context of this CLEAN pilot action, it relates to organising, making available and keeping up-to-date - via easy to use and available ICT tools (websites, databases, mapping, query) and agreement between public sector bodies - all data relevant to energy efficiency policy making and measure implementation in a typical EU region, regardless of who currently collects and stores it.

The aim of this proposed Action is to facilitate Regional energy-usage knowledge and awareness for all stakeholders and communities in the region. This ICT implementation would offer dynamic energy-usage data is up-to-date and also can be filtered and extracted to serve the needs of organisations in all the various domains in the Region. The main project outputs should meet the needs of integrated energy services and public services by allowing visibility of total energy usage in the built environment, influence providers of energy policy by improving overall energy management across communities; facilitate research and test solutions with Consumers and the Public Services.

In addition to engaging regional and local stakeholders, it will also involve cooperation with national (Irish) open data initiatives and using European open data services - such as the EU Public Data portal (which provides access to energy datasets from public bodies across Europe).

The nature of the activities envisaged are described below.

Task 1: Activate the organisations in the stakeholder team, their representative(s), describe role in the pilot action, commitment needed (in days) and the tasks and outputs to which they will contribute.

Task 2: Document the various categories and type of data needed to support energy efficiency policy decision making; establish where the data currently resides (which organisations); determine constraints to making any of the data available.

Task 3: Agree - in consultation with open data practitioners in local, regional and national authorities – what subset of the "needed" (see Task 1) energy data can be made available within the time-scale available for the pilot.

Task 4: "Open-up" this data to stakeholders by publishing it on a database-driven website to be hosted in the Irish Government public services cloud (It is intended to leverage existing

open data competencies, resources and ICT infrastructure in local, regional and national public authorities as much as possible). This task will also include the data sharing agreements with the data owners for updating the database from their own systems on a regular basis.

Task 5: Test the usefulness of the open data published in the website/database (task 4) to support rapid identification and selection of superior energy efficiency policy actions in the BMW region. This is necessary to validate the choice of data identified in task 2 above. The usefulness of the data will be determined by its ability to:

- Establish action and measure baselines
- Support evidence to justify choice of particular energy measures in the ROP
- Provide energy efficiency trend data for housing

In the case of this pilot, it will be tested by its ability to provide the above data (baseline, evidence and trend data) to introduce a measure to improve the energy efficiency within a small or "local" geographic area, a public housing community in the town of Letterkenny in County Donegal in the BMW region.

Task 6: Develop, agree and implement a durability plan with the pilot stakeholders. This will involve development and implementation of a communications plan during Semester 3.

Task 7: Publish the results of the pilot in a Final report, including general guidelines and lessons for public policy energy authorities in Ireland.

Organisations Involved

Organisation	Role
ERNACT	Action Co-ordinator, Open Data expertise
Donegal County Council	Main data manager for the initiative, ICT expertise, energy efficiency expertise, hosting the Open Data platform and tools
Derry City & Strabane District Council	Data contributor, energy efficiency expertise

Timeframe

Investment Line/Funding Source	Submitted for Funding	Funding Decision	Start Date	Finish date

Interreg Europe (CLEAN Pilot Implementation Action Request)	*December 2019*	May 2020	*July 2020*	*July 2021*

*This Action has been approved for funding by the Interreg Europe Monitoring Committee via a Pilot Implementation Action Request.

4.3.2 Action 2: New Approaches to Fuel Poverty

This Action addresses the issue of fuel poverty and is influenced by the good practice provided by North Karelia (Finland) which addressed climate change mitigation and adaptation to implement the climate targets set out in the European Union and Finland. The example sought sustainable long-term solutions to meet the requirements of governing authorities. The programme was designed with inclusion of all the actors in the region, calibrating and defining a common vision of the desired future. In 2019 a commitment was made by the Joint Committee on Climate Action to a 100% reduction in fossil fuel in Ireland by 2030. During the proceedings it also emerged that more than 25% of the nation was living in fuel poverty.

Fuel poverty is described as the condition by which a household is unable to afford to heat their home to an adequate temperature. It is caused by low income, high fuel prices, poor energy efficiency, unaffordable housing prices and poor quality private rental housing. A household is considered fuel poor if:

- They have above average required fuel costs
- And were they to spend this amount, they would be left with a residual income which is below the poverty line
- In Ireland a household is considered fuel poor if it spends more than 10% of their disposable income on energy costs

Fuel poverty is most common among vulnerable households:

- Those on low incomes
- People with children under the age of 16
- People with disabilities or suffering from a long-term illness
- Older people

The depth of fuel poverty is measured by the fuel poverty gap, which is a measure of the additional fuel costs a fuel poor household faces in order to be determined non-fuel poor.

In the year 2000, Ireland implemented a nationally-funded "Better Energy Warmer Homes Scheme", targeting low-income households at risk of energy/fuel poverty. In 2014, the use of EU-funds was incorporated to fund this scheme. This involved mainly simple upgrades (dry lining, attic insulation, lagging jackets for hot water tanks and cavity wall insulation). However, the energy rating of most of the supported households did not improve after the project, confirming that the investments did not yield much in terms of energy savings. This indicates that alternative measures to address the issue of energy/fuel poverty are needed.

Implementation of this action will address the issue of fuel poverty by assessing data related to fuel consumption in the region. This is in a bid to develop new strategies to mitigate the issue and improve availability and use of affordable, local and renewable sources of fuel. Energy experts will collaborate with local and regional authorities to develop new methods of fossil fuel use reduction. Information relating to improving energy efficiency, lower-cost renewable alternatives and carbon emission reduction will be disseminated throughout regional communities to educate and increase uptake of other solutions.

This Action is strongly linked to the previous Action, as the information harvested and collated in the Open Energy Data Repository will facilitate a more accurate understanding of energy usage in the Region, contributing to informed planning, policy development and investment where it is actually required. Metrics relating to energy usage in communities can be evaluated and disseminated amongst all stakeholders and communities within the region to encourage uptake of measures that will produce a financial gain for consumers and members of the community and thus, reduce fuel poverty.

This Action will be implemented via the following steps:

Task 1: Gather usage data from Regional Open Energy Data Repository, analyse data to produce results that can be easily relayed to non-expert members of the community.

Task 2: Disseminate this information to other communities in the region in relation to fuel poverty reduction.

Task 3: Identify new methods of fuel reduction in association with local, regional and national authorities.

Task 4: Conduct seminars in various Regional communities to pilot and promote fuel poverty initiatives.

Organisations Involved

Name of Organisation	Role
ERNACT	Action Coordinator

Donegal County Council	Energy efficiency expertise, fuel poverty expertise, community and stakeholder animation (e.g., local banks)
Derry City Strabane District Council	Advice and expertise on designing community fuel poverty initiatives

Timeframe

Investment Line/Funding Source	Submitted for Funding	Funding Decision	Start Date	Finish date
ERDF	April 2020	November 2020	January 2021	December 2021

This action addresses the Irish Border, Midland and West (BMW) Regional Operational Programme Priority 4 which supports the shift towards a low-carbon economy in all sectors with a specific objective to improve energy efficiency in the housing stock including the *SEAI* initiative for the *Better Energy Warmer Homes Scheme*.

It is hoped that this action can be funded by the current Irish Border, Midland and West (BMW) Regional Operational Programme (2014 – 2020) for SEAI initiatives. Alternatively, this action may be funded by a consortium of EU/national/local funding sources including the *Special EU Programmes Body (SEUPB), SEAI, Project Ireland Climate Action Fund* and other sources of appropriate funding.

4.4 Players involved

The executive members who are committed to the mitigation of climate change and will drive the Actions include:

1. Donegal County Council

Donegal County Council (DCC) is responsible for a broad range of services, the administration of a range of EU and National legislation as well as the management of a substantial number of assets and infrastructure of local, regional and national significance. They are on the frontline in dealing with the impacts of climate change. They are earnest about the critical role they play in ensuring that local circumstances are adequately considered in the overall adaptation process and in involving the local community directly in efforts to facilitate effective change.

Donegal County Council are strongly positioned to inform government departments and agencies about the needs of local communities, and also to communicate directly with communities and local enterprise.

Under the requirements of the Climate Action and Low Carbon Development Act 2015 Donegal County Council have prepared Climate Ready Donegal - the Climate Change Adaptation Strategy for County Donegal, for the period 2019-2024 which sets out strategic priorities, measures and responses for adaptation in County Donegal over the next five years. The Adaptation Strategy recognises and builds on adaptation action already underway, and it also lays the groundwork for a new, integrated approach to adaptation under the National Adaptation Framework. Further, it requires climate change principles and objectives to be considered in all of Donegal County Council's policies and programs. The aim of the Adaptation Strategy is to identify the risks, challenges and opportunities that need to be considered, and to take a coherent coordinated action in response. The Council's vision of a Climate Ready Donegal is to achieve: "A County that understands how climate change will affect the region, our businesses and communities, and actively working together to reduce our exposure to climate risks and to capture new opportunities."

The Council employs a substantial team of architects, planners, legal experts, civil engineers, financial and enterprise staff, whose expertise will be utilised to successfully deliver and sustain this project.

2. Derry City Strabane District Council

Derry City Strabane District Council (DCSDC) are also responsible for a broad range of services, including the management of many local assets and infrastructure. They work with other organisations and contribute to cross-border initiatives that deal with the short, medium & long-term impact of climate change. DCSDC are experts at involving local community and other stakeholders in the directive toward their energy vision. This energy vision offers a target date of 2030 to embrace the region's commitment to addressing the challenges of climate change by ensuring a sustainable, secure and affordable energy supply for all citizens, whilst maximising the region's opportunities for economic growth. The authority has taken several actions to this end, including the *Irish Street CC Solar PV Battery Storage Project* which saw a 12kw solar PV installed on the community centre roof (March, 2019), three 5kw Sonnen batteries installed within community centre offices (January, 2019) and a field *"Fit and Tell" Study* (commenced in April, 2019). Another example is the *Green Infrastructure Plan 2019–2032*, developed as part of the evidence base generated for the District's Local Development Plan 2032. The plan reviews the existing green infrastructure, identifies gaps in provision and investigates opportunities to improve the green infrastructure. It outlines the strategic vision, aims and priorities for the District to 2032 with an action plan launched in 2019, outlining the short, medium & long-term actions.

DSCSD also published "Places for People – A Sustainable Planning Guide for Counsellors". This handbook aims to help inform counsellors of the key principles of sustainable development, exploring the themes that require careful consideration when making planning decisions, these include coping with climate change. The handbook demonstrates how sustainability can be achieved, using case studies from each council area to illustrate good practice.

3. Joint Initiatives Between Derry City and Strabane District Council and Donegal County Council

Donegal County Council & Derry City Strabane District Council collaborate in several innovation projects that will accelerate the transition to a low carbon energy system. One such example is the ambitious DCSDC City Deal will provide £50 million in funding to support innovation and the growth of the area's digital sector within DCSDC. The final Plan was published on November 6th 2017, and identifies the outcomes and objectives which have been prioritised as essential drivers for delivering inclusive economic, social and environmental growth and equality for the City and District over the next 15 years. The learnings that are acquired from the innovative projects funded will be applied across the entire region wherever possible.

Additionally, both Local Authorities are involved in the following energy related innovation projects:

- The European Commission's Digital Cities Challenge
- SECURE – Smarter Energy Communities
- SMARTrenew – Smarter Renewable Energy & Heating Management
- SMARCTIC – Smart Energy Management in Remote Areas
- STARDUST – Holistic and Integrated Urban Model for Smart Cities
- CLIMATE – Collaborative Learning Initiative Managing & Adapting to the Environment
- GREENWAYS – Reducing Transport Carbon Emissions via provision of greenway infrastructure

Derry City & Strabane District Council and Donegal County Council regions import the majority of their energy in the form of oil & gas from external sources and face similar problems associated with the volatility of wholesale energy costs caused by global pressures and at the same time do not capitalise on the benefits of local generated renewable energy sources. Both council areas have similar problems with an aging electricity network, in conjunction with difficulties in electricity grid connections in a predominantly rural setting with large renewable energy source potential. Initial, midterm and finalising supporting activities will correlate and analyse the cross-border regions energy consumption to include the domestic sector (social/private rental/private owned), commercial and industrial sectors, including

road, rail and develop a strategy to reduce combined energy consumption by 20% while balancing the uptake of installed renewable energy with traditional fossil fuels.

DCSDC and DCC both recognise the need to transition towards a smart, low carbon economy which can deliver sustainable prosperity for individuals, communities, businesses and the local environment within the Region. To fulfil this goal, both councils have collaborated to define a clear and structured North West Energy Strategy for the combined north west area. This strategy has been aligned with binding targets set by central governments and the EU and provides a roadmap to a sustainable low carbon future for the North West. This can deliver real reductions in annual carbon emissions, whilst encouraging the growth of a low carbon economy and improving security of supply.

This strategy recommends a Whole Energy System approach and a holistic view on the consumption and management of energy throughout the region. A wide variety of local measures have been recommended as potential opportunities to encourage the adoption of renewable Low Carbon Technologies (LCTs) both for the consumption and generation of energy within the Region. Moving forward, these local measures will be assessed individually and applied wherever technically and commercially feasible.

3. ERNACT

ERNACT, or European Regions Network for the Application of Communications Technology, was founded in 1991. The organisation is an international network of European regional and city public authorities who work together to access European Union digital technology programmes and funding for the benefit of local regions, companies and universities. The not-for-profit organisation is owned and governed by both DCSDC and DCC, placing the organisation in a strong position to successfully implement and conduct the Action Plan, meeting key objectives and achieving the main goals.

ERNACT has a 25-year history in developing and delivering European-wide projects involving multiple partners. To-date, it has delivered 30 projects with a combined budget of approximately €60 million (average of €2 million per project). This has enabled development of substantial levels of expertise, experience and systems for managing multi-partner projects, bidding for innovation funding at European level and domain knowledge in the areas of innovation and entrepreneurship.

ERNACT's expertise will be particularly useful in providing an overall project management function for the project (staff have PRINCE 2 and PMP project management accreditation).

It will also use its substantial European connections with other regions, universities, research groups and knowledge of European climate change funding programmes to develop new proposals that will assist the longer-term sustainability of Actions that are implemented.

4. Stakeholders & Expertise

This action plan has been formulated with the contribution of multiple local, regional and national stakeholder and expert organisations. The main organisations include:

- North West Regional Assembly (BMW Managing Authority)
- Sustainable Energy Authority of Ireland (Ireland's national sustainable energy authority)
- Climate Action Regional Office (Irish Government offices to help drive climate action at both regional and local levels.)
- Eirgrid and NIE Networks (electricity distributers & providers)
- Letterkenny Institute of Technology (university)
- SSE Enterprise (supplier of energy infrastructure construction services)
- Siemens (supplier of energy systems)
- WSP (energy consultants)

4.5 Costs / Budget

The estimated cost for the actions is set out in the table below.

Cost Category	**Action 1 - Open Data**	**Action 2 - Fuel Poverty**	**Total**
Staff	52,000	58,000	156,000
Overhead (Office Costs)	7,800	8,700	23,400
Travel	2,000	4,500	15,500
Expertise	18,500	7,500	22,500
Promotion	-	6,000	15,500
Implementation	-	-	10,000
Total	**80,300**	**84,700**	**165,000**

4.6 Impact expected

The expected impacts of the pilot are described below in both qualitative and quantitative terms for each action. While conventional "energy" metrics are used for actions one and two, custom metrics were designed for Action 1.

Action 1: Energy Open Data

The expected impacts of the Energy Open Data action are as follows:

- More accurate establishment of energy efficiency baselines
- More accurate monitoring and impact evaluation of policy initiatives and measures
- Higher quality evaluation of energy policy options and measures
- More rapid implementation of energy policy as a result of relevant high-quality energy data
- Enhanced capacity in local authorities to reach their low-carbon goals
- Enhanced regional capacity to implement new energy efficiency and renewable energy solutions
- Easier capture of ongoing energy usage trends in the region
- Contribution to development of open data indicators for the NWRA's '*Regional Development Monitor Framework*'

Establishment of Local Regional Open Energy Data has the capacity to drive carbon emission reduction policy, market regulations and community activities to meet national targets. Up-to-date and accurate data provides supports informed actions and implementations, as well as providing a baseline to help to measure the impact of future projects.

At a national level, the Irish government's **Open Data Impact Series,** organised by *Derilinx,* in collaboration with the Open Data Unit of the Department of Public Expenditure and Reform promotes awareness, adoption and use of Open Data in different sectors, and supports the publication of high-quality Open Data. The government has acknowledged that Open Data is a valuable resource that can provide key insights to help protect our environment and support sustainability. Open Data can be used to build new applications, enhance existing products or provide additional context for decision-making.

The main beneficiaries will be:

- Public authorities in the BMW region, either responsible for developing energy efficiency policy (through Regional Operational Programmes (ROPs), or its implementation, e.g., county councils. They will benefit as a result of having relevant, accessible and up-to-date energy data for estimating policy "baselines" and for

evaluating results of policy choices and actions implemented. Implementation bodies can use the data to launch "calls" and better evaluate project proposal responses.

- Owners and tenants of houses, public buildings and/or public infrastructure will benefit from better energy efficient buildings and lower costs as a result of more precise evidence-based policy measures.
- Business providers of energy efficiency products and services and energy research and innovation centres will have comprehensive, up-to-date and accessible energy data upon which to base pilots, new products and services and applied research.

The following metrics will be used to measure both the current situation and predict the impact of completing the pilot.

Metric	Current	% Improvement Expected
Comprehensiveness: % of energy significant data items available	20%	50%
Accessibility: degree of effort required to access energy data that exists (measured in average person days)	10 days	80%
Timeliness: Age of available data (in months)	24 months	100%

Action 2 – New Approach to Fuel Poverty

The expected impacts of the New Approaches to Fuel Poverty Action are as follows:

- Increased use of local/renewable energy sources
- More energy efficient homes as a result of householders accessing new fuel poverty schemes
- Reduced incidents of fuel poverty
- Positive contribution to defined targets for the *SEAI Better Warmer Homes Scheme*

Implementation of this action will impact the region by educating stakeholders and communities on new methods of fuel poverty reduction. This will benefit local and region authorities to meet national targets for reducing the consumption of fossil fuels and carbon emissions.

The main beneficiaries will be:

- Local communities who will be educated in actions to mitigate fuel poverty and in use of local/renewable sources of energy.
- Public authorities in the BMW region, either responsible for developing energy efficiency policy (through Regional Operational Programmes (ROPs), or its implementation, e.g., county councils. They will benefit as a result of having educated communities in a bid to meet local/national emission reduction targets.
- Business providers of energy efficiency products and services may benefit from raised community awareness, this includes those who offer local and renewable fuel resources.

Metric	**Current**	**% Improvement Expected**
Average energy efficiency (EUI) level of socially disadvantaged homes	20 units	50%
Number/percentage of socially disadvantaged homes with advanced energy efficiency solutions	5%	80%
Number of socially disadvantaged homes availing of fuel poverty schemes	100	100%

** Energy Use Index (EUI) is a very commonly used metric for building energy performance, defined as the energy consumption per unit conditioned floor area.

Overall Impact on Policy Instrument

The implementation of these actions can influence the Policy Instrument in 2 ways:

- Type 1 (Implementation of new projects): Action 1 has already secured the funding via a pilot action for its implementation. Action 2 is dependant on securing funding. As mentioned above, this could come from the current Irish Border, Midland and West (BMW) Regional Operational Programme (2014 – 2020) for SEAI initiatives. Alternatively, this action may be funded by a consortium of EU/national/local funding sources including the Special EU Programmes Body (SEUPB), SEAI, Project Ireland Climate Action Fund and other sources of appropriate funding.
- Type 2: change in the management of the policy instrument (improved governance): the policy instrument can be influenced by improving monitoring for the BMW ROP Priority 4, and also provide indicators for the NWRA's '*Regional Development Monitor Framework'.*

4.7 Action Monitoring

Overall governance for the implementation of the two actions will be provided by a Steering Group, comprising of key stakeholders, who will be responsible for ensuring delivery of the Action Plan within the two-year time period. ERNACT will provide day-to-day management of the Action Plan.

The Steering Group will be serviced by ERNACT who will provide the necessary input progress reports and provide meeting organisation and facilitation. In addition to the Stakeholders identified above (see Section 4.4), the Managing Authority for the energy policy instrument in the region will participate. This will ensure maximum impact of the project in the finalisation and rollout of the new programming period 2021 – 2027.

- ERNACT will provide status reports for each of the actions every two months
- These will be distributed to the members of the Steering Group for their feedback and action (where relevant)
- The Steering Group will meet formally on a bi-annual basis
- The Steering Group will set and monitor energy reduction targets
- The progress of the Action Plan will be supported by a communications plan. This will include progress on achieving on-going energy reduction results

Alignment with NWRA's '*Regional Development Monitor Framework' will allow for improved monitoring of the measured success of the Actions; whilst also contributing to undertaken regional monitoring of Priority 4* - 'Shift towards a low-carbon economy in all sectors'.

ANNEXES

Please find Annexes 1 and 2 attached.

5 Approval of Action Plan:

David Minton, Director of the Northern & Western Regional Assembly, Managing Authority of the Border, Midland and Western Regional Operational Programme 2014-2020, agrees to implement the Action Plan for partner 1 as detailed above. I confirm that I have the required authorisation of to do so and that the required authorisation process has been duly carried out.

Signed: 

Date: July 8th 2020

ANNEX 1

This Annex provides a description of the different activities and meetings involving the local stakeholders to (1) drive forward economic, environmental and social regeneration and prosperity in the Region, (2) define measures that encourage the use of local energy services & products and (3) quantify the expected impact to be included in this action plan.

Regional Stakeholders

The Regional Action Plan developed though exchange of knowledge with project partners and input from regional stakeholders including:

- North West Regional Assembly (BMW Managing Authority)
- Donegal County Council (Local Authority in Ireland)
- Derry & Strabane District Council (Local Authority in Northern Ireland)
- Sustainable Energy Authority of Ireland (Ireland's national sustainable energy authority)
- SONI -- System Operator for Northern Ireland (electricity system operator for Northern Ireland)
- Climate Action Regional Office (Irish Government offices to help drive climate action at both regional and local levels.)
- Eirgrid and NIE Networks (electricity distributers & providers)
- Letterkenny Institute of Technology (university)
- SSE Enterprise (supplier of energy infrastructure construction services)
- Siemens (supplier of energy systems)
- Atlas World Energy Management and Renewable Energy Solutions (energy consultants)
- WSP (energy consultants)

Activities

CLEAN partners have met in various partner regions a total of six times during Phase 1 of the project. These meetings include meetings that address official meeting business, good practices, study visits and thematic seminars that contribute to regional knowledge transfer, exchange of experience and development of good practices.

In addition to project partner meetings, study visits, thematic seminars and policy learning events, the CLEAN project held six stakeholder meetings in each region. The aim of these

events is to increase local stakeholder capacity, involve them in the project, and to stimulate transnational knowledge exchange regarding energy efficiency in buildings between participating regions.

Stakeholder meetings hosted by ERNACT in Donegal are outlined in the table below:

ERNACT/Donegal Regional Stakeholder Meetings & Workshops

No.	Date	Activity	Attendees	Agenda
1.	16th Aug. 2017	CLEAN Stakeholder Meeting 1	Caitriona Strain (ERNACT) Leo Strawbridge (DCSDC) Ianire Renobales (ERNACT) Paddy Mullen (DCC) Michael McGarvey (DCC) Jonathan Henderson (DCSDC)	• Project Funding • Objectives • Goals • Anticipated Outputs • Timelines • Budget • Good Practices • Current regional situation (buildings)
2.	8th Nov. 2017	CLEAN Stakeholder Meeting 2	Leo Strawbridge (DCSDC) Ianire Renobales (ERNACT) Paddy Mullen (DCC) Colm McColgan (ERNACT)	• Official Launch Conference Summary • Analysis of Current Situation • Policy Learning Events
3.	30th April 2018	CLEAN Stakeholder Meeting 3	Leo Strawbridge (DCSDC) Ianire Renobales (ERNACT) Paddy Mullen (DCC)	• Analysis of Current Situation • Policy Learning Events
4.	7th Sept 2018	CLEAN Stakeholder Meeting 4	Leo Strawbridge (DCSDC) Ianire Renobales (ERNACT) Paddy Mullen (DCC)	• Update on project progress • Development of Regional Action Plans
5	5th April 2019	CLEAN Stakeholder Meeting 5	Leo Strawbridge (DCSDC) Ianire Renobales (ERNACT) Paddy Mullen (DCC) Caitriona Strain (ERNACT)	• Update on project progress • Development of Regional Action Plan • Plan for upcoming workshop
6	14th Oct. 2019	CLEAN Workshop & Stakeholder Meeting 6	Ianire Renobales (ERNACT) Juanita Blue (ERNACT) Marion Boyce (ERNACT) Caitriona Strain (ERNACT) Michael McGarvey (DCC) Peadar Espey (DCC) Bryan Cannon (DCC) John McCarron (DCC) Alana Green (DCC) Leo Strawbridge (DCSDC) Siobhan Cameron (DCSDC) Ciaran McGrath (DCSDC) Heather Young (DCSDC) David Strain (NI Dept. for Infrastructure) Orla Grey (Energy regulator) David McGowan (SONI/EIRGRID) David Mellett (CARO) (Eirgrid & NIE Networks) Nick Timmons (LYIT) Ben Graham (LYIT) Mary Daly (LYIT)	• Carbon Reduction Seminar & Workshop • Low carbon heat • Update on project progress • Development of Regional Action Plan

			Bob Barbour (SMARTgrid Ireland) Ross McClorey (SSE Distributed Energy) Andy McPherson (SSE Enterprise) David McGaffey (Siemens) Joan Mulvihill (Siemens) Aisling Nic Aoidh (Údarás) Paul McGonigle (Ecowood) Anthony Donoghue (WSP) Ian Campbell (Atlas)	

ANNEX 2

CLEAN Project North West Carbon Baseline Report – WSP Consultants (December 2019)

A baseline study was conducted, as part of the process of developing the Action Plan, in the North West area of the BMW region. Its overall aim was to summate all the significant sources of greenhouse gas emissions arising from the area. The study focused on overall regional emissions in Donegal (Ireland) and Derry (Northern Ireland) from sources such as transport, public/domestic buildings, waste, water, agriculture and public infrastructure.

For the purpose of this Action Plan which focuses on carbon emissions produced by the built environment in Donegal (BMW region), carbon emission data and analysis relating to the built environment in Donegal has been extracted from the main report and included in this Annex. Data and analysis relating to the Derry region and other sources of emissions have been omitted.

Domestic Buildings

This part of the carbon calculation accounts for all CO2e emissions associated with private domestic buildings for residential buildings within the North-West Region. The total emissions are based upon the type of dwelling, construction period, and the primary fuel source used for space heating and water heating. The calculation methodology which has been used is described below:

Stage 1:

Firstly, the calculation engine considers the number of dwellings within each of the Local Authority area, and categorises the data by dwelling type and construction period as shown in Figure 0-1.

Figure 0-1 – Private housing statistics for Donegal (DCC) – Raw Data

	Pre 1919	1920 - 1970	1971 - 1990	1991 - 2000	2001 - 2010	Post 2011	Unknown	All Years
Detached	3,483.00	5,385	10,957	6,479	11,551	956	1,042	39,853.00
Semi-Detached	523.00	1,356	1,779	2,260	4,845	193	737	11,693.00
Terraced	524.00	1,244	1,137	257	450	26	223	3,861.00
Apartments	119.00	165	245	321	953	63	268	2,134.00
Unknown	44.00	74	103	53	90	13	387	764.00
Total Dwellings	**4,693**	**8,224**	**14,221**	**9,370**	**17,889**	**1,251**	**2,657**	**58,305.00**

For DCC, this data was available from the Central Statistics Office (CSO) for private households and through the Local Authority for the social housing stock. Following integration of the data into the calculation tool, the unknowns were accounted for by applying a weighted average for both the number of unknown construction period and unknown dwelling type – shown in Figure 0-2.

Figure 0-2 – Private housing statistics for Donegal (DCC) – Processed Data

	Pre 1919	1920 - 1970	1971 - 1990	1991 - 2000	2001 - 2010	Post 2011	All Years
Detached	3,642.58	5,627.30	11,411.63	6,726.58	11,977.43	1,001.76	**40,387.27**
Semi-Detached	568.49	1,472.79	1,925.75	2,438.72	5,221.62	210.20	**11,837.58**
Terraced	566.39	1,343.59	1,223.90	275.77	482.27	28.16	**3,920.08**
Apartments	138.61	192.03	284.18	371.17	1,100.56	73.52	**2,160.07**
Total Dwellings	**4,916**	**8,636**	**14,845**	**9,812**	**18,782**	**1,314**	**58,305.00**

Stage 2:

To determine the total energy use and fuel source by dwelling type for each construction period, the calculation engine considered the average energy consumed by each property for space and water heating including the fuel source utilised. This extensive data set was applied to the total domestic building stock to gain insight of the fuel source and volume required for the North-West Region. The data is broken down into dwelling type and period to aid extrapolation – dataset shown in Figure 0-3.

Figure 0-3 - Average Energy Used for each Dwelling Type and Construction Period

		Energy Used (kWh/m2/yr)	Floor Area (m2)	Total Energy (kWh/yr)	Water Heating from Electricity (kWh)	Space Heating from Electricity (kWh)	Lighting, Fans & Pumps From Electricity (kWh)	Total From Electricity (kWh)	Total From Natural Gas (kWh)	Total From Liquified Petroleum Gas (kWh)	Total From Heating Oil (kWh)	Total From Petroleum Coke (kWh)	Total From Sod Peat (kWh)	Total From Coal (kWh)	Total From Solid Multi-fuel (kWh)	Total From Wood Log and Pellets (kWh)	Total Without Electricity (kWh/m2/yr)	Total Without Electricity (kWh/yr)
Detached	Pre 1919	486.9724516	121.662129	59246.10524	281.4740037	1525.89543	1150.791689	2958.161123	0	44.5896363	26255.47133	0	115.18154	200.6099374	6144.6299	151.0781133	32911.56046	270.5160654
	1920 - 1970	423.9951104	111.6845978	47353.72337	171.043948	1046.76331	1075.367676	2293.174934	0	38.7451418	23906.33932	176.765217	188.78099	198.936621	3230.4928	50.43420252	27790.49432	248.830142
	1971 - 1990	304.3689839	126.1266767	38389.04844	61.37294402	196.4928947	1197.715948	1455.581787	5.887465303	68.3682799	21230.30554	62.8945451	65.670907	165.5447945	2049.1036	89.31039759	23737.08551	188.2003564
	1991 - 2000	234.0156563	155.3069736	36344.26334	49.55932327	94.71958093	1420.944392	1565.223296	0	105.331726	20224.37442	54.5247574	94.207356	206.509033	959.53114	56.58343794	21701.06187	139.7301188
	2001 - 2010	192.3029008	179.8596153	34587.52576	245.508322	737.072759	1600.248629	2582.82971	0	28.4186873	18392.18927	3787.81453	3775.0659	3846.811752	4048.4544	7711.505809	41590.26026	231.2373469
	Post 2011	75.34320442	192.150663	14477.24668	1039.224168	505.4090964	1329.430169	2874.063433	0	8.82538292	4984.108584	0	0	0	31.336405	11.17422865	5035.444601	26.20571026
Semi-Detached	Pre 1919	474.04125	113.2607927	53690.28774	413.5033587	2095.414866	1087.265573	3596.183798	0	27.6741581	22794.6406	162.704252	146.43836	145.4418875	5509.3343	183.9891763	28970.22271	255.78333
	1920 - 1970	395.6685994	90.54204819	35824.6454	138.0928241	780.508809	892.0156461	1810.617279	71.57192331	34.4787308	16667.95965	182.18385	48.970979	385.6704917	3613.2928	0	21004.12844	231.9820333
	1971 - 1990	288.7885331	82.56996422	23845.25885	83.9300563	333.6701206	818.5547361	1236.154913	0	100.302858	11679.01636	433.679576	35.851918	311.145832	1323.6342	21.9122109	13905.54298	168.4092165
	1991 - 2000	249.0804252	94.08530094	23434.80676	127.7452693	424.4603113	895.106693	1447.312274	49.36753808	64.2862517	10523.2627	100.064594	39.645151	1170.874374	1254.6036	0	13202.10419	140.3205821
	2001 - 2010	193.6986266	103.4191176	20032.14105	105.7344783	285.2663064	986.7654984	1377.766283	10.29002374	27.1212627	10951.48172	1311.51625	1309.9292	1492.202636	1532.1101	2613.116466	19247.76763	186.1142124
	Post 2011	62.75217391	113.7213478	7136.261796	362.9322424	87.85006926	748.8180522	1199.600364	0	0	3469.117576	0	0	0	36.984905	0	3506.102481	30.8306448
Terraced	Pre 1919	435.6178977	102.7574148	44762.969	389.8447564	1778.570598	992.986446	3161.4018	0	22.4325071	19439.52348	170.410581	338.08284	161.8466601	3512.5111	66.50273088	23711.30995	230.7503551
	1920 - 1970	324.2434516	94.07819355	30504.2382	110.9831465	396.7888969	922.0443	1429.816343	37.08807085	27.2652206	16080.38042	201.975749	65.401886	613.846628	1896.6422	0	18922.60021	201.1369426
	1971 - 1990	238.1689753	108.4052973	25818.77859	47.07918464	137.68734	1000.492423	1185.258947	75.41619287	70.6947934	14634.06446	179.929094	165.0691	104.6676545	785.0885	15.25289305	16030.18269	147.8726878
	1991 - 2000	209.9886015	144.5765134	30359.41987	83.08521224	188.5697533	1262.524429	1534.179395	26.94288719	164.093229	16648.40993	53.5077075	0	154.1799579	429.76873	108.7205296	17585.62298	121.6354065
	2001 - 2010	173.1530735	151.8621416	26295.39656	108.8516679	369.7081271	1297.630666	1776.190461	51.48720949	121.226799	14482.62443	0	0	94.49808953	78.680604	175.9397807	15004.45691	98.80314313
	Post 2011	92.17777778	142.4796296	13133.45564	257.9715273	306.7407818	1048.059222	1612.771531	0	0	7616.956418	0	0	0	0	0	7616.956418	53.45996784
Apartments	Pre 1919	512.9124022	67.9977095	34876.86852	1043.337478	4605.563911	640.299933	6289.201322	239.7386778	156.4735	7404.605806	0	0	536.0676	993.49193	0	9330.377511	137.216056
	1920 - 1970	487.1394231	56.31163462	27431.6172	747.0044571	2243.470619	544.5388654	3535.013942	0	155.25879	7766.717095	86.6675048	0	1137.24661	783.5329	0	9929.422905	176.3298646
	1971 - 1990	355.7259649	68.00730994	24191.96595	803.2286744	1832.864994	644.0784854	3280.172154	92.6800407	379.608407	6076.311424	370.976959	0	245.2787849	1537.2014	0	8702.056971	127.9576707
	1991 - 2000	273.0439548	62.7910452	17144.71531	1290.509786	2062.040158	559.8445706	3912.394514	150.7413667	549.344367	1680.362561	0	0	0	0	0	2380.448295	37.91063339
	2001 - 2010	216.0402064	69.76430619	15071.89511	769.1280579	1500.954807	623.2920625	2893.374928	178.9942648	859.857194	1859.456994	16.9126384	0	7.676202292	50.411044	0	2973.308336	42.619335
	Post 2011	90.91	86.744	7885.89704	603.0190909	288.8279091	635.8192	1527.6662	0	0	4535.016273	0	0	0	0	0	4535.016273	52.28046058

For the DCC region, the average energy used was developed using raw datasets from the Sustainable Energy Authority of Ireland (SEAI), specifically utilising their Building Energy Rating (BER) research tool which contains all the registered BER data for Ireland, including energy required for normal use of space heating, hot water, ventilation, and lighting for each residential property type and floor area.

Stage 3:

Using the values calculated within Stage 1 and 2, the carbon tool then calculates the total energy consumed by each dwelling type for all construction periods for each fuel source used. It should be noted that the energy calculated refers to the Total Primary Energy Required (TPER), which accounts for all losses in the delivery of the specific fuel sources. The total quantity of CO2e in tonnes is then calculated by multiplying the total energy use for each building type by the CO2 emission factors, as shown in Figure 0-4 for DCC.

Figure 0-4 – DCC Total Residential Energy Use and CO2e emission

Residential Area	Electricity	Liquid and Gas Fossil Fuel								Solid Fossil Fuels and Derivatives				Renewable Fuels						Total
		Natural Gas	Liquid Gas	Gasoline & Petrol	Diesel	Kerosene	Heating Oil	Liquified Petroleum Gas	Petroleum Coke	Coal	Solid-Multi Fuel	Sod Peat	Peat Briquettes	Solid Biofuel	Biogas	Solar Thermal	Biodiesel	Bioethanol	Geothermal	
Energy Use by Dwelling Type (MWh)																				
Detached	84633.65	67.19	0.00	0.00	0.00	0.00	833762.95	2218.39	47447.50	51203.38	118920.70	48080.59	0.00	94609.15	0.00	0.00	0.00	0.00	0.00	1280943.48
Semi-Detached	17953.16	499.44	0.00	0.00	0.00	0.00	143574.94	558.06	8288.25	11897.04	22070.14	7161.06	0.00	13791.51	0.00	0.00	0.00	0.00	0.00	225793.60
Terraced	6487.41	174.39	0.00	0.00	0.00	0.00	62316.61	239.58	602.86	1132.62	5655.10	481.39	0.00	171.17	0.00	0.00	0.00	0.00	0.00	77261.13
Apartments	7231.52	312.51	0.00	0.00	0.00	0.00	7248.13	1309.60	140.68	370.84	780.49	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	17393.78
Total	116,305.74	1,053.53	-	-	-	-	1,046,902.62	4,325.64	56,479.29	64,603.88	147,426.43	55,723.03	-	108,571.82	-	-	-	-	-	1,601,391.99
CO2 Contribution by Dwelling Type (tCO2)																				
Detached	41809.02	13.77	0.00	0.00	0.00	0.00	220113.42	508.01	15894.91	17409.15	35462.15	18030.22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	349240.66
Semi-Detached	8868.86	102.38	0.00	0.00	0.00	0.00	37903.78	127.80	2776.56	4045.00	6581.32	2685.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	63091.10
Terraced	3204.78	35.75	0.00	0.00	0.00	0.00	16451.58	54.86	201.96	385.09	1686.35	180.52	0.00	0.00	0.00	0.00	0.00	0.00	0.00	22200.90
Apartments	3572.37	64.06	0.00	0.00	0.00	0.00	1913.51	299.90	47.13	126.09	232.74	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6255.80
Total	57,455.04	215.97	-	-	-	-	276,382.29	990.57	18,920.56	21,965.32	43,962.56	20,896.14	-	-	-	-	-	-	-	440,788.45

Social Housing

The methodology associated with the calculation of carbon emissions with regard to social housing is the same as that for private domestic buildings, using an overall housing stock and BER data to determine the Total Primary Energy Required (TPER) for each dwelling type, and using CO2 conversation factors to determine the carbon impact.

Although the methodologies for social housing and domestic buildings are identical, the input data for each of the engines is unique to the category. For the DCC region, the housing stock input data was sourced from the Donegal City Council and provided a breakdown of the property type, construction period and associated BER data. It should be noted that the SEAI BER research tool was utilised for social housing where data was not available.

Commercial Buildings

The carbon emissions associated with the commercial buildings within the North-West region were evaluated based on the building type, commercial type, floor area, and fuel sources utilised for commercial operation.

The data provided for the commercial buildings output of the carbon assessment is confidential. It has been included in the overall assessment with permission from Local Authorities the North-West Region. The raw input data for DCC was provided by the Valuation Office. The data provided includes building type, building use, and floor area. To ensure valuable insights could be drawn from the data, it was classified into the following categorisations and an example of the input data is shown in

Figure 0-5.

- Industrial Processes
- Local Authority Buildings
- Education
- Healthcare
- Warehouses
- Hospitality
- Public Buildings
- Utilities
- Offices
- Retail
- Other

- Leisure and Entertainment

Figure 0-5 – Commercial Buildings statistics for DCC

Donegal County Council (DCC)

Commercial Premises by Property Use and Type

	Property Use	Number	Adjusted Average Floor Area (m2)	Fossil Fuels Used (kWh)	Electricity Used (kWh)	Building Related Energy (kWh)	Process Energy (kWh)	Total Energy (kWh)
Industrial Use	Dry Cleaning	17	179.91	0	3147165.63	0	0	3147165.63
	Forestry Services	3	134.11	84489.3	144034.14	0	0	228523.44
	Joinary Activities	23	259.98	1255703.4	2140675.32	0	0	3396378.72
	Motor Repair	196	274.71	16260634.32	4576668.6	0	0	20837302.92
	Funeral Services	40	137.08	1151472	1962985.6	0	0	3114457.6
	Logistics	72	239.04	3614284.8	6161495.04	0	0	9775779.84
	Electrician	35	148.33	1090225.5	1858574.9	0	0	2948800.4
	Cleaning Services	3	136.12	85755.6	146192.88	0	0	231948.48
	Construction Planning	6	173.56	218685.6	372806.88	0	0	591492.48
	Plumbing	24	212.39	1070445.6	1824854.88	0	0	2895300.48
	Light Manufacture	27	371.21	0	0	3247345.08	821858.94	4069204.02
	General Manufacturing	210	668.08	0	0	57381391.2	69446916	126828307.2
	Textiles	3	321.45	0	0	328843.35	461923.65	790767
	Distribution	9	698.05	0	0	1306749.6	0	1306749.6
	Heavy Manufacturing	26	204.71	0	0	1484966.34	5386329.52	6871295.86

To determine the annual total primary energy required for commercial buildings, the typical energy consumption for each building category was calculated using the UK CIBSE Guide: Energy Efficiency and TM46. This report documents the common energy requirement for different types of commercial types per square meter of floor area for each of the types of industry (Hospital, Supermarket, Car Mechanic, High School, Offices, etc.).

Next, the total primary energy required (TPER) was determined for each of the categories previously defined. For the DCC region however, the raw data only included the type of commercial entity and total floor area. This therefore required the utilisation of the CIBSE Guide to assign each commercial type with an associated energy consumption based on the size (floor area) of the property.

Municipal Resources

The energy used by both local authorities for municipal buildings and general operation has been classified within the municipal resources category of this study. This includes the energy used by buildings (heat and power), street lighting, and transport fleets.

For municipal resources the raw data was obtained directly from each local authority. For DCC, another SEAI tool was utilised – The SEAI Monitoring and Reporting system (M&R) – which is used to track the energy progression of local authorities in Ireland towards regional or national targets.

The provided data included a breakdown of the energy consumed by buildings electricity, street lighting, building thermal requirements, and transport fleets. The data also included an associated fuel type to deliver the energy. Figure 0-6 illustrates the first stage of the assessment.

Figure 0-6 – Municipal Resources for DCC Region

	Fuel Type	Raw Units	2018 (Raw)	2017 Overall Energy Use (kWh)
Total Electricity	Electricity	kWh	12,107,317	**12,107,317**
Thermal	Liquified Petroleum Gas	kWh	135,266	**135,266**
Thermal	Kerosene	kWh	3,434,227	**3,434,227**
Thermal	Gasoil	kWh	2,467,813	**2,467,813**
Thermal	Wood Fuels & Solid Biomass	kWh	714,569	**714,569**
Thermal	District Heating	kWh	77,953	**77,953**
Transport	Petrol	kWh	34,968	**34,968**
Transport	Diesel	kWh	7,377,901	**7,377,901**
Transport	Marked Diesel	kWh	11,249,883	**11,249,883**
Transport	Biodiesel	kWh	311,289	**311,289**
Transport	Bioethanol	kWh	1,150	**1,150**
Overall Energy Used				**37,912,336**

The volume of carbon contributed by municipal resources in the North-West Region was calculated by firstly categorising the raw input data into three broad energy categories: Buildings/Facilities heating and electricity, public street lighting, and transport fleets. It should also be noted that the raw energy consumption data was also adjusted to the total primary energy required (TPER) using the appropriate conversion factors. The final quantity of CO2e was determined using carbon conversion factors for fuel source, the results of which are shown in Figure 0-7.

Figure 0-7 - Total Municipal Energy Use and CO2e Impact for DCC

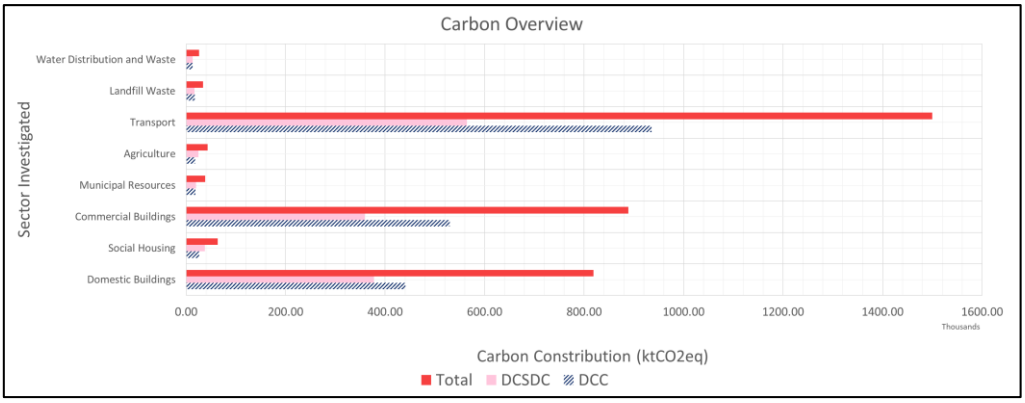
Municipal Sector	*Electricity*	Liquid and Gas Fossil Fuel								Solid Fossil Fuels and Derivatives				Renewable Fuels						Total
		Natural Gas	*Liquid Gas*	*Gasoline & Petrol*	*Diesel*	*Kerosene*	*Heating Oil*	*Liquified Petroleum Gas*	*Petroleum Coke*	*Coal*	*Solid-Multi Fuel*	*Sod Peat*	*Peat Briquettes*	*Solid Biofuel*	*Biogas*	*Solar Thermal*	*Biodiesel*	*Bioethanol*	*Geothermal*	
Energy Use by Municiple Type (MWh)																				
Buildings/Facilities	9443.88	0.00	0.00	0.00	0.00	0.00	2714.59	148.79	0.00	0.00	0.00	0.00	0.00	786.03	0.00	0.00	0.00	0.00	85.75	13179.04
Public Lighting	15569.84	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	15569.84
Fleet and Transport	0.00	0.00	0.00	38.46	20490.56	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	342417.90	1265.00	0.00	364211.93
Total	**25013.71692**	**0**	**0**	**38.4648**	**20490.5624**	**0**	**2714.5943**	**148.7926**	**0**	**0.00**	**0**	**0**	**0**	**786.0259**	**0**	**0**	**342417.9**	**1265**	**85.7483**	**392960.81**
CO2 Contribution by Municiple Type (tCO2)										**CO2 Contribution by Municiple Type (tCO2)**				**CO2 Contribution by Municiple Type (tCO2)**						
Buildings/Facilities	4665.28	0.00	0.00	0.00	0.00	0.00	716.65	34.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5416.00
Public Lighting	7691.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7691.50
Fleet and Transport	0.00	0.00	0.00	9.69	5409.51	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5419.20
Total	**12356.77616**	**0**	**0**	**9.6931296**	**5409.508474**	**0**	**716.6528952**	**34.0735054**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**18526.704**

RESULTS

The total carbon baseline across all sectors for the North-West region was calculated to be 3,413 ktCO2eq (kilo tonnes of CO2 equivalent), of which 1,999 ktCO2eq is attributable to DCC.

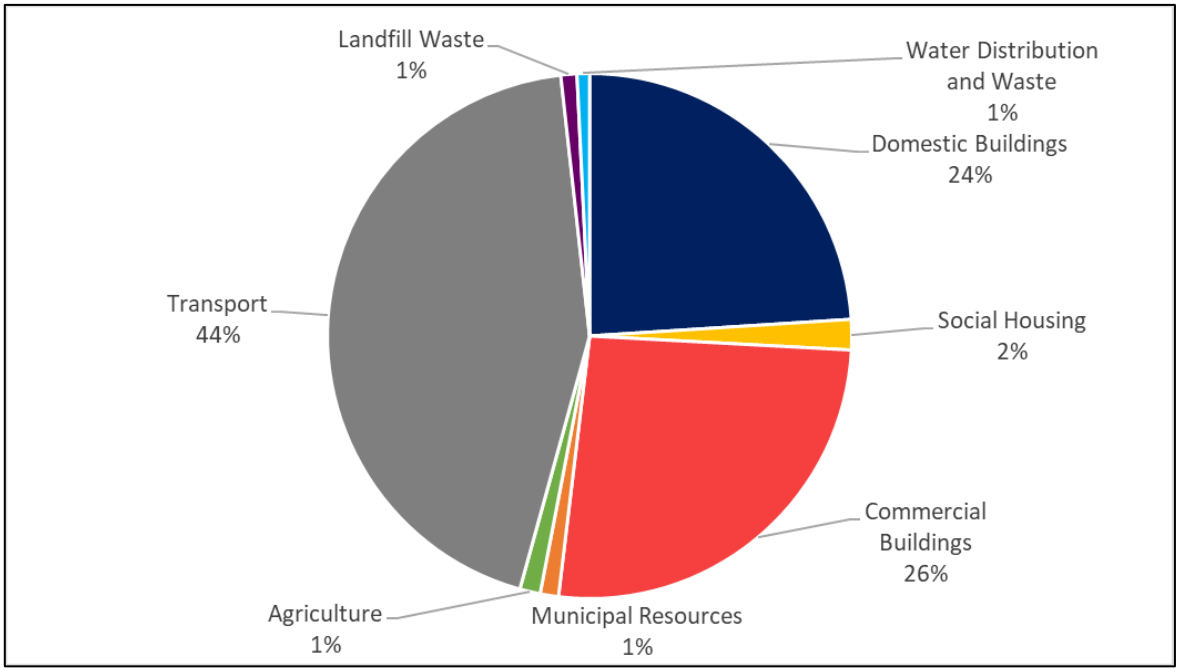
The carbon associated to each sector disseminated by Figure 0-8.

Figure 0-8 – North-West Region Carbon Baseline



Three main sectors; Transport, Commercial Buildings, and Private Domestic Buildings, have significant contribution to the carbon baseline making up 94% of the total baseline (44%, 26%, and 24% for transport, commercial and domestic buildings respectively). This highlights the key focus areas for DCC authorities to target with carbon neutral development strategies.

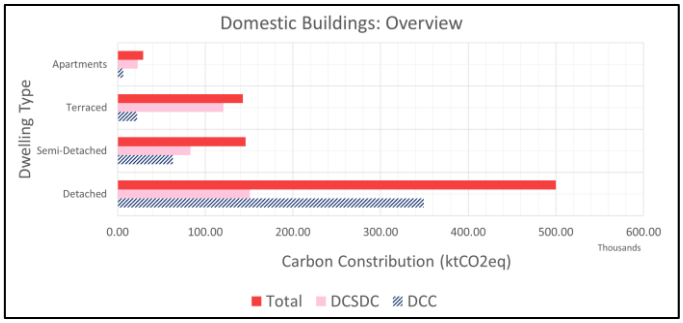
Figure 0-9 – Total Segmented Breakdown (DCC & DCSDC)



Domestic Buildings

Domestic buildings contribute 818.6 ktCO2eq towards the North-West carbon baseline. This is split relatively evenly between DCC and DCSDC with shares of 54% and 46%, respectively. As previously discussed, the sector is categorised by four dwelling types: Apartment, Detached, Semi-detached, and Terraced buildings. Figure 0-10 shows the carbon contribution from the sector.

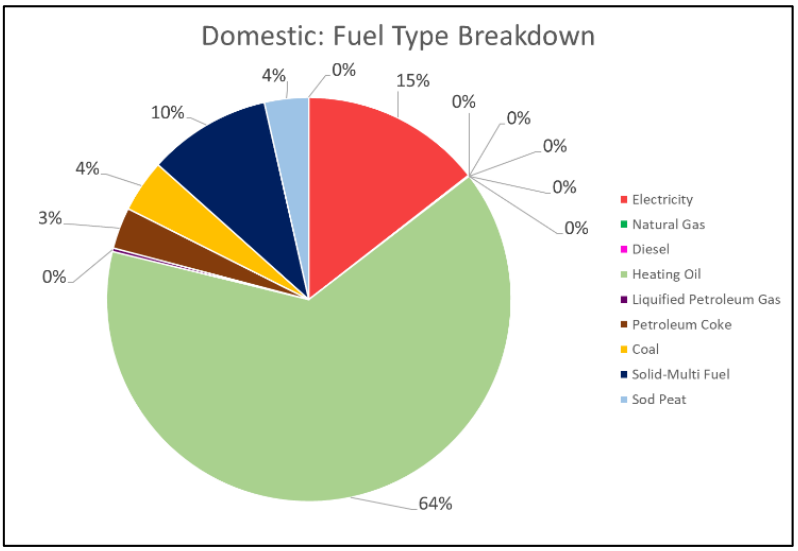
Figure 0-10 – Domestic Buildings Carbon Contribution



Detached buildings are the largest carbon contributor with 61% of the total ktCO2eq, while making up 49% of the total domestic housing stock. Additionally, detached properties produce 63% more carbon per household than Semi-detached or Terraced buildings, and 155% more than apartments. This presents a primary area that could be targeted in the development of carbon strategies.

A secondary focus for potential strategies could relate to the terraced and semi-detached properties. The two dwelling types are the second biggest contributors of carbon in the region (40%), making up 44% of the total housing stock. Terraced dwelling types were identified as less energy efficient producing 5.66 tCO2eq per household, compared to 5.24 tCO2eq for semi-detached. To gain deeper insight of the domestic carbon outputs, the fuel mix was studied, shown Figure 0-11.

Figure 0-11 – Fuel Breakdown for Domestic Buildings



Heating oil was the most common source of fuel for dwelling types in the North-West Region, contributing 64% of the total sector carbon output. Heating Oil contributes 264 tCO2eq per MWh of energy used, if replaced with less carbon intensive sources such as natural gas (205

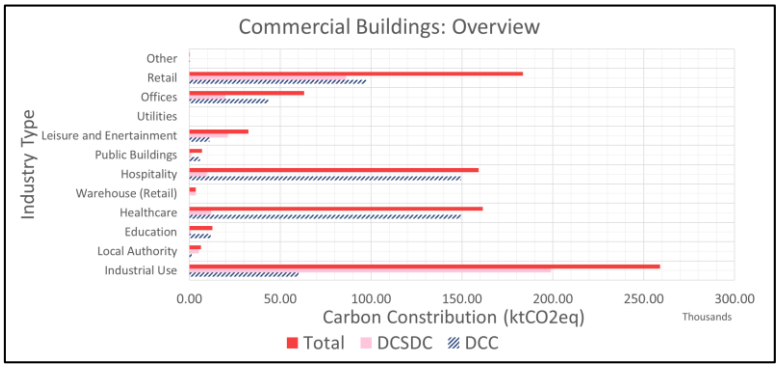
tCO2eq/MWh) or Liquified Petroleum Gas (229 tCO2eq/MWh) the North-West Region could see a carbon reduction of 22% and 13%, respectively.

Similarly, Solid-Multi Fuel, Coal, and Peat have a combined fuel share of 18%, contributing 144 ktCO2eq for the DCC and DCSDC regions. If similar replacements of natural gas were made, carbon savings of 64.8 ktCO2eq per year could be achieved.

Commercial Buildings

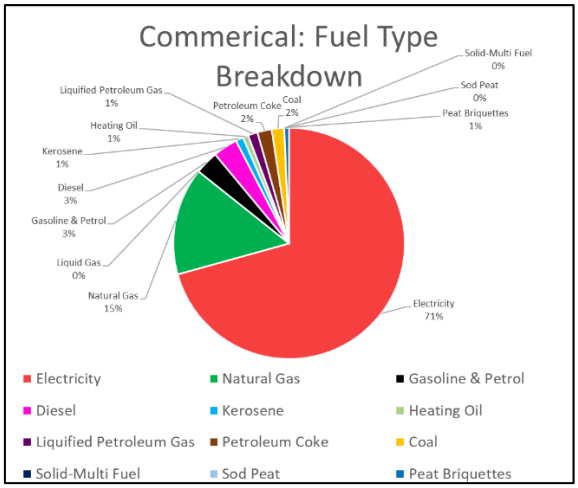
In the North-West Region the total carbon contribution attributed to commercial buildings was found to be 889.2 ktCO2eq, 59.6% of which originating from the DCC region. Here the sector is segmented into 12 categories; Industrial Use, Local Authority, Education, Healthcare, Warehousing and Storage, Hospitality, Public Buildings, Leisure and Entertainment, Utilities, Office Space, Retail, and Other.

Figure 0-12 – Commercial Buildings Carbon Emissions



The four largest commercial carbon contributors in the region are Industrial Use (29%), Retail (21%), Healthcare (18%), and Hospitality (18%). Healthcare was found to produce the largest volume of carbon per unit area of real estate at 85.08 tCO2eq per meter square, 71.7% higher than Industrial Use, 71.2% on Retail, and 45.3% higher than hospitality – indicating a focus area for carbon reduction. Figure 0-13 provides deeper insight into the demographic of fuel types utilised for commercial buildings.

Figure 0-13 – Fuel Breakdown for Commerical Entities

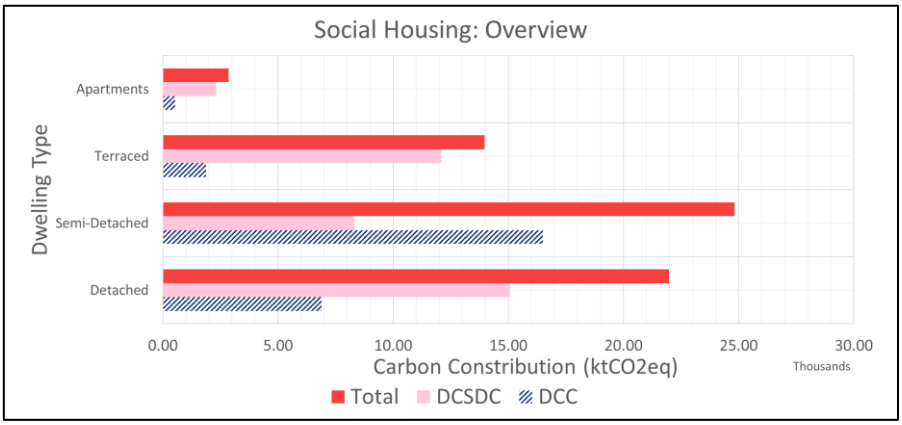


Electricity was found to be the most common fuel source for commercial buildings in the North-West Region, contributing 71% of the total carbon output, with Natural Gas contributing to the next largest segment with 15%, and combustion fuels (Diesel and Petrol/Gasoline) making up the next 6%. This is however attributed to the assumptions made during the calculation process as energy metrics were not provided in the raw data and had to be determined based on floor area and commercial type (Section 0 has previously expanded upon the methodology).

Social Housing

Social housing contributes 636 ktCO2eq annually for DCC and DCSDC combined, split 59.4% towards DCSDC and 40.6% for DCC. Similar to domestic buildings, the carbon is associated to four categories; Detached, Semi-Detached, Terraced, and Apartments - as shown in Figure 0-14.

Figure 0-14 – Social Housing Carbon Impact



Semi-detached buildings have the largest segment of the carbon contributions – 39% of the total ktCO2eq for social buildings – which is closely followed by Detached Housing at 34.5%.

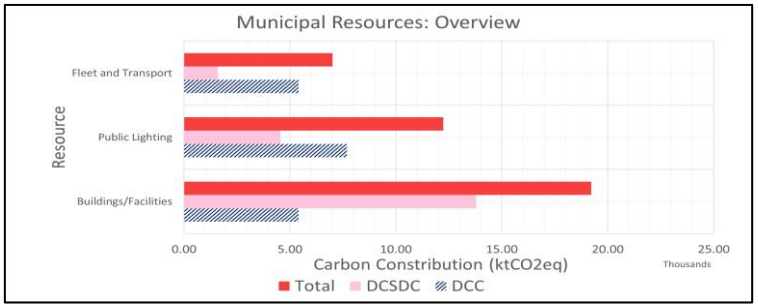
However, Detached buildings can be seen to be less carbon efficient than semi-detached houses when comparing the housing stock percentage shares, 45% and 24% for Semi-detached and detached housing, respectively. The carbon produced per dwelling reflects this finding with Detached producing 8.29 tCO2eq per year while Semi-detached is 40% lower.

Comparably, Terraced dwelling types have an annual carbon production per household of 5.55 tCO2eq while holding similar stock to Detached (23%) – contributing 36.5% less carbon than Detached dwellings.

Municipal Resources

The Municipal category has a relatively low contribution to the carbon emissions in the North-West Region at 38.5 ktCO2eq, only making up 1.13 % of the total carbon shares. DCC and DCSDC have comparably even contributions to this at 48.2% and 51.8%, contributed from three main categories; Buildings, Public Lighting, and Fleet Operations. Figure 0-15 details the emissions attributed to each.

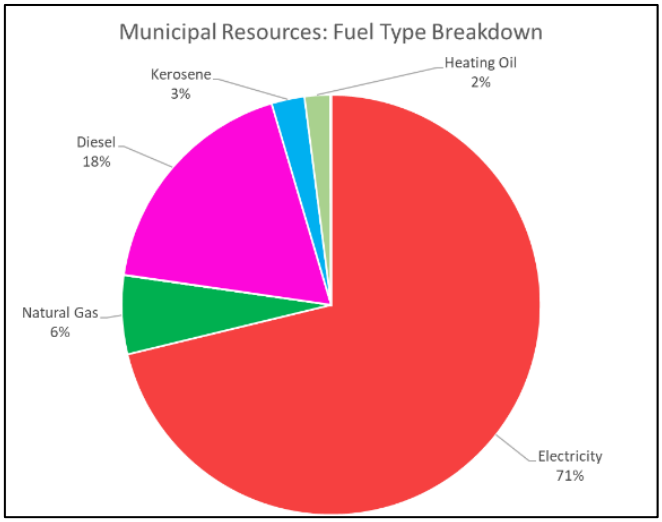
Figure 0-15 – Carbon Emissions from Municipal Resources



Buildings have the largest carbon contribution at 19.2 ktCO2eq per year (49.9% of the sector), trailed by Public Lighting at 12.2 ktCO2eq (31.8%), and Fleet Operations at 7 ktCO2eq (18.2%). When comparing the two regions the Buildings carbon output has the largest discrepancy of 8.3 ktCO2eq. Here, DCSDC relies heavily on carbon intensive sources such as Natural Gas and Diesel, while the DCC region has a more diverse fuel mix and renewable fuels (Biodiesel), which has led to increase carbon contributions. A detailed account of the fuel mix for Municipal Resources is shown in

Figure 0-16. Electricity has the largest contribution to Municipal Resources (71%), followed by Diesel (18%), and Kerosene (3%) and Heating Oil (2%) making up the remaining. The carbon emissions arising from electricity has a relativity even split between DCC and DCSDC (45.1% and 54.9%). However, Diesel has a much larger proportion (77.6%) originating from DCC – which is likely due to the larger use in fleet operations. The two regions also have comparable uses of combined kerosene and heating oil (41.4% and 58.6% for DCC and DCSDC).

Figure 0-16 – Fuel Breakdown for Municipal Resources



CONCLUSIONS & NEXT STEPS

Within this report the greenhouse gas emissions for the North-West region have been calculated as a baseline for future comparison. It is recommended that the calculation is revisited on a regular basis to track progress against any local measures which are taken to reduce carbon emissions and to inform the creation of new carbon reduction strategies. This baseline can now be used to set informed carbon reduction targets between now and the "Net Zero" target date of 2045.

The current carbon baseline for the North-West Region is 3,413 ktCO2eq per year with Private Domestic Housing, Transport, and Commercial Buildings contributing the bulk of carbon (94%). The findings of this study will be compared against the local initiatives within the North-West Regional Energy Strategy to enable carbon reduction targets to be set in the progression towards the "Net Zero" target date of 2045.

The carbon baseline calculated within this study has been developed to be repeatable and easily used whilst producing informative results. As such, a relatively straight-forward calculation methodology was adopted utilising many data sources.

The following recommendations are made for future studies to increase the accuracy of the results that are calculated and to produce a more representative Carbon Baseline:

1) **Domestic Buildings BER Reports** – The calculation set out within the report will increase in accuracy as more households within the area attain a BER assessment. Currently, for Donegal 26,555 out of 58,305 private households have a BER certificate, as the requirement to do so was established in 2009. However, each year as more households are sold the percentage of houses with a BER rating will increase, and the accuracy of the calculation will improve.
2) **Commercial Buildings Stock** – The calculation methodology currently estimates the energy usage of commercial properties based on floor area and type of property. The

carbon calculation could be improved by providing a detailed list of the properties with their energy consumption and fuel type used.

3) **Data Collection** - As Local Authorities continue to understand their contribution towards climate change and create decarbonisation strategies, the tracking and recording of relevant data will become increasingly important. To aid the development of future carbon strategy programs in the North-West Region, WSP proposes the development of a tool, similar to the Sustainable Energy Authority of Ireland's (SEAI) Building Energy Rating (BER) research tool. This tool could be developed for Northern Ireland, and include data relating to commercial buildings and social housing, including the following: type of commercial entity, floor area, energy consumption, and fuel types used. The DCC region could also utilise such a tool given the data limitations of the SEAI tool.

4) Three key areas for decarbonisation strategies will be Transport, Commercial Buildings, and Domestic properties, heightening the need for effective recording, storing, and analysis of related data to achieve decarbonisation targets and progress towards the "Net Zero" target date of 2045.