



Rhondda Cynon Taf County Borough Council

Carbon Footprint 2019/20

March 2021



Key contacts



Prepared by:

Ben Noble

Analyst

Ben.Noble@carbontrust.com

Approved by:

Rob Hatcher

Senior Manager

Robert.Hatcher@carbontrust.com

Prepared for:

Steve Lock

Head of Energy Project Management

Stephen.Lock@rctbc.gov.uk

Contents

1. Introduction
2. Executive summary
3. Carbon footprint methodology
4. Carbon footprint analysis
5. Recommendations and next steps
6. Appendices



1. Introduction

Context

- In 2017, the Welsh Government (WG) set the ambition of achieving a net zero public sector by 2030 and in March 2019, published Prosperity for All: A Low Carbon Wales which includes a policy to “Support the public sector to baseline, monitor and report progress towards carbon neutrality”.
- The upcoming “**Welsh Public Sector Net Zero Carbon Reporting Guide**” is expected to be in place imminently and will form the basis of ongoing carbon reporting for the overall net zero Welsh public sector target.
- In anticipation of the publications release, Rhondda Cynon Taf County Borough Council (RCT) have commissioned the Carbon Trust to calculate the organisational carbon footprint of the council for the financial year 2019/2020, aligning with the reporting guidelines as much as possible.
- Rhondda Cynon Taf (RCT) have committed to a target aligned with the overall WG target of becoming **Net zero by 2030** across its own estate.
- RCT have also committed to becoming “Net zero” in their ‘Corporate Plan 2020-24 Making a difference’, which will align with RCT’s commitment to the Wellbeing of Future Generations Act.
- This report aims to build on the carbon reduction efforts made by RCT over the last 10 years including over 100 Solar PV installations, a mixture of micro-combined heat and power (CHP), CHP installations and High Efficiency Boiler Plant replacements, HVAC upgrades including pool plant, over 200 LED upgrades in our buildings and LED street lighting.
- This footprint report will help RCT establish a revised carbon baseline for its own operations, taking into account a comprehensive set of Scope 1, 2 Scope 3 emissions sources.
- This carbon baseline will form a crucial part of the council’s Climate Action Planning efforts.
- The Council also recognises the importance of action at the County Borough level and should consider developing a separate Borough-wide carbon footprint to identify areas for action.



About Carbon Trust

The Carbon Trust is an independent, expert partner of leading organisations around the world, helping them contribute to and benefit from a more sustainable future through carbon reduction, resource efficiency strategies and commercialising low carbon technologies.

Our mission is to accelerate the move to a sustainable, low carbon economy.





About Rhondda Cynon Taf County Borough Council

Rhondda Cynon Taf County Borough Council is the governing body for Rhondda Cynon Taf. The County Borough has an approximate population of 240,000 with the most populous areas centred around Aberdare and Pontypridd.

The council is responsible for local refuse collection and recycling, parks, provision of schools, and office-based services such as local planning and building control.

Rhondda Cynon Taf has a strong track record of placing sustainability and the environment at the heart of its operations.



2. Executive Summary

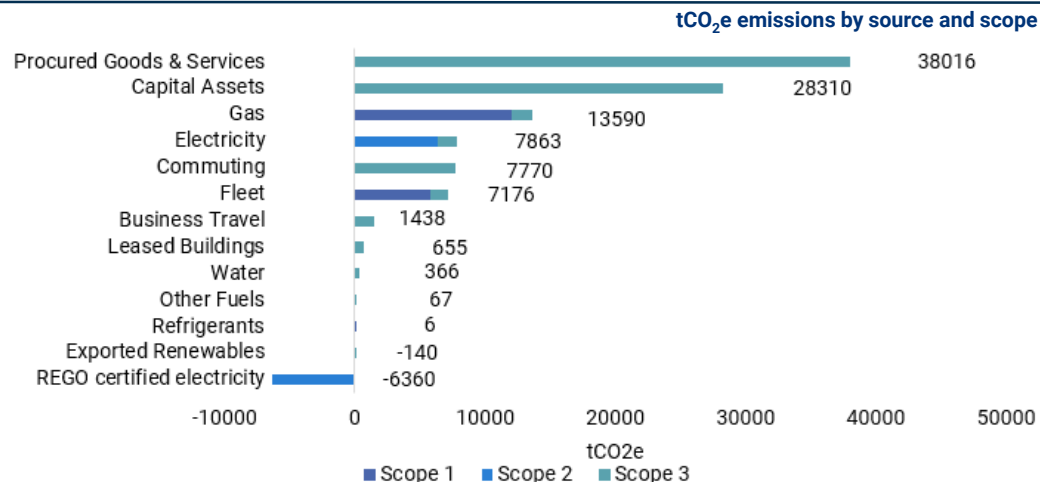
Key findings

The total footprint for Rhondda Cynon Taf (RCT) during the Financial Year (FY) 2019/20 has been estimated at **105,257 tCO₂e**. These emissions can be broken down into three separate scopes, according to the Greenhouse Gas Protocol:

- **Scope 1:** Direct emissions associated with the use of natural gas in buildings, fleet fuel consumption, other fuels and refrigerants (**17,888 tCO₂e**)
- **Scope 2:** Indirect emissions associated with purchased electricity in buildings (**6,360 tCO₂e**)
- **Scope 3:** Indirect emissions associated with the embodied emissions from procured goods and services, capital goods, employee commuting, business travel, upstream emissions from scope 1 and 2 activities, leased buildings and water consumption in FY 19/20 (**81,009 tCO₂e**).

The overall Net Emissions for RCT total **98,757 tCO₂e**. The GHG protocol and UK Environmental Reporting Guidelines encourage dual reporting to allow for reflection of positive carbon activity which cannot be captured within a formal, reportable Carbon Footprint. Net Emissions go beyond the scope of the anticipated Welsh Public Sector Net Zero Carbon Reporting Guide to include the avoided emissions from exported renewables and electricity purchased through REGO certified contracts.

- The footprint is heavily concentrated around indirect scope 3 emissions, a very common situation for local authority emissions.
- Emissions associated with procured goods and services account for 36% of the total footprint for RCT with a further 27% of emissions associated with capital assets (projects).
- Overall, scope 3 emissions account for 77% of the total footprint. RCT will therefore have to integrate carbon management in its interactions with external parties such as contractors to achieve net zero by 2030 (if including supply chain emissions in this target).
- Emissions associated with natural gas and electricity consumption across RCT operated sites account for 20% of the footprint (including upstream energy impacts).
- Continued monitoring of these emissions is recommended, to identify emissions hotspots across selected buildings/sites.
- Fleet emissions represent a further ~7% of emissions.
- The top 6 categories of emissions account for 98% of the total (procured goods and services, capital goods, gas, electricity, commuting and fleet).



Key recommendations

Targeted opportunities and future reporting

- RCT should use the findings of this report to target emission reduction activities in high impact areas, balanced with reducing emissions in areas where organisational influence is higher. The measured carbon footprint therefore signposts that RCT should prioritise reducing emissions from the supply chain, whilst also making in-roads in reducing emissions from direct building and transport operations.
- During phase 2 of this work, Carbon Trust will continue to work with RCT developing a supply chain engagement approach, in order to move towards better measurement and management of the ~63% of estimated emissions from procured goods and services and capital projects.
- The findings in this footprint report should be used as a basis for future reporting under the anticipated WG reporting guidelines. Given its draft nature, some changes may be required in order to fully align with the requirements. This report has however been drafted with the most up to date understanding of the requirements.



Data quality and inclusion

- RCT should continually seek to improve the quality of data being used to calculate its organisational carbon footprint. This will help to improve overall understanding of the key emission sources across the council.
- RCT should initially focus on uncertainties related to the supply chain, fleet, commuting and business travel.
- With regards to the council's procured goods and services and capital goods, RCT should plan to move away from using expenditure proxies and begin working closely with contracted suppliers to obtain more accurate information on their scope 1 and 2 emissions of those specific services.
- A move towards individual vehicle-level consumption data should also be recorded across RCT's fleet, commuting and business travel operations. This will allow the council to more accurately quantify the emissions associated with individual vehicles and take action on high consumers.

3. Carbon Footprint methodology

Greenhouse Gas Protocol

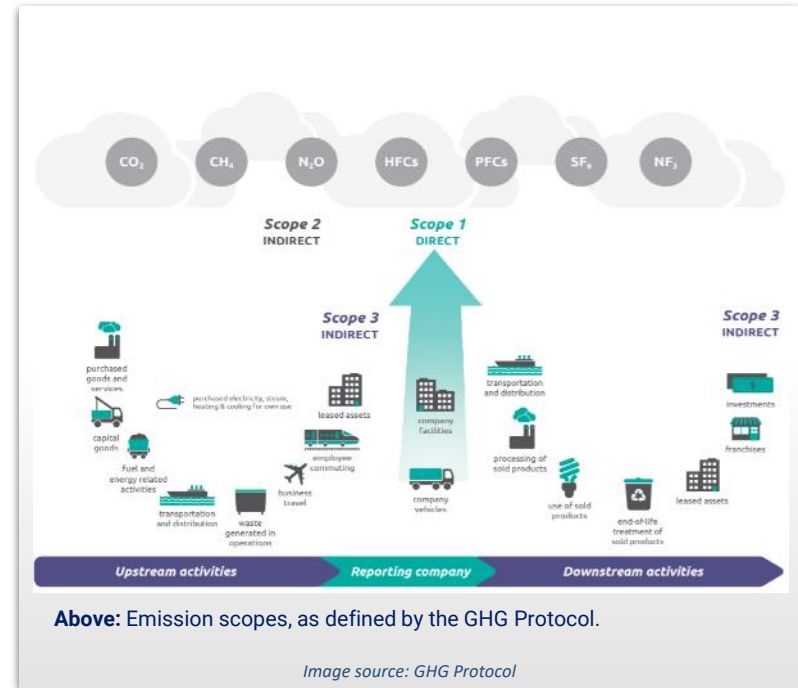
Introduction to carbon footprinting

The Carbon Trust has conducted the carbon footprint for RCT in accordance with the greenhouse gas (GHG) protocol – the most widely used and accepted methodology for GHG accounting. The GHG protocol categorises emissions into three scopes:

- Scope 1:** All direct GHG emissions (i.e. 'on-site' emissions, such as gas from a gas boiler or tailpipe carbon emissions from owned vehicles).
- Scope 2:** Indirect GHG emissions from consumption of purchased electricity, heat or steam.
- Scope 3:** All other indirect emissions, such as the extraction and production of purchased materials and fuels, transport-related activities in vehicles not owned or controlled by the reporting entity, outsourced activities, waste disposal, etc.

Direct and indirect emissions are defined according to operational control, such that:

- Direct GHG emissions are emissions from sources that are operationally controlled by RCT.
- Indirect GHG emissions are emissions that are a consequence of the activities of the reporting entity, but occur at sources controlled by another entity (for example, a power plant that generates the electricity consumed by RCT, or a waste-water treatment site that processes RCT's waste water).



Carbon footprint methodology

Calculation of emissions and introduction to greenhouse gases

A carbon footprint is calculated by aligning activity data (e.g. litres of vehicle fuel, kWh of electricity/gas) with an associated emissions factor:

- Where possible, primary activity data should be collected throughout the reporting period for the footprint calculation.
- Emission factors are updated annually and published by the UK Government's department for Business, Energy and Industrial Strategy (BEIS).¹

If activity data is not available, various benchmarks and proxies can be used:

- Benchmarks can be used to approximate activity data. For example, typical electricity consumption per m² of a buildings floor area.
- When input data is scarce, high level factors can be used in place of the BEIS factors to approximate emissions from the available input data.

Carbon dioxide equivalent (CO₂e)

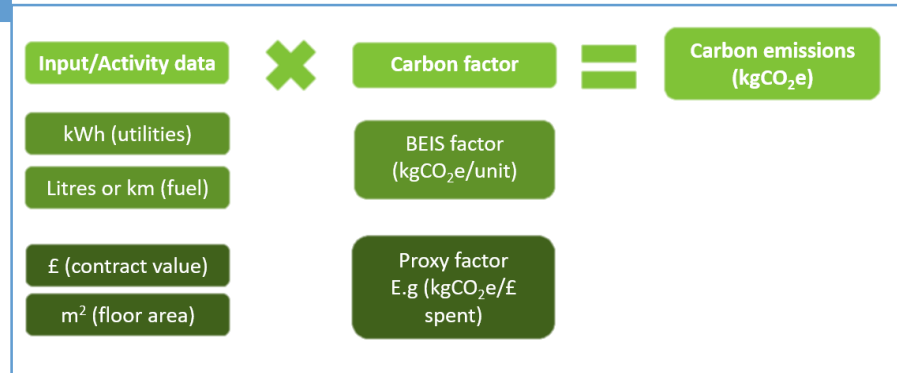
There are multiple greenhouse gases that prevent solar radiation from escaping the atmosphere and contribute to global warming.²

Each gas contributes towards this effect in different magnitudes.

To account for this in reporting, a common unit of carbon dioxide equivalent (CO₂e) is used, which allows the impact of greenhouse gasses to be expressed in terms of the amount of CO₂ that would create the same amount of warming.³

RCT's calculated footprint therefore covers the main GHG's, but it is reported in terms of carbon dioxide equivalent.

Box 1 – General calculation methodology for carbon emissions



1 UK Government's conversion factors for greenhouse gas (GHG) reporting: <https://www.gov.uk/government/collections/government-conversion-factors-for-company-reporting>

2 There are seven key greenhouse gases: Carbon dioxide (CO₂), Methane (CH₄), Nitrous Oxide (N₂O), Hydrofluorocarbons (HFCs), Perfluorocarbons (PFCs), Sulphur hexafluoride (SF₆), Nitrogen trifluoride (NF₃).

3 For example, carbon dioxide has a Global Warming Potential (GWP) of 1, whilst methane has a GWP of 24, therefore we can say that 1 tonne of Methane is equal to 24 tonnes of CO₂e (tCO₂e).

Carbon footprint methodology

Boundary of this assessment

The boundary of this assessment was agreed by RCT, and includes all organisational scope 1 and 2 emissions and those scope 3 emissions required by WG reporting. The selection of emission sources was also reviewed against a) perceived magnitude, b) data availability, and c) sphere of influence and ability to achieve reductions through direct action. The emissions included are consistent with the current understanding of WG reporting requirements and although significant changes are not expected, minor future amendments may be required. Emission sources excluded from this assessment (as per the GHG protocol) can be found in the Appendix.

SCOPE 1



Gas consumption, typically for space and water heating in buildings and other RCT operations

RCT owned vehicle fossil-fuel consumption

Fugitive emission from refrigerant leakage

Other fuels (LPG)

SCOPE 2



National grid supplied Electricity consumed in buildings and other RCT operations

Avoided emissions from use of renewables (e.g. solar PV and REGO backed tariffs) have been included in RCT's Net Emissions total.

SCOPE 3



Indirect emissions from procured goods and services and capital projects.

Emissions resulting from business travel and commuting in non-council operated vehicles.

Emissions from the third party disposal and treatment water across council operated sites.

Upstream emissions from scope 1 and 2 activities

Emission from buildings with a leased status

Data collection

Data on expenditure, buildings, fleet, travel, water and waste was collected by RCT and reviewed by Carbon Trust. Adjustments to the figures were applied where necessary.

	Activity data	Source	Notes, assumptions and data quality comments
Scope 1	Natural gas consumption in buildings	Consumption data was made available for 225 sites. A further 18 sites were provided without data. kWh consumption and cost (£).	Consumption was assumed to be zero where data was not provided with no estimates included. Data was not available where the site was not under an RCT supply contract or no usage data was recorded. RCT should validate this in future years.
	Vehicle fossil fuel consumption	As part of RCT's ULEV submission (WGES) an inventory of fleet consumption was assembled. A mix of mileage and vehicle consumption data according to the "fleet data" tab was used for the assessment. Fuel type and general description were used to assign best fit emission factors.	Where present, fuel consumption data has been prioritised to calculate the footprint, only using mileage in its absence. RCT waste collection vehicles are also present within this data which represent community and organisational waste collection emissions. A number of further uncertainties exist around fuel consumption associated with hire vehicles.
	Other fuel consumption	LPG consumption for 2 sites was based upon communicated billing data provided by the sites concerned.	Data was provided in litres of annual consumption.
	Refrigerant leakage	Refrigerant leakage data was provided for 2 sites.	Data for F-gas leakage has been based on annual routine maintenance/top-ups of all refrigerant. The leakage data should be verified through an independent audit of the 3 rd party contractor maintaining the systems.
Scope 2	Electricity consumption in buildings	Consumption data was made available for 346 sites. A further 18 sites were provided without data. kWh consumption and cost (£). Renewable energy supply evidence was presented to demonstrate REGO power purchasing.	Consumption was assumed to be zero where data was not provided with no estimates included. Data was not available where the site was not under an RCT supply contract or no usage data was recorded. RCT should validate this in future years.
Scope 3	Procured goods and services	Spend report for RCT expenditure in 2019/20 (~£300million). Data removed includes public body / inter-authority spend, pensions and salaries spend and other capital / balance sheet spend (such as VAT related payments etc).	Economic proxies in the form of environmentally extended input output (EEIO) factors have been used to calculate the emissions associated with individual procured services (see next page).
	Capital assets	Spend report for RCT expenditure in 2019/20 as above. Spend categorised as "capital assets" where evidence suggests construction based activities e.g. "works". As such the category relates to construction based emissions e.g. embodied emissions in construction products and operations.	Economic proxies in the form of environmentally extended input output (EEIO) factors have been used to calculate the emissions associated with individual capital projects (see next page).

Data collection

Data on expenditure, buildings, fleet, travel, water and waste was collected by RCT and reviewed by Carbon Trust. Adjustments to the figures were applied where necessary.

	Activity data	Source	Notes, assumptions and data quality comments
Scope 3	Employee commuting	Anonymised employee home addresses and work destinations were provided. Average return distances were estimated using the home address and one central location (CF40).	Assumptions were made on the number of working days per year (taking into account PTE and WfH i.e 3.5/week). An assumed transport mode split was then applied e.g. car, public transport, walk etc.
	Business Travel: Transport	As part of RCT's ULEV submission (WGES) an inventory of grey fleet consumption was assembled. Mileage figures from the grey fleet tab were utilised for the assessment.	Assumptions were made on the fuel type split (petrol, diesel, EV, motorcycle) using national averages and average vehicle emission factors for each category. Other forms of business travel emission have been deemed to be de minimis (flights, accommodation, trains etc.)
	Water supply and treatment	m ³ consumption – consumption data provided for 380 sites.	A small sample of sites used extrapolated data to make assumptions on water supplied (conducted by RCT). 95% of water supplied has been assumed to be extracted for treatment. Actual water consumption should be used for future measurements.
	Waste disposal	Waste data not included. Evidence provided that confirm very limited waste to landfill occurs (<1%) therefore as per reporting guidelines and the GHG protocol, only waste collection (vehicle) emission are required.	Waste emissions are included under fleet emissions as no waste to landfill is present (waste collection emission only). Not possible to disaggregate organisational waste from community waste.
	Leased Assets	41 sites were identified as either upstream sites where RCT is the landlord or downstream where RCT is the tenant. Electricity and gas consumption was provided for most downstream sites. Only floor area (m ²) was provided for upstream sites.	Only sites where RCT deliver services or have control of the utility bills have been included. Building energy benchmarks have been used (CIBSE) to estimate energy consumption where actual data is not available. This should be avoided where possible due to the increased uncertainty.
	Renewable electricity generation	Energy generation data from 106 small scale roof mounted solar PV installations were also provided.	Renewable energy data includes Solar PV generation data provided and estimated export data based on 50% export for schools, 25% export for offices, and no export for other sites. RCTs CHP are behind the meter and do not export, so therefore are considered within electricity and gas totals.

Environmentally Extended Input-Output Factors

Environmentally Extended Input-Output values (EEIO) are used to calculate the hidden, upstream, indirect or embodied environmental impacts associated with downstream consumption activity. The diagram below provides an overview schematic of how emissions factors for a purchased item (fast food in this example) may be calculated by looking at the emissions produced per major economic activity, associated emissions and output of each stage of the product's value chain.

They have been used as a means to calculate emissions relating to procured goods and services and capital good and represent an estimate of the full "cradle to gate" emissions for each item that has been assessed. Each EEIO factor details the typical emissions of a product or activity per unit of spend on that produce or activity. We work from a database of 500 EEIO factors for a range of different sub-sector goods and activities.

EEIO factors are useful for providing a broad estimate of the emissions from procured goods and services and capital assets, however, they reflect the general emissions of a sub-sector and not of the specific supplier of that good or activity. It is recommended that EEIO factors are used initially to identify emission hotspots within the supply chain that can then be further refined through primary data collection.



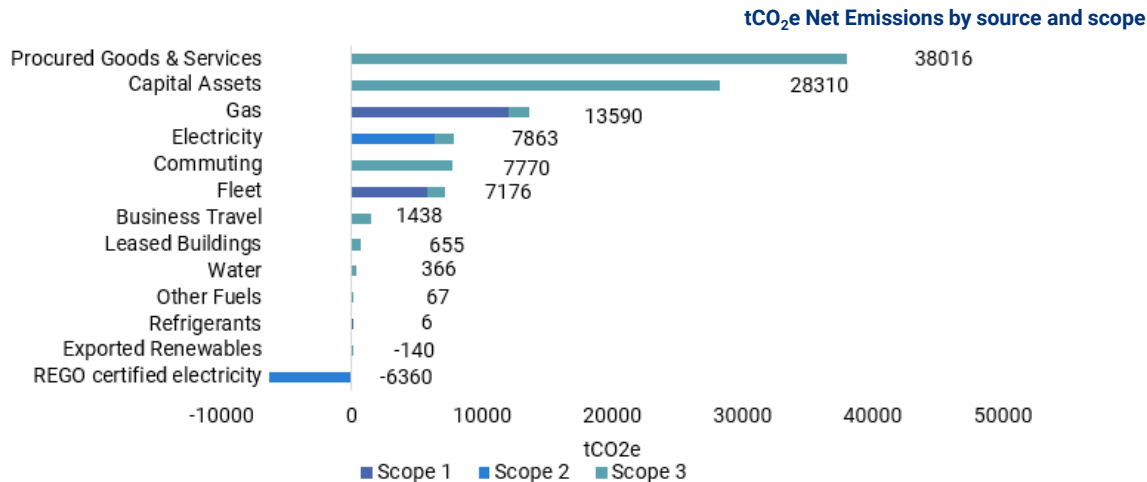
4. Carbon Footprint analysis

RCT Total Carbon Footprint summary

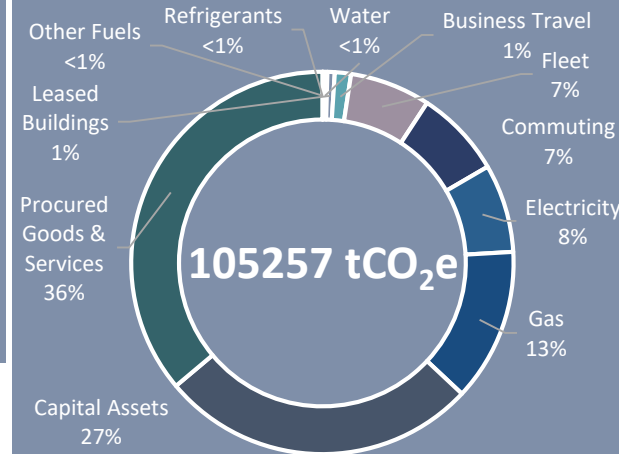
The total estimated carbon footprint of RCT in FY 19/20 has been calculated to be **105,257 tCO₂e**. The indirect emissions associated with the council's procured goods and services account for 36% of the overall carbon footprint. Emissions associated with capital assets make up a further 27% of total emissions. The top 4 categories are summarised as:

- Procured goods and services: **38,016 tCO₂e** (Scope 3)
- Capital assets: **28,310 tCO₂e** (Scope 3)
- Natural Gas consumption in buildings: **13,590 tCO₂e** (Scope 1 and 3¹)
- Electricity consumption **7,863 tCO₂e** (Scope 2 and 3¹)

The overall Net Emissions for RCT total **98,757 tCO₂e**. The GHG protocol and UK Environmental Reporting Guidelines encourage dual reporting to allow for reflection of positive carbon activity which cannot be captured within a formal, reportable Carbon Footprint. Net Emissions go beyond the scope of the anticipated Welsh Public Sector Net Zero Carbon Reporting Guide to include the avoided emissions from exported renewables and electricity purchased through REGO certified contracts.



RCT Carbon Footprint



RCT Net Emissions

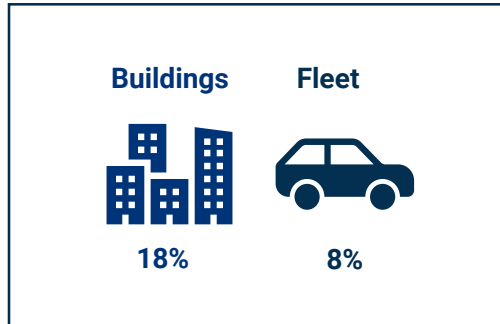
98,757 tCO₂e

¹Figures include upstream emissions from scope 1 and 2 activities. According to the GHG Protocol, upstream emissions are referred to as 'Fuel and energy-related activities', and are included in the council's scope 3 emissions. These emissions are associated with transporting the fuel to the power stations before it is used and inefficiencies in the system such as transmission losses.

Summary of scope 1 and scope 2 emissions

Scope 1 and 2 emissions represent a combined figure of 23,952 tCO₂e which is 23% of RCT's total emissions¹.

- **Scope 1 vs. Scope 2 emissions:** 17% of the footprint arise from scope 1 emissions from fleet and building fuel consumption. Scope 2 emissions account for the remaining 6% from building electricity use.
- **Emissions by activity:** Approximately 18% of the total footprint emissions are from electricity and heat use in buildings. Fleet fuel consumption is responsible for 6% of emissions.
- **Net Emissions:** approximately 140 tCO₂e were avoided through renewable energy generation from solar PV exported back into the grid², in addition the scope 2 electricity is REGO certified.



Scope	Category	tCO ₂ e ²
1	Gas	12,026
1	Fleet	5,796
1	Other Fuels	59
1	Refrigerants	6
2	Electricity	6,360

¹Not including scope 3 upstream impacts

²Electricity generation from micro CHP units not captured

Summary of scope 1 emissions

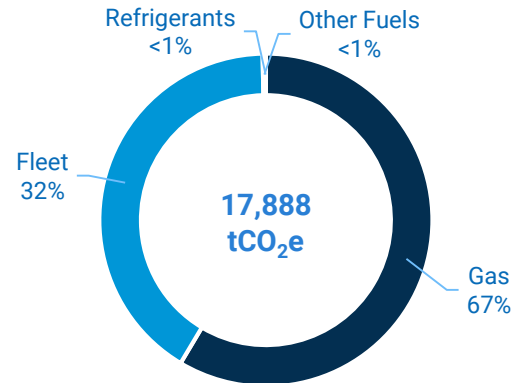
Scope 1 emissions are the result of the direct burning of fossil fuels by RCT

There are four sources of scope 1 emissions that have been calculated as part of RCT's footprint:

1. Natural gas consumption: **12,026 tCO₂e** (13,590 tCO₂e when included scope 3 upstream energy impacts)
2. Operation of fleet vehicles: **5,769 tCO₂e** (7,176 tCO₂e when included scope 3 upstream energy impacts)
3. Liquid fuel consumption (other fuels): **59 tCO₂e** (67 tCO₂e when included scope 3 upstream energy impacts)
4. Refrigerant leakage: **6 tCO₂e**

The vast majority of scope 1 emissions arise from those created by natural gas consumption and from use of petrol and diesel in fleet vehicles. Refrigerant emissions are associated with leakage of refrigerants from air conditioning systems. "Other fuels" represent the consumption of LPG at 2 x RCT sites.

Summary of RCTs Scope 1 emissions



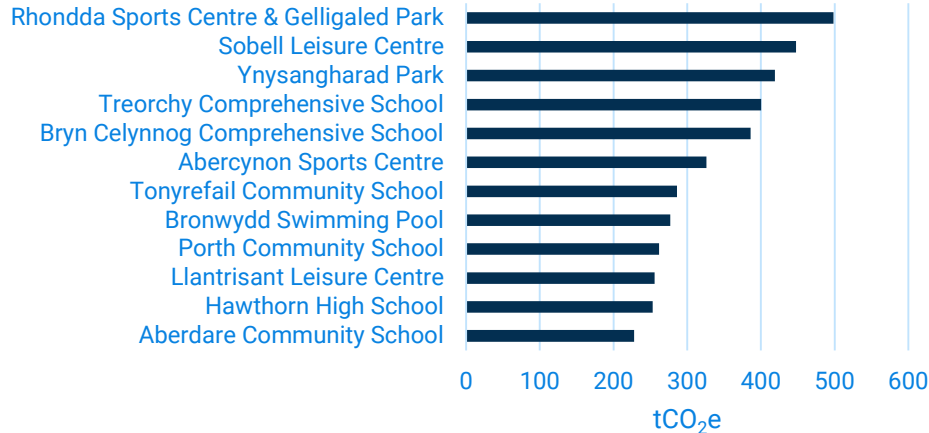
Scope 1 emissions breakdown

Natural gas consumption emissions

Carbon emissions associated with gas consumption accounts for **12,026 tCO₂e** (13,590 tCO₂e when including scope 3 upstream energy impacts). This represents 11% of total emissions (or 13% including the scope 3 upstream energy impacts).

Gas consumption records were provided for 243 RCT sites (in addition to 18 sites with no associated consumption data). The top 12 sites in terms of carbon emissions are shown below. These sites represent 34% of total RCT emissions (4,564 tCO₂e) which is 4% of RCT total emissions. Energy efficiency investigations should be prioritised at high consuming sites to understand the potential for efficiency improvements and electrification of systems¹. The majority of the sites with the highest gas consumption contain swimming pools, which will be a focus of the subsequent stages of the work suggesting steps to decarbonise.

Top 12 sites gas emissions



¹The emissions factor associated with Natural Gas is essentially a fixed factor. As such where a building uses roughly the same amount of gas year on year, the associated carbon emissions will not change.

On the contrary, due to the increasing amount of renewable energy being introduced to the national electricity grid, the emissions associated with electricity consumption are falling year on year and will become more green than gas. Whilst the exact future for the UK's heating systems isn't entirely known, the majority of forecasts assume that most heat and hot water for buildings will be supplied by heat pump solutions that take advantage of the lower grid emission factors and their high efficiencies (known as co-efficient of performance). Ground source and air source heat pumps are common types and alongside improvements to the insulation and fabric of buildings, RCT should be investigating moving towards these systems in the majority of buildings.



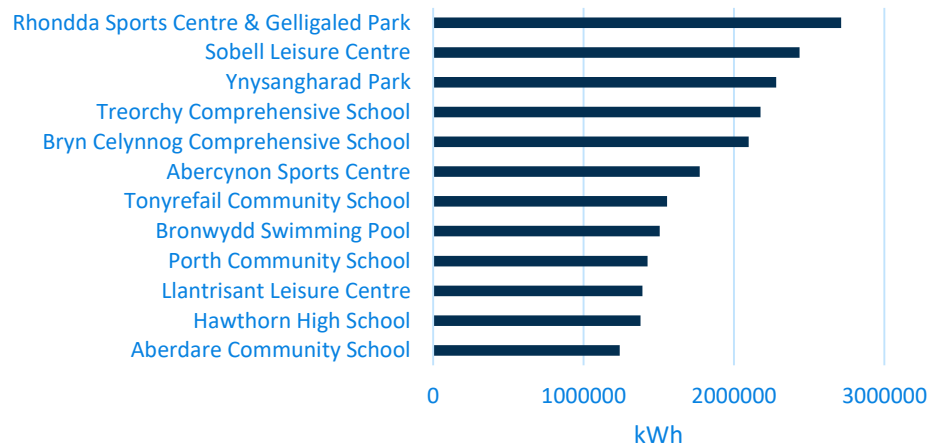
Scope 1 emissions breakdown

Natural gas consumption: energy benchmarking

The 12 highest emitting sites were identified as predominantly being leisure centres, sports facilities and comprehensive schools.

The 12 sites with highest natural gas consumption make up **34%** of the total natural gas consumption from all RCT buildings.

Top 12 gas consumption



A basic energy benchmarking exercise has been conducted below to highlight significant departures from expected gas consumption at the top 12 sites.

The data indicates poor energy efficiency at a number of sites, as well as some sites, such as Llantrisant leisure centre, with seemingly high efficiency compared to the benchmarked values. All of these sites should be investigated further since their consumption is high and discrepancies with benchmarked sites can sometimes inflate the comparative performance of a building.

Site	Site type	% diff.
Aberdare Community School	Secondary	-25%
Hawthorn High School	Secondary	16%
Llantrisant Leisure Centre	Swimming pool centre	-150%
Porth Community School	Secondary	27%
Bronwydd Swimming Pool	Swimming pool centre	37%
Tonyrefail Community School	Secondary	77%
Abercynon Sports Centre	Combined centre	-27%
Bryn Celynnog Comprehensive School	Secondary	31%
Treorchy Comprehensive School	Secondary	36%
Ynysangharad Park	Swimming pool centre	26%
Sobell Leisure Centre	Swimming pool centre	23%
Rhondda Sports Centre & Gelligaled Park	Combined centre	-70%

Scope 1 emissions breakdown

Fleet vehicle emissions

Fleet vehicle emissions represent approximately 6% of RCT's total emissions at 5,796 tCO₂e (7,176 tCO₂e and 7% when including scope 3 upstream energy impacts).

Data for more than 1,000 vehicles was included within the fleet submission.

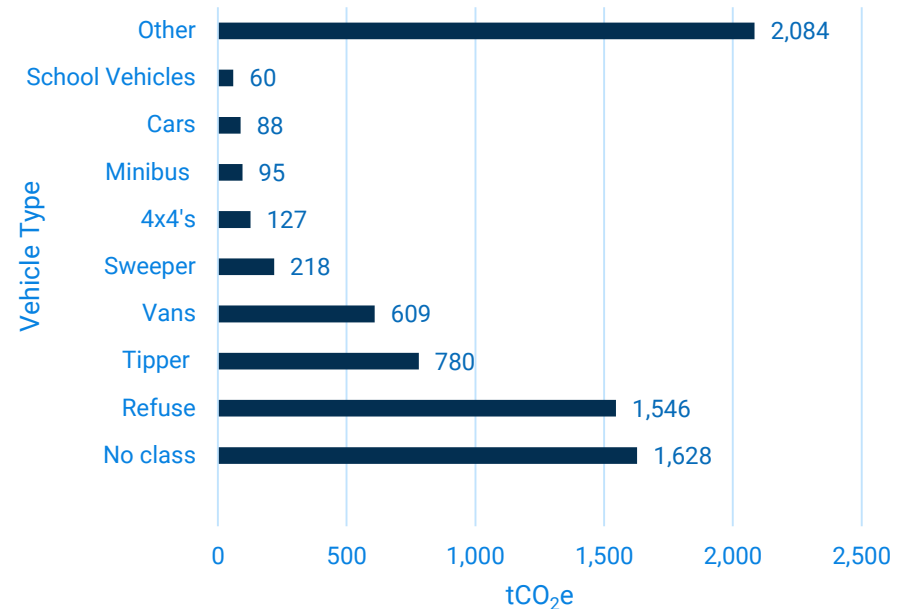
1,628 tCO₂e of emissions arise from vehicles with no specification classification (no class). A sample review of the recorded registration plates show that these vehicles are a mix of small to medium trucks and goods vehicles.

Those vehicles identifiable as waste collection vehicles (refuse), represent the third largest category of vehicles. These vehicles are understood to represent community, as well as RCT's organisational waste emissions (due to no waste to landfill) and the categorisation of emission according to UK government and GHG protocol guidelines.

The top 3 categories (not including "other"): non classified large vehicles, Refuse vehicles and Tipper vehicles make up 55% of emissions from fleet vehicles. School vehicles, cars, minibuses and 4x4's represent only 5% of the total.

Whilst "Other" emissions represent the largest aggregated category on the graph, in reality this proportion represents a sub set of a large number of different vehicle types.

RCT Fleet Emissions



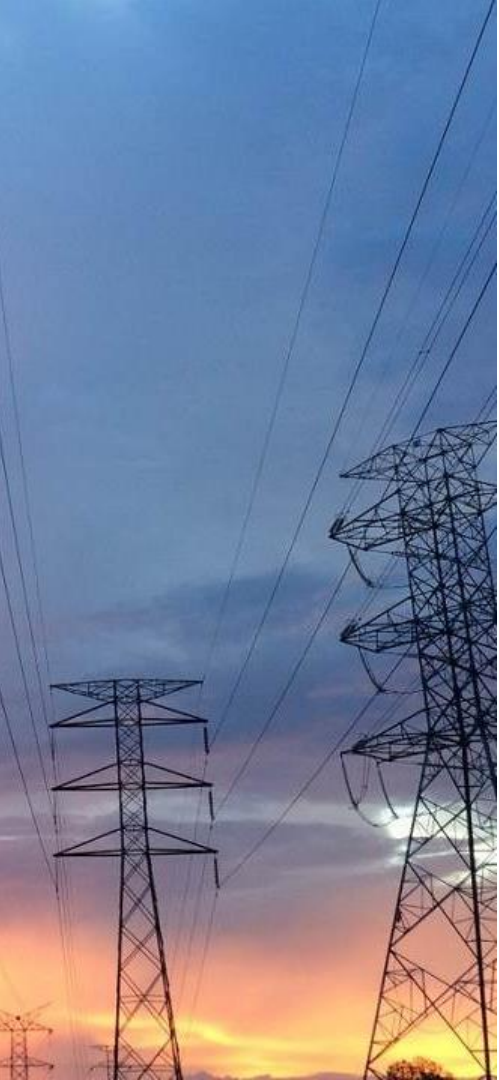
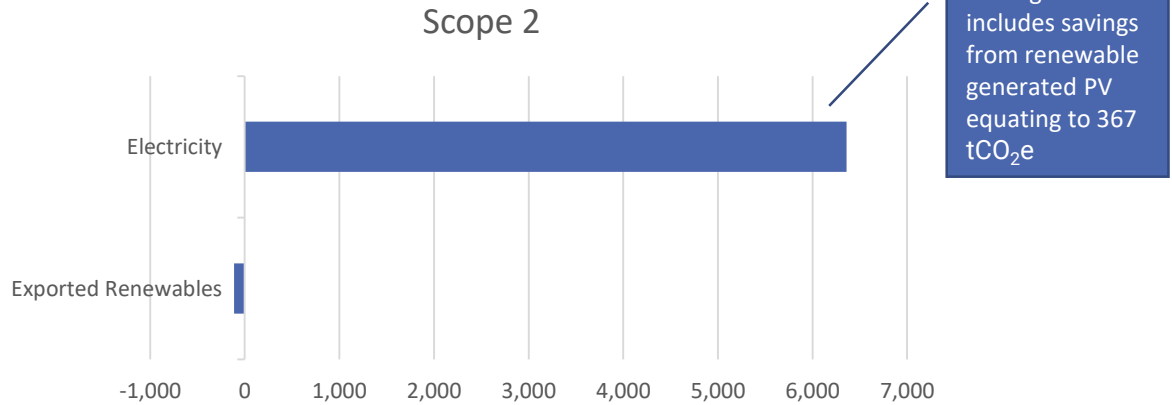
Scope 2 emissions breakdown

Purchased electricity emissions

Scope 2 emissions from the electricity purchased from the national grid for use in RCT buildings accounts for to **6,360 tCO₂e** (7,863 tCO₂e when including scope 3 upstream energy impacts). Emissions from electricity therefore account for approximately 6% of the overall footprint.

Consumption data was provided for 346 sites. Use of Solar PV equates approximately 140 tCO₂e of Net Emissions saved annually. The emission estimate is based on the average grid emissions factor for 2019 as published by the UK government. The reportable carbon footprint assumes the standard location based approach to scope 2 this aligns with the anticipated Welsh Government Carbon Reporting Guidance. It is understood that 100% of electricity is REGO procured, this will be reflected in RCT's Net Emissions total.

Scope 2 emissions split



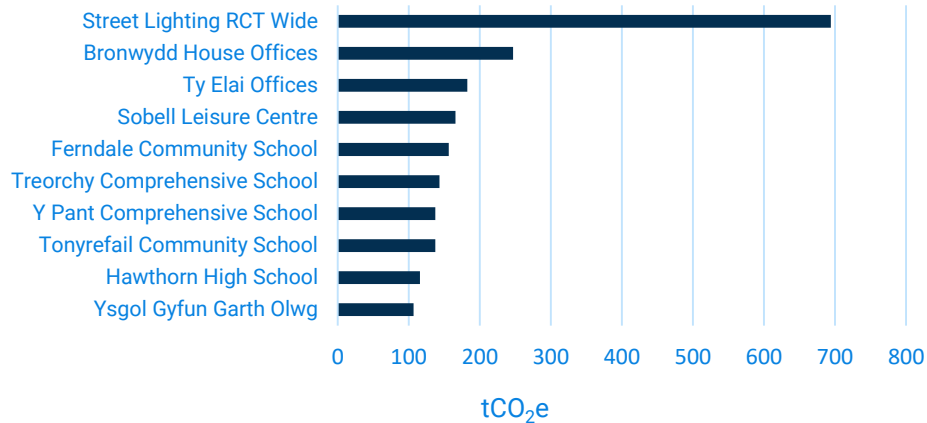
Scope 2 emissions breakdown

Electricity consumption emissions

Carbon emissions associated with electricity consumption accounts for **6,360 tCO₂e** (**7,863 tCO₂e** when including scope 3 upstream energy impacts). This represents 6% of total emission (or 7% including the scope 3 upstream energy impacts elements).

Electricity consumption records were provided for 346 RCT sites and streetlighting (in addition to 18 sites with no associated consumption data). The top 10 sources of electricity in terms of carbon emissions are shown below. These sites represent 33% of total RCT electricity based emissions (2,578tCO₂e) which is 2% of RCT total emissions. Streetlighting is unsurprisingly the largest source of electricity consumption representing 11% of all electricity consumption emissions. It is understood that essentially all street lighting is now LED.

Top 10 electricity emissions



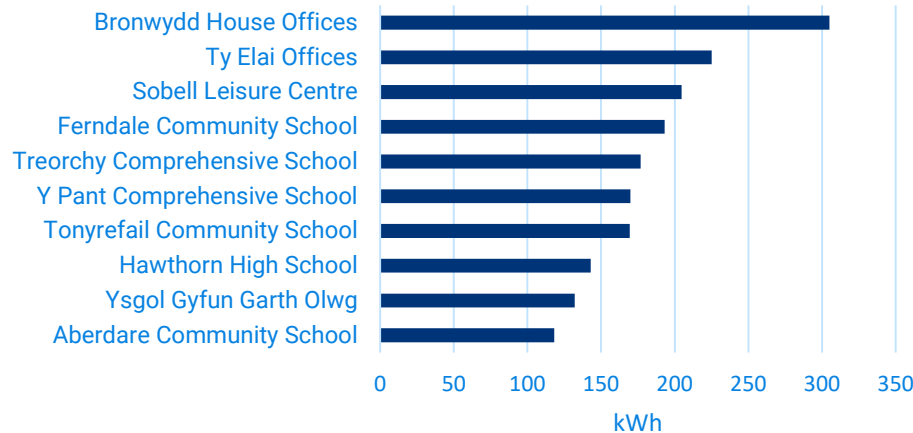
Scope 2 emissions breakdown

Electricity consumption energy benchmarking

The top 10 sites with the highest electricity consumption as shown below. They make up 23% of all electricity consumption across all RCT buildings.

Street lighting was not included in the graph below however it accounts for 11% of all the electricity consumption emissions from RCT.

Top 10 sites electricity consumption



A basic energy benchmarking exercise has been conducted below to highlight any significant departures from expected electricity consumption at the top 10 sites.

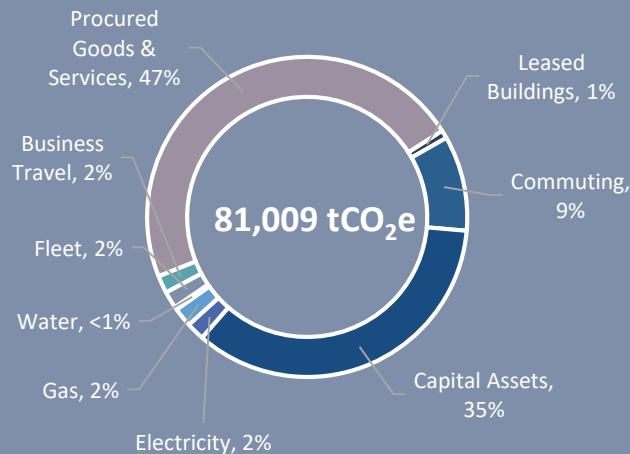
The data indicates poor energy efficiency at a number of sites (particularly Tonyrefail community school and Bronwydd house offices), as well as some sites, with seemingly high efficiency compared to the benchmarked values. All sites should be investigated further since their consumption is high and discrepancies with benchmarked sites can sometimes inflate the comparative performance of a building.

Site	Site type	%diff
Aberdare Community School	Secondary	-87%
Ysgol Gyfun Garth Olwg	Secondary	-49%
Hawthorn High School	Secondary	-15%
Tonyrefail Community School	Secondary	70%
Y Pant Comprehensive School	Secondary	-27%
Treorchy Comprehensive School	Secondary	-13%
Ferndale Community School	Secondary	13%
Sobell Leisure Centre	Leisure pool centre	-16%
Ty Elai Offices	Local government	-4%
Bronwydd House Offices	Local government	52%

Summary of scope 3 emissions

Scope 3 emissions arise from indirect operations and third party services linked to RCT operations. The primary emission sources associated with RCT's footprint (and that of all other local authorities), arise from the procurement of goods and services and those linked with capital assets e.g. construction. These emissions arise from "upstream" activities used to create the products and services that RCT require in order to run operations and deliver public services.

Another significant area of scope 3 emissions arise from commuting conducted by RCT employees. This is also a common significant category for other local authorities. The energy related emission below represent "upstream" impacts of scope 1 and 2 emissions for gas, electricity and fleet.



For the FY 19/20, total scope 3 emissions have been estimated at **81,009 tCO₂e**. Overall, scope 3 emissions account for 77% of the total footprint, the largest source of emissions by GHG protocol scope.

The largest scope 3 source is associated with emissions from the council's procured goods and services, which have been calculated using Environmentally-Extended Input-Output Factors (EEIO) – an economic proxy used to calculate emissions. These emissions account for 47% of total scope 3 emissions. Capital projects account for a further 35% and employee commuting accounts for 9% of scope 3 emissions.

Gas, Electricity and Fleet scope 3 emissions are the "Well-to-Tank" and "Transmission and distribution" emissions from the upstream supply chain.

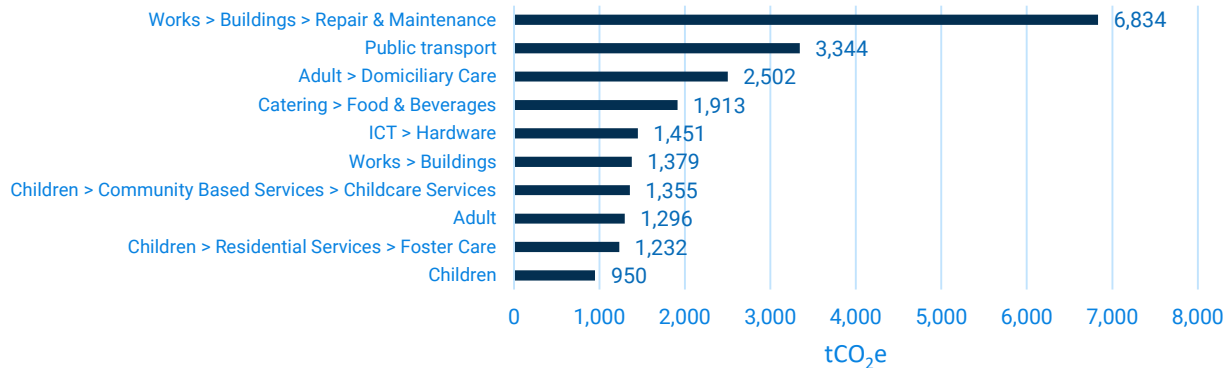
Scope 3 emissions breakdown

Procured goods and services emissions

Emissions from the execution of services outsourced to third parties - RCT's procured goods and services account for **38,016 tCO₂e**, representing **36% of the total footprint**, the largest source of emissions across RCT. Below are the top 10 categories found to be the highest emitting sources¹. The categories are those taken from RCT's internal procurement reporting system (under "category") and not aggregated or re-arranged at this point to draw similar services into new categories e.g. a number of categories relate to childcare support and adult services as seen below (which could be combined).

The highest emitting service was found to be building maintenance and repairs at **6,834 tCO₂e**, accounting for 22% of scope 3 emissions from procured goods and services, and 7% of total emissions across the council. This is followed by public transport (home to school and other taxi/coach services) and adult services ("domiciliary care") which together represent a further 19% of procured goods and services emissions (and 6 % of total RCT emissions). In phase 2 of the work with RCT, Carbon Trust will conduct further analysis on RCT procured goods and services emissions to present the data in different ways and to develop a way forward in terms of a supplier engagement approach.

RCT Procured goods and services Top 10



¹Excluding "unmapped" spend as a defined category.

Calculation approach

- Emissions have been calculated using EEIO economic proxies. EEIO proxies are a GHG Protocol approved method of calculating Scope 3 emissions and have the advantage of being simple to apply, facilitating manageable effort versus the collection of primary data from suppliers.
- However, emissions that are calculated using EEIO factors will carry a degree of uncertainty due to the nature of EEIO factors being based on benchmarks, as opposed to actual consumption data.
- In future, primary data sources for procured goods and services should be used wherever possible to calculate associated emissions, instead of using expenditure proxies e.g. the council should engage with suppliers to obtain information on scope 1 and 2 emissions.



Scope 3 emissions

Capital Assets

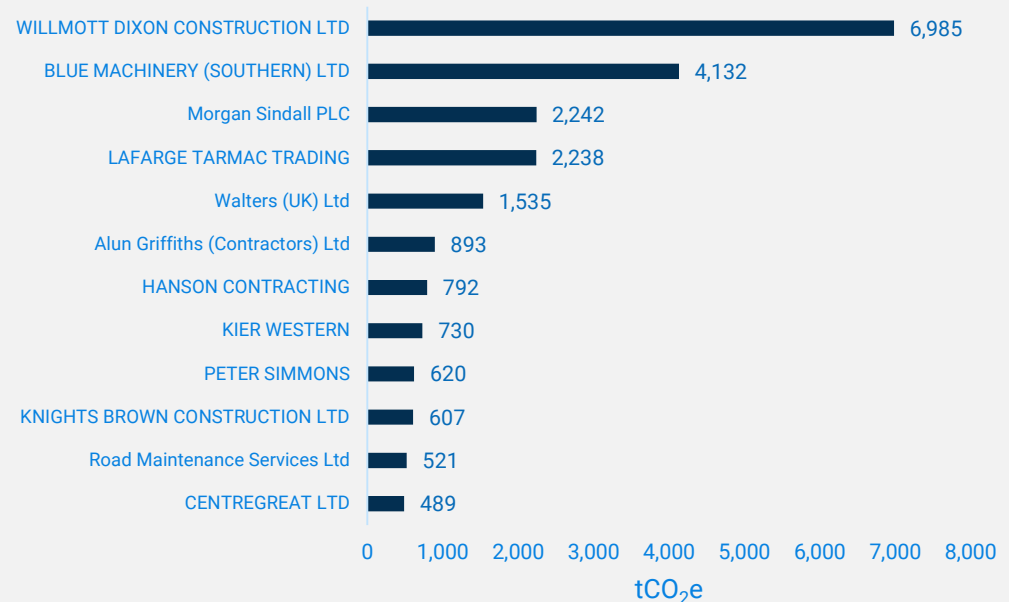
Emissions from capital assets have been estimated to account for 28,310 tCO₂e of emissions in 2019/20 which is 27% of the RCT total emissions.

Of those emissions, the top contracts and related projects have been identified to make up 77% of all emissions associated with capital assets.

Emissions from this category were also assessed using the EEIO approach explained on the previous slide. Emission sources were assigned to the capital assets category where they were identified under one of the various “works” classifications (under the procurement classifications provided), or in one case “industrial machinery”. These were also cross checked against a sample of supplier activities and confirmed to be based in the construction industry. Additional project level disaggregation has not been possible due to data limitations. i.e. assigning carbon emissions to specific construction project included within the capital asset category. Additional data may allow this however.

The top 12 contracts identified here may inform the basis of second phase of this project, and future work related to supplier engagement to better understand and manage these large sources of emissions e.g. engagement with Wilmott Dixon, Morgan Sindell etc. to obtain enhanced information on their particular construction related emissions and carbon management practices.

Capital Asset Project Suppliers with highest associated emissions



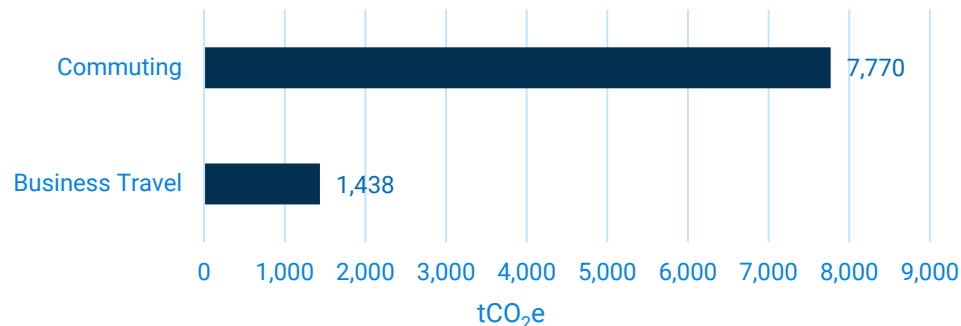
Scope 3 emissions breakdown

Business travel and commuting

Scope 3 emissions from RCT employee commuting have been estimated to account for **7,770 tCO₂e** which is ~7% of total RCT emissions. This figure is based on estimates derived from the number of employees, a database of journeys and assumptions on travel type and mode split. It has been estimated that RCT's 10,000+ employees cover approximately 39 million miles per year. 64% of these journeys are estimated to occur via car (using a national level assumption¹) with an average daily commute distance of 22 miles per employee (return).

Scope 3 emissions from RCT business travel account for **1,438 tCO₂e** for the FY 19/20, accounting for ~1% of the total footprint. Business mileage claims for RCT were provided and a number of assumptions applied in order to estimate the associated emissions. This included assigning a fuel type split (67% petrol, 27% Diesel, 6% EV with residual emission from motorcycles). Average emission factors were also required due to limited information on the vehicles and engine sizes. In 2019/20 RCT employees claimed 4.1 million journey miles at a cost of £1.42 million to RCT. Anecdotal information provided suggests that flights, taxis, and other transport as well as accommodation are minimal and therefore not included.

Commuting and Business Travel Emissions



¹https://www.racfoundation.org/assets/rac_foundation/content/downloadables/car-and-the-commute-web-version.pdf

Scope 3 emissions

Leased Assets

Emissions associated with RCT's 41 leased buildings (upstream and downstream) have been estimated to account for 655 tCO₂e of emissions in 2019/20 which is approximately 0.5% of RCT's total emissions.

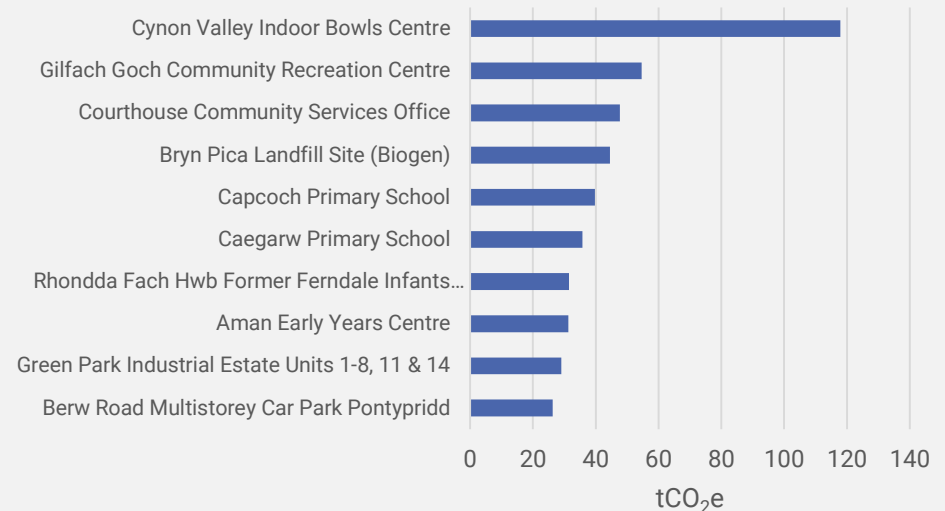
Emissions from these sites arise from gas and electricity consumed in buildings that sit under the control of other users (downstream) or where RCT are leasing space from other building owners (for the delivery of RCT services).

The top 10 sites seen on the right represent 70% of total leased asset emissions, with the Cynon Valley Indoor Bowls Centre representing 18% of all leased asset emissions.

In situations where RCT are the landlord (downstream), actual consumption has been primarily provided for the assessment (inc. Cynon Valley Indoor Bowls Centre).

For upstream leased assets, floor areas have mostly been utilised to estimate energy consumption in the absence of actual consumption data. This introduces a greater level of uncertainty into the assessment.

Top 10 Leased buildings



Assumed after clarification with RCT that "Bryn Pica Landfill site (Biogen)" refers to the portion of the Biogen site that has been leased to Biogen and not RCT operations in this instance.

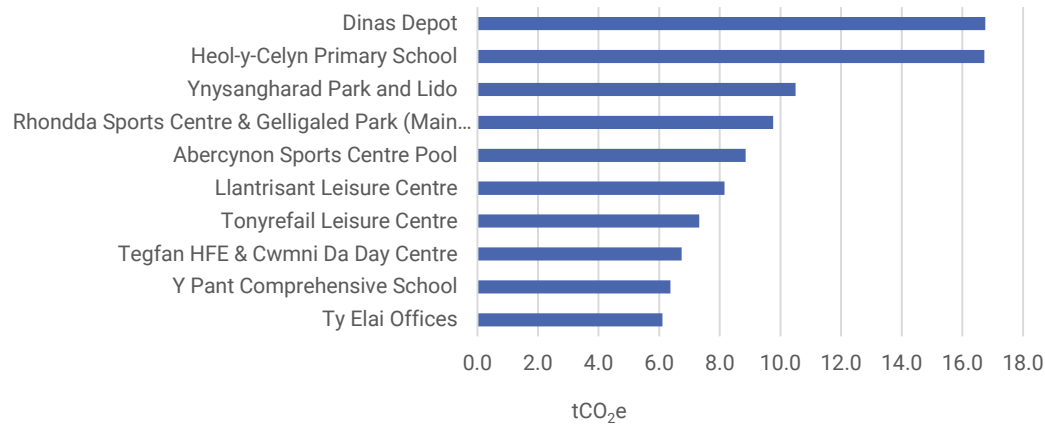
Scope 3 emissions breakdown

Water consumption

Emissions associated with water consumption account for **366 tCO₂e** which is approximately 0.3% of RCT total emissions. Whilst only a very small amount, it is likely there are still ways in which RCT can enact carbon reduction from the water that is consumed. Emission factors are applied to both the supply and treatment of water. It is assumed that 95% of the water that is supplied is extracted for treatment with the remaining 5% assumed as losses in the system.

The top 10 water consuming sites can be seen below which present 27% of all water consumption emissions across the 380 sites data was submitted for (an additional 46 sites had consumption recorded as 0). These sites should form the focus of water reduction efforts where possible.

Top 10 sites water consumption emissions

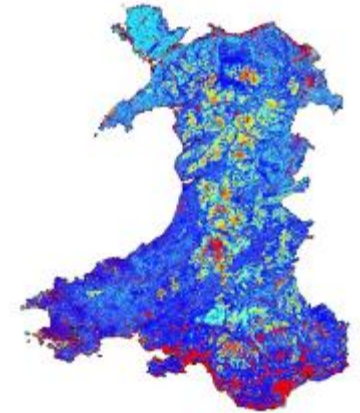


Land-based emissions and sequestration

In addition to emissions resulting from the combustion of fuels and other processes, organisations with significant land holdings are also responsible for carbon balances of land areas. An assessment of RCT's land use has not been carried out as part of this project. However, provisional site level information was provided to Carbon Trust in order to advise RCT upon the data requirements that are likely to form part of the pending WG reporting guidelines. A list of **2,355 sites** was provided to Carbon Trust representing approximately **3,355 hectares of land** owned by RCT.

Different habitat types can be net sinks (absorbing atmospheric carbon and storing it in biomass) or net sources (producing additional emissions into the atmosphere) depending on the habitat and the land management practices. There is a growing need for organisations to account for sequestered atmospheric carbon to provide a complete and accurate picture of their GHG impacts. There is also an opportunity for the Welsh Public Sector to proactively manage these resources to maximise their potential for carbon capture and storage. In the first instance **RCT will need to set a boundary** for owned and leased land assets in order to verify the total amount of land relevant for the assessment. The following guidelines should be followed to either **include or exclude land from the assessment**:

- Where RCT owns and manages land areas, **these should be included** within the boundary
- Where RCT leases land to a private organisation or individual but it is still used for delivering public services, **it should be included** within the boundary
- Where RCT leases land from a private organisation or individual, and it is used for delivering public services, **it should be included** within the boundary
- Where RCT leases land to another public sector body, **the organisation responsible for management of the asset should include it** within their boundary (you will need to agree this split with the other organisation)
- Where RCT leases land from another public sector body, **the organisation responsible for management of the asset should include it** within their boundary (you will need to agree this split with the other organisation)
- Where RCT leases land to a private organisation or individual and it is not used for delivering public services, for example tenant farms, it should be **excluded** from the boundary



Land-based emissions and sequestration

Following the boundary setting exercise the subsequent step will be to conduct an initial scoping assessment. The purpose of this step is to allow organisations with limited or no land areas to opt out of the assessment. The threshold to of total land area to opt out is 10 hectares. Following the boundary assessment, RCT should review the remaining land deemed within scope against this figure. As RCT hold land assets over 3,000 Hectares, it is highly likely that at a minimum, a tier 1 assessment will need to be followed. RCT should be prepare the following information in order to complete the assessment.

Key information required:

- Land will need to be categorised into 1 of 6 land types: **Forest land, Cropland, Grassland, Wetlands, Settlements and Other Land**
- **Where the land type has changed category within the last 20 years**, RCT will need to confirm the previous land type. Where it has not changed, this should be left as constant.
- **Soil type** is also needed and should be either classified as **mineral or organic** – where no information is directly available from data held by the organisation on the soil type, this can be estimated from national [databases](#)

By preparing the above information, including defining the land in scope through the boundary assessment, RCT will be able to conduct the tier 1 methodology with use of the reporting spreadsheet. Suggested emission factors will be automatically selected where data on the current land type, soil type, previous land type and area (in ha) are provided.

NB. The above only represents a basic method for estimating annual carbon sequestration and emissions from land. Given RCT may have significant land assets in scope, more detailed and specific methodologies are recommended for future reporting. An example of a more specific methodology can be found in the [Carbon Positive Report](#) produced by NRW.

5. Recommendations and next steps

Six key sources of emissions have been identified which should be considered priority areas for carbon reduction across RCT services and operation:

1. Emissions from Procured Goods and Services

- The emissions associated with the council's procured goods and services account for **36% of the overall footprint (38,016 tCO₂e)**.
- Emissions assigned to this category arise from the ~£135million RCT spend on various activities in 2019-20.
- 22% of these emissions have been mapped to building related repairs and maintenance services. The services under this category are provided by a wide variety of third party contractors and a range of sub service types. However, a shortlist of suppliers will be drawn out in phase 2 of this work to represent who significant areas of estimated emissions (who may form the basis of future supplier engagement work). Adult, social and child care services make up another significant proportion of emissions in this category and will also be the focus of more detailed analysis in phase 2 of this project.
- One key way which the council can reduce its Scope 3 emissions is through expanding its selection criteria for contractors to include sustainability metrics – for example minimum kilometres driven by Electric Vehicles in delivering the contract, or giving an X% weighting to environmental/social value in tender evaluation scoring.



2. Emissions from Capital Assets

- The emissions associated with the council's capital projects account for **27% of the overall footprint (28,310 tCO₂e)**.
- Emissions assigned to this category arise from the ~£75million RCT spend on construction activities in 2019-20 (as categorised from the “works” categories provided by RCT).
- Emissions associated with this category will also form the basis of the second phase of work where Carbon Trust will conduct further analysis on the construction related spend data to pull out specific suppliers for engagement and develop suggestions for better carbon measurement and management of these emissions.
- As detailed on page 29, a number of top suppliers have already been identified and are likely to be the focus of future work.
- Similarly to emissions associated with procured goods and services, by expanding its selection criteria for contractors to include sustainability metrics, RCT should move towards working with construction contractors who are also taking their sustainability journey seriously. They should also be able support RCT with their move towards Net zero by providing better information related to carbon within their construction activities and work with RCT to design and deliver lower carbon buildings and infrastructure.



Six key sources of emissions have been identified which should be considered priority areas for carbon reduction across RCT services and operation:

3. Gas consumption emissions

- The emissions associated with the council's gas consumption account for **13% of the overall footprint (13,590 tCO₂e)**.
- 34% of gas emissions are associated with consumption at only 12 of RCT sites (of 242 sites) and the top 50 sites, represent 66% of gas consumption emissions.
- As the national grid decarbonises, it is recommended that heat sources are generally electrified where possible (e.g. by the installation of heat pumps). This will help to reduce gas consumption significantly and the emissions associated with heating RCT operated buildings.
- RCT should continue to review all gas systems annually and implement upgrades where energy/carbon savings potential is identified.
- At leisure centres and large schools in particular, RCT should ensure that all equipment is running as efficiently as possible in order to reduce emissions. Examples of measures that can be implemented in order to reduce emissions include the installation of a heat exchanger which recovers waste heat to provide space heating to localised demand needs.



4. Electricity consumption emissions

- The emissions associated with the council's electricity consumption account for **8% of the overall footprint (7,863 tCO₂e)**.
- 33% of electricity emissions are associated with consumption at 10 of RCT sites and the top 50 represent 67% of electricity consumption emissions (inc. streetlighting)
- Energy efficient LED lighting should be installed where it hasn't been already, as well as measures such as installing presence detection to reduce electricity consumption.
- Street Lighting has the highest electricity consumption at 11%, this is all now LED's with control regimes in place.
- Offices make up the majority of the highest consuming buildings, for these buildings, internal servers can be a highly consuming source, wherever possible cloud-based systems should be used. LED's and presence detection should also be installed wherever possible.
- For school buildings and leisure centres, lighting and small power should be assessed for areas where electricity consumption could be reduced (LEDs and presence detection installed where not already).
- Solar PV installation save 367 tCO₂e from the generated power used on site and further export an estimated 140 tCO₂e to benefit RCT's Net Emissions impact.



Six key sources of emissions have been identified which should be considered priority areas for carbon reduction across RCT services and operation:

5. Commuting emissions

- The emissions associated with the council's commuting activities account for **7% of the overall footprint (7,770 tCO₂e)**.
- A large number of assumptions was used to determine the above figure therefore the first task for RCT in this area is to conduct a more accurate assessment of commuting emissions in future years.
- Typically this is done through employee surveys to gather information related to the journey type (vehicles) frequency and distance in order to calculate the emissions from primary data rather than through proxies.
- The larger the survey sample size the better although it is likely that extrapolation of data will need to be carried out.
- Once a more accurate figure has been determined then high consumers can be targeted for incentivisation for remote working, car sharing and shift towards lower carbon forms of transport. It is not possible to pinpoint carbon hotpots within commuting with the current data.



5. Fleet emissions

- The emissions associated with the council's fleet account for **7% of the overall footprint (7,176 tCO₂e)**.
- Unclassed large vehicles and refuse vehicle's make up 44% of emissions in this category.
- Tipper vehicles, vans and Sweepers make up a further 22% of emission within this category.
- Schools vehicles, cars, minibuses and 4x4s only make up 5% of emission from fleet.
- Carbon Trust understand that work is being conducted by ULEV to produce detailed analysis and recommendations on decarbonising RCTs fleet.
- Whilst larger vehicles and waste collection operations are seen as much harder to decarbonise elements of local authority fleets, there are various emerging examples of ways that councils are making moves to switch to low carbon alternatives utilising biofuel, hydrogen and electrified versions emerging on the market. A number of EV large vehicle and waste collection fleets are emerging which whilst have upfront high costs, show excellent returns over the lifetime with much lower maintenance costs and improved air quality, safety, comfort and user satisfaction levels.



The total footprint from **natural gas and electricity consumption** across RCT operated sites is **21,453 tCO₂e**. These emissions account for approximately 77% of direct operational emissions across RCT (excluding scope 3 emissions). Prioritising carbon reduction measures across operational sites will be key for RCT in the short-term as they work towards reducing operational emissions.

Energy efficiency

- More efficient heating and cooling systems
- More efficient lights
- Premium efficiency equipment

Reduce demand

- Improved management practices
- Better operational procedures
- Measurement, monitoring and targeting

Renewable generation

- Non-fossil fuel sources
- Decentralised energy
- Solar/Bio-Fuel/Wind

Low carbon generation

- High efficiency fossil fuels
- Decentralised energy
- Combined Heat and Power, Heat Pumps.



Next steps – data quality and reporting

Quality and expansion of footprint data

- To improve the accuracy of the overall carbon footprint, RCT should aim to enhance the data used for their scope 1, 2 and 3 carbon footprint measurement.
- RCT should ensure that actual consumption data for gas, electricity and water is always available for each building and site. In the absence of consumption data for a number of sites, assumptions can be made using industry benchmarks to calculate overall emissions. However efforts should be made to collect primary data, which will yield more reliable results and reduce uncertainty.
- Obtaining individual vehicle-level data relating to fuel consumption (not just mileage) should also be a priority for RCT moving forward (fleet, business travel and commuting). Keeping up to date records of fuel consumption will help to provide a more reliable indication of those vehicles that are emitting the most emissions, and therefore where efforts to reduce emissions should be prioritised.
- In relation to scope 3 emissions sources, specifically data used to measure emissions from procured goods and services and capital projects, RCT should move away from using expenditure proxies and begin working closely with contracted suppliers to obtain more accurate information on the scope 1 and 2 emissions of specific services. Phase 2 of this work will provide more detail on this.
- RCT should also look to improve the accuracy of first-hand data-sets used to calculate the emissions associated with employee commuting and business travel. The implementation of a staff survey, for example, would help to consolidate key information that could be used for such calculations e.g. mode of transport and distance travelled.
- RCT should may also consider expanding their scope 3 footprint to include emissions from investments in the future.

Monitoring

- RCT should aim to complete a carbon footprint at regular intervals (i.e. annually) in order to demonstrate progress in carbon reduction. This will be a requirement of Welsh Government through the “Welsh Public Sector Net Zero Carbon Reporting Guide”. Note that the approach taken in this footprint aligns with the same principles of the guide.
- As RCT becomes increasingly familiar with the process required to complete a carbon footprint, and is able to instil a strong data collection framework, they can begin to look to expand their footprint to cover all emission sources and revisit existing sources to make them more accurate and less reliant on proxies.
- Fundamental to this is establishing clear roles and responsibilities for the different areas of data collection feeding into the footprint – i.e. electricity, gas, business travel, water, waste, leased buildings.
- RCT should use the findings of this footprint report to drive organisational change across the council and reduce overall emissions.
- In addition to monitoring the footprint itself, RCT should continually monitor how national and local plans and policies will affect RCT’s footprint and influence the ability to reach carbon reduction targets. This will help to identify other potential carbon reduction opportunities and ensure that any carbon reduction co-benefits of specific policies can be delivered.

6. Appendices

Appendix 1. Key Data Sources

- Copy of Carbon Trust Report - all spend FY 1920 (after exclusions) – RCT PG&S and capital projects data
- Masterspread subcontract - Amgen data second cut - RCT waste data
- Trade Data _ waste - RCT waste data
- RCTCBC Carbon Footprint Profile - School Vehicles - RCT fleets data
- Copy of Water Consumption 2019 - RCT water data
- Copy of RCTCBC Energy Carbon Footprint Data Collection Form @ 25th Feb 21 - RCT various data
- Copy of BlueGEN CHP Gas Data – RCT CHP data
- RCT - All Vehicles – RCT fleet data
- Master spread subcontract - Amgen data first cut – RCT waste data
- Refrigerant Leakage Data 2019-20 – RCT F-gas data
- S Locke_Adresses_12.02.21 – RCT commuting data
- Bunked fuel issues 2019-20.xls - RCT land use data
- All sites-hectares.xls – RCT land use data
- Building energy benchmarks – Chartered Institution of Building Services Engineers (CIBSE)
- Government conversion factors for company reporting of greenhouse gas emissions for the year 2019 – [BEIS](#)

Appendix 2. Excluded emission sources

Scope 3 emissions are emitted by third-party operations and therefore are generally more difficult to monitor, control and reduce. However, there is now increasing appetite to include more scope 3 emissions in footprints to encourage carbon reduction in an organisations' supply chain.

Some emission categories are not relevant to Local Authority operations and have therefore been excluded from this footprint. In future, RCT could consider expanding it's boundary to include emissions from investments. This would require additional data.

	Emission Source (Scope 3)	Assessment
Upstream	Upstream transportation and distribution	Included elsewhere
	Investments	Not measured
Downstream	Downstream transportation and distribution	None anticipated
	Processing of sold products	None anticipated
	Use of sold products	None anticipated
	End-of-life treatment of sold products	None anticipated
	Downstream leased assets	None anticipated
	Franchises	None anticipated

Appendix 1. Glossary

Term	Explanation
Activity	An action that leads to emissions of greenhouse gases. Examples include combustion of fossil fuels for heat, generation of electricity, transport, treatment of waste and wastewater, and 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.
BEIS	Department for Business, Energy & Industrial Strategy
Emission(s)	In the context of this report emission refers to carbon emission (equivalent)
Heat Pump	Heat pumps extract free heat from the soil, ambient air, or a body of water. This heat is then transferred for domestic use with the help of an electric compressor
tCO₂e	One ton of carbon dioxide equivalent
WG	Welsh Government

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