2020

Swale Borough Council

CLIMATE ACTION PLAN

STATUS: FINAL ISS3

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1. Executive Summary

This Climate Action Plan forms the first step in Swale Borough Council's (SBC) climate emergency response and sets out a number of strategic actions that SBC should work towards in order to achieve their carbon reduction target by 2025. SBC's ambition to reduce organisational carbon emissions is highlighted in their recent climate emergency declaration, which introduces the targets of making SBC's own operations carbon neutral by 2025, alongside facilitating the actions required to move the whole borough of Swale to carbon neutrality by 2030.

In response to the pressing need to act on climate change highlighted by the special report from the IPCC in 2018[1], local authorities are now taking the necessary steps to declare climate emergencies, recognising the need for action at the local level. Many declarations from local authorities, including that of SBC, have included targets that are more ambitious than the national 2050 net zero emissions target, recognising the urgent need to act now against the causes and impacts of climate change. This Climate Action Plan is an important first step for the council towards meeting their 2025 carbon neutral target providing SBC with an initial outlook on the strategic actions that should be considered in order to meet this target.

Building on previous carbon management efforts, this report outlines SBC's vision for managing and reducing emissions arising from operational activities over the next five years. If the 2025 target is achieved, this will contribute to annual carbon savings of approximately 2,588 tCO_2e (2018/19 baseline figure outlined in this report). Achieving these ambitions will solidify SBCs recognition of the wider climate emergency we are all facing whilst showing the council's local leadership role towards climate change action.

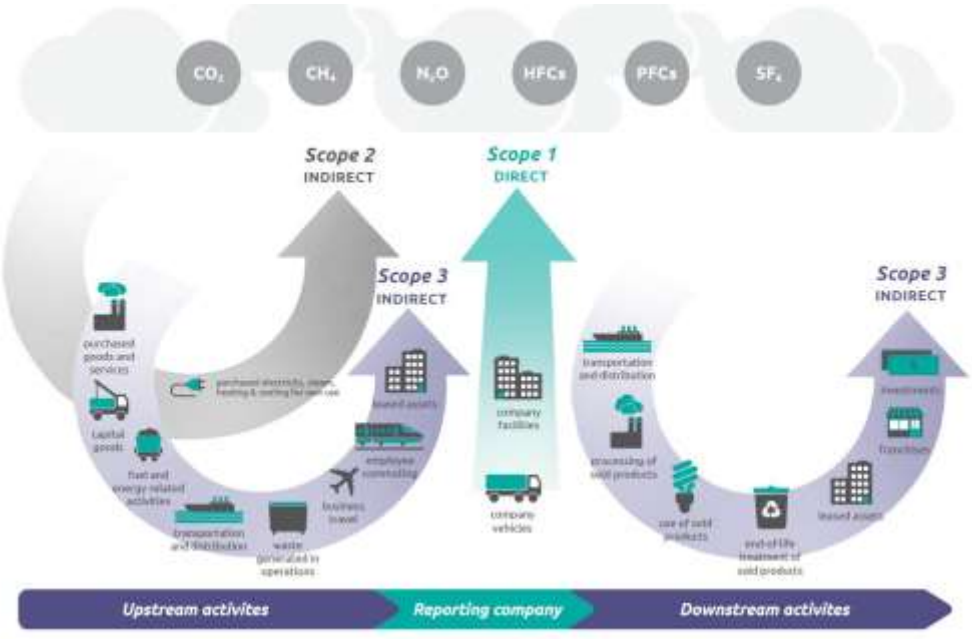


Figure 1: Overview of the World Resources Institutes GHG Protocol accounting methodology.

[1] https://www.ipcc.ch/sr15/

The Greenhouse Gas (GHG) inventory presented in this document has been compiled in accordance with the World Resources Institutes globally recognised accounting methodology, the Greenhouse Gas Protocol (GHG Protocol), which covers the accounting and reporting of seven GHGs covered by the Kyoto Protocol (Figure 1). This is the de-facto standard used by the majority of organisations around the world for carbon emissions accounting.

The following charts provide a high-level overview of SBC's carbon footprint for 2018/19. Scope 1, 2 and 3 emissions relate to the categories outlined in figure 1. For a full breakdown of emissions sources included please refer to section 4.

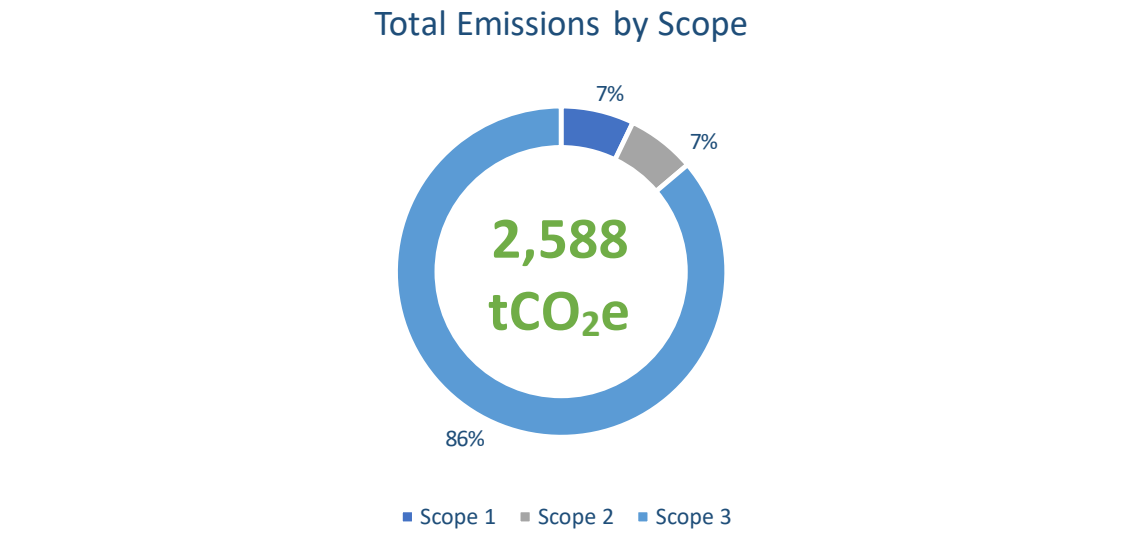


Figure 2: SBC emissions broken down by scope 1, 2 and 3.

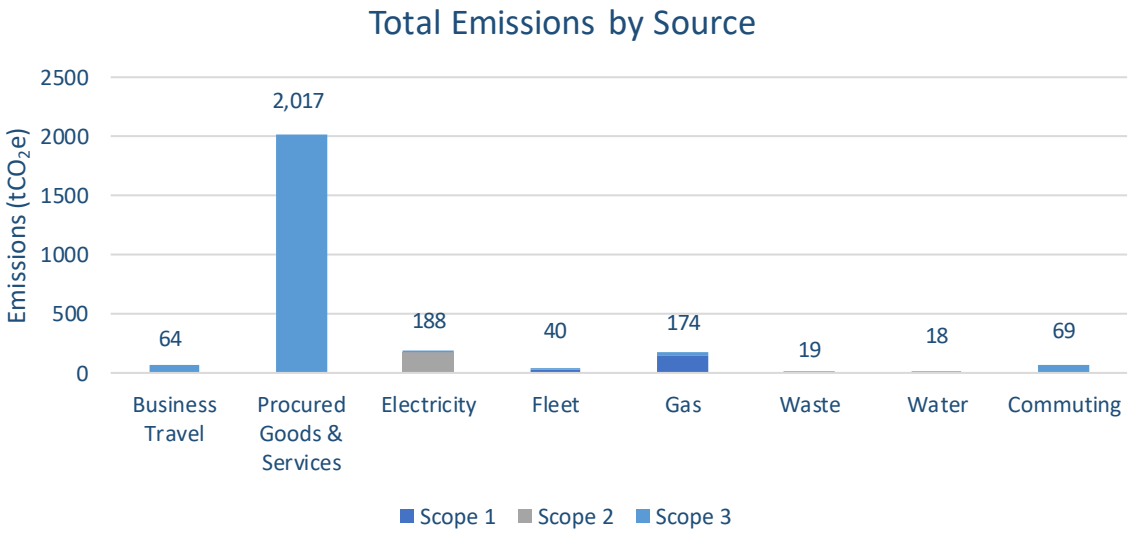


Figure 3: SBC emissions broken down by source and scope

The footprint developed for SBC includes emissions from scope 1 and 2 sources, alongside selected scope 3 elements (Table 1). The decision was made to include these elements of the council's footprint based on the availability of suitable data-sets that could appropriately be used to calculate an accurate

footprint. The produced footprint totals 2,588 tCO_2e for 2018/19, this has been further analysed in terms of its scope and its source. The majority of emissions are scope 3 and arise from SBC's supply chain – most notable "procured goods and services". Such high emissions from this source is fairly typical for a council and represents the large number of upstream activities that councils procure, contract out or purchase. These typically include building maintenance contracts, waste contracts, and environment and facilities management etc. Scope 1 and 2 emissions, those that the council have direct control over, account for 14% of total emissions; almost all of this is from energy usage within Swale House and the council owned and operated fleet of vehicles.

Scope 1	• *Natural Gas* • *Fleet*
Scope 2	• *Electricity*
Scope 3	• *Water* • *Operational Waste* • *Upstream Fuel and Energy Activities* • *Employee Commuting* • *Business Travel* • *Procured Goods and Services*

Table 1: Footprint Boundary for Swale Borough Council

In order to reach a carbon neutral target by 2025, the council would need to reduce scope 1 and 2 emissions by approximately 51 tCO_2e per year, and scope 3 emissions by 319 tCO_2e per year (average annual reduction from 100% down to 0%[2]). The following carbon reduction projects and opportunities have been identified. These projects will assist SBC on the pathway towards carbon neutrality.

1. Swale House deep refurbishment project
2. Transition of council's own vehicle fleet to Electric Vehicles
3. Improving waste management of council's own waste
4. Sustainable contracting

The projects identified in this plan have the potential to reduce SBC's emissions by a cumulative figure of 1,115 tCO_2e per annum by 2025. This equates to a total reduction in emissions of 43% between 2018 and 2025[3]; this reduction can be broken down in to scope 1 & 2 emissions (90% reduction) and scope 3 (35% reduction). The substantial difference in percentage reductions between the scopes comes down to the greater ability for the council to influence its scope 1 & 2 emissions compared to scope 3. The outlined projects do not, however, allow the council to reach 'neutral' emissions – there is a gap to target of 1,473 tCO_2e. It is likely that to reach the council's ambition of being carbon neutral they must look to offset this 'gap to target'.

[2] Doesn't factor in any offsetting

[3] This percentage reduction considers the effects of proposed projects AND the decarbonisation of the UK electricity grid

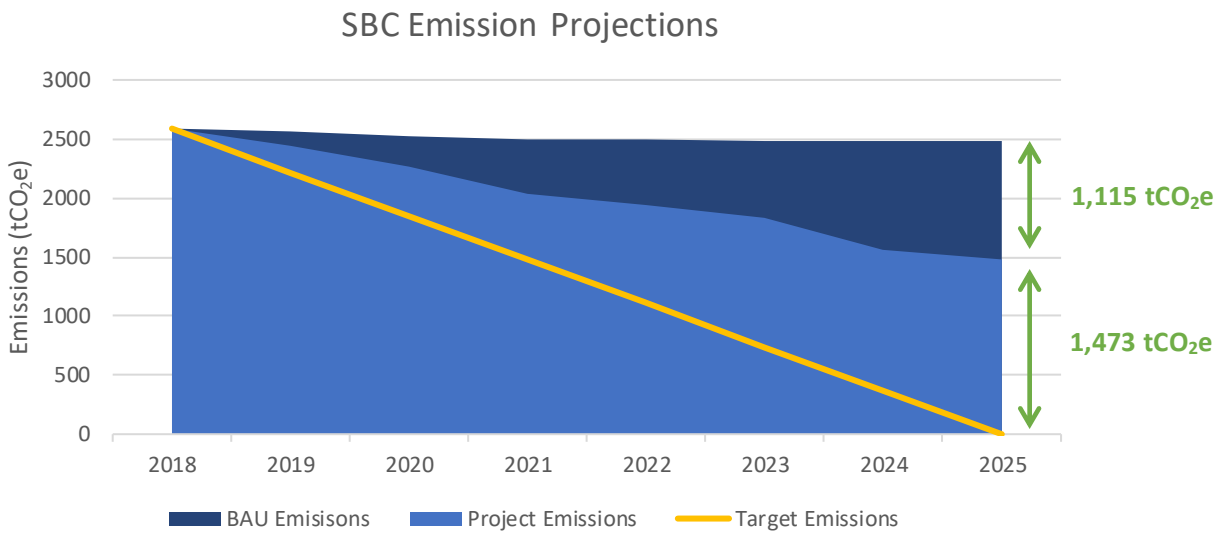


Figure 4: Projection of total SBC business as usual emissions (including grid decarbonisation), the effect of proposed projects and the carbon neutral target. NB. projected grid decarbonisation is included within the above BAU pathway.

The cost of implementing the projects in this plan has been estimated at £2, 473,329 with anticipated financial savings of £66,376 per annum. If all the projects in this plan are implemented, the overall payback period on the capital investment has been calculated as 37.3 years. This level of payback may have previously been considered to be too long a time period to be classed as 'cost effective'. However, the projects outlined within this report go beyond the typical 'low hanging fruit' and address the fact that the council must take urgent action if they are to be realistic in meeting their carbon neutral by 2025 target.

In addition to the carbon reduction projects outlined within, it will be crucially important that SBC ensure robust organisational procedures are put in place to maintain a focus on carbon reduction over time. In order to achieve a carbon neutral target, the Council will have to consider dynamic organisational structures to ensure that they remain flexible in the approaches being taken to tackle climate change. A key starting point for the council to focus on will be to enhance knowledge sharing across internal teams, and to make sure that carbon reduction is embedded across the council in the first instance.

Closely aligned to strong governance is the essential monitoring and reporting of overall progress against pre-determined targets, which forms an intrinsic part of this Climate Action Plan. Once a carbon footprint has been measured and a target set, a key part of the implementation phase is to ensure that progress is being made against the desired target. Monitoring and reporting is an essential activity that should be undertaken at least annually between the baseline year and target year, and indeed after the target year too.

Depending on the outcome of future project feasibility[4] and further work to ascertain more accurate estimates on the suggested projects carbon savings, to meet a carbon neutral target by 2025, the council will very likely need to consider offsets. Currently the amount to be offset (based on implementation of projects in this plan and nothing further) is estimated to be 1,473 tCO_2e per year.

[4] Additional "rounds" of project development should be conducted beyond the initial phase of development outlined in this report. This should be carried out on annual basis by the councils working group in order to update the project pipeline and this document. The carbon reduction process should be treated as an ongoing iterative process and not a one-off fixed exercise.

from 2025 onwards. The council can achieve this through a variety of measures including tree planting, and offsetting schemes. This will come at a cost to the council and it is recommended that as much should be done as possible to reduce operational and organisational emissions before looking to offset.

Next Steps

Building on the analysis and suggestions provided throughout this action plan, it will be important for SBC to conduct a further, more detailed feasibility assessment of individual project opportunities. This will ensure that the council is able to appropriately quantify and take forward the provisional opportunities identified within. Considering the current emissions 'hot spots' (Swale House, fleet, waste, and supply chain), SBC should prioritise and coordinate efforts towards one element of emissions sources in the first instance, and use the contents of this Climate Action Plan to drive further iterations of project development.

A suggested approach that the council should look to follow as an immediate next step is to use the contents and quantifications (energy, carbon and cost saving potential) provided throughout this document as a key business case for action going forward. The results within should be clearly communicated and shared with key decision makers from across the organisation, and should be used as a basis through which further project development and feasibility analysis can be completed. Putting in place an immediate plan that builds on the findings of this Climate Action Plan will help to ensure carbon reduction remains a key part of the council's agenda going forward, whilst also allowing the necessary budgets and organisational structures to be developed accordingly.

2. Climate emergency context

Growing acknowledgement of the latest science and recommendations from the Committee on Climate Change has resulted in unprecedented recognition of the global climate emergency, and the need to act urgently in order to reduce carbon emissions to limit further global warming and associated environmental impacts. Global initiatives are now focused on limiting warming to well below 2°C, aligning to the pledges outlined in the Paris Agreement. Despite this, warming continues, with the impacts being felt both nationally and internationally. Across the UK, continued warming is projected to make winters warmer and wetter, and summers hotter and drier[5]. Sea levels will also continue to rise and threaten many coastal communities across the country. Many industrial and farming processes will also be affected by a continuation of rising temperatures, exacerbating impacts that warming will have on communities across the UK.

The UK Government declared a climate emergency in 2019, with the principle aim of achieving net zero emissions by 2050. In response, many local authorities across the UK have taken the necessary steps to declare a climate emergency, recognising the need for robust local action. The ambition of local authorities to take meaningful action on this issue is highlighted by the number of authorities who have pledged to achieve emissions reductions well in advance of the 2050 national target. The declaration of a climate emergency recognises firstly the crucial role that local authorities can play in helping to reduce both the causes and impacts of climate change, but it also provides local authorities with the opportunity to develop effective pathways towards reducing their emissions, which if successfully achieved, will help to reduce the impact on the climate at both the local and national scale.

Local authorities who have declared a climate emergency also now have an opportunity to facilitate action at the local level and play a key role in encouraging action across a variety of key stakeholders and organisations. Whilst the primary focus for local authorities when declaring a climate emergency should be on reducing carbon emissions, it also presents local authorities with several opportunities to develop robust strategic actions plans that will also deliver a number of co-benefits to both human and natural systems (Figure 4). This is reflected in the Council's original declaration, where a 'Climate and Ecological Emergency' has been declared, which recognises the need to protect natural systems and species from accelerated climate change.

Regarding the declaration of an ecological emergency, this is in growing recognition of the need to protect natural habitats and species diversity. Declarations of this nature provide the stepping stones towards ensuring that natural habitats remain undisturbed and continue to thrive despite on-going human developments. In July 2019, The UK Government announced that it would mandate 'Bio-diversity Net Gains' in the upcoming Environment Bill, giving greater responsibility to local decision makers to agree biodiversity issues relating to new developments. This therefore places a greater importance on robust local action as a means through which to improve the local state of biodiversity

[5] Met Office, 2019. UK Climate Projections: Headline Findings, https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/research/ukcp/ukcp-headline-findings-v2.pdf

e.g. Through ensuring that developers actually increase natural habitat and ecological features over and above that being affected as part of planned developments (net-gain)[6].

Figure 5: Key aspects of a Climate and Ecological Emergency Declaration

Key drivers for climate action

Considering the on-going climate emergency and need to reduce emissions, local authorities are now well placed to lead on the development of transitions towards a more sustainable, low-carbon economy. Opportunities exist for local authorities to lead the way in reducing emissions and to take ownership of this issue to ensure that organisations, businesses and residents across local areas are collectively working towards reducing their environmental impact. In addition to this, further drivers for local authorities to act on this issue are based around national legislation and regulation, organisational reputation and leadership, and the cost reductions that can be achieved through delivering robust action to reduce carbon emissions (Figure 6).

[6] CIEEAM, 2019. Biodiversity Net Gain, https://cieem.net/i-am/current-projects/biodiversity-net-gain/

Climate Legislation The updated Climate Change Act legislates that UK Government must reduce emissions by 100% in 2050 compared to 1990 levels. To meet this target, UK Government will undoubtly introduce new national legilsation that targets highly polluting sectors of the UK economy.
Cost saving Alongside meaningful emissions reductions, councils can also achieve significant energy and cost savings though improving the efficiency of their operations.
Regulation Building regulations contain requirements that relate to the conservation of both fuel and power. There are set minimum energy performance standards for new buildings and major refurbishments of existing buildings, which Swale Borough Council subsequently has to meet.
Leadership Taking strategic action towards reducing carbon emissions will ensure that Swale Borough Council can lead the way in developing effective mechanisms to tackle the climate emergency. This will help stimulate low carbon transitions across the regions in which they operate.
Reputation With the growing climate emergency, there is now an increasing pressure and requirement for local authorities to take an effective leadership role on climate action. Failure to act could lead to reputational risks and adversely affect Swale's public image.

Figure 6: The key drivers for climate emergency action

Recognising the importance of making sure emissions reductions must first come from local authorities themselves, many councils are now taking a much more strategic view of carbon reduction and are embedding changes across their organisation in order to achieve robust emissions reductions. Swale Borough Council therefore recognises the significant role it can play in helping to accelerate the national transition towards developing a low carbon economy.

3. Council target

Swale Borough Council have declared their intention to become a carbon neutral organisation by 2025. This carbon neutral target refers solely to the Council's own estate and operations; however, the Council would like to use their influence across the borough to encourage action across local organisations, businesses and key stakeholders. As a result of this ambition, Swale Borough Council's motion to declare a climate and ecological emergency includes the aim of making the entire borough carbon neutral by 2030.

This climate emergency target builds on the previous Carbon Management Plan for Swale Borough Council, completed in 2009, which detailed a plan of action for the Council towards achieving a target of reducing their own CO_2 emissions by 20% by 2012-13. Focusing on scope 1 and 2 emissions, the Council were able to achieve a 19% reduction in emissions by 2012-13, through a combination of national grid decarbonisation, alongside actions across a number of key council departments, most notably across property services.

The ambition of Swale Borough Council to achieve a carbon neutral target goes well beyond what the Council has previously sought to achieve, highlighting the intention of the council to act against the causes and impacts associated with climate change. The Council must now work towards rapidly reducing its footprint in order to achieve this target, building and accelerating on the emissions reductions that have previously been achieved throughout the organisation. This document details initial actions and key mechanisms required in order to work towards achieving carbon neutrality by 2025.

Carbon Neutral

It is important to identify and define what carbon neutrality means for an organisation in the first instance. Achieving carbon neutrality generally involves implementing a carbon reduction and management plan. The planning stages of this should clearly detail the actions required to reach carbon neutrality. A carbon neutral local authority is one that reduces the sum of its operational greenhouse gas emissions (CO_2e) as much as is practical to do so and then, offsets the residual emissions using natural carbon sinks and/or good quality offsets. Reasons for becoming carbon neutral are outlined in the box below.

Why Carbon Neutral?

1. **Deliver greater efficiency savings** – developing a carbon neutral approach will allow the Council to identify carbon hotspots, firstly prioritising efforts and reductions on areas of the council that are the most carbon intensive
2. **Enhance reputation** – enhance the Council's green credentials and showcase the ambition of the Council to lead the way in tackling climate change
3. **Drive local change** – successfully achieving a carbon neutral target will allow the council to positively influence stakeholders and businesses across the local area, contributing to borough-level changes and emissions reductions.

4. Carbon Footprint

In order to reduce emissions effectively, it is critical to have a reference point to start from, thus it is integral to understand what current emissions sources are present, how large they are, and who is responsible for them.

This section provides an inventory of Swale Borough Council's greenhouse gas emissions for the 12-month period covering the financial year 2018/19, which forms the baseline against which future progress will be evaluated.

Scope

The globally accepted carbon accounting standard known as the World Resources Institute (WRI) Greenhouse Gas (GHG) Protocol defines direct and indirect organisational emissions as follows:

- Direct GHG emissions are emissions from sources that are owned or controlled by the reporting entity.
- Indirect GHG emissions are emissions that are a consequence of the activities of the reporting entity, but occur at sources owned or controlled by another entity.

The GHG Protocol further categorises these direct and indirect organisational emissions into three broad scopes:

- Scope 1: All direct GHG emissions.
- Scope 2: Indirect GHG emissions from consumption of purchased electricity, heat or steam.
- Scope 3: 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, electricity-related activities (e.g. T&D losses) not covered in Scope 2, outsourced activities, waste disposal, etc.

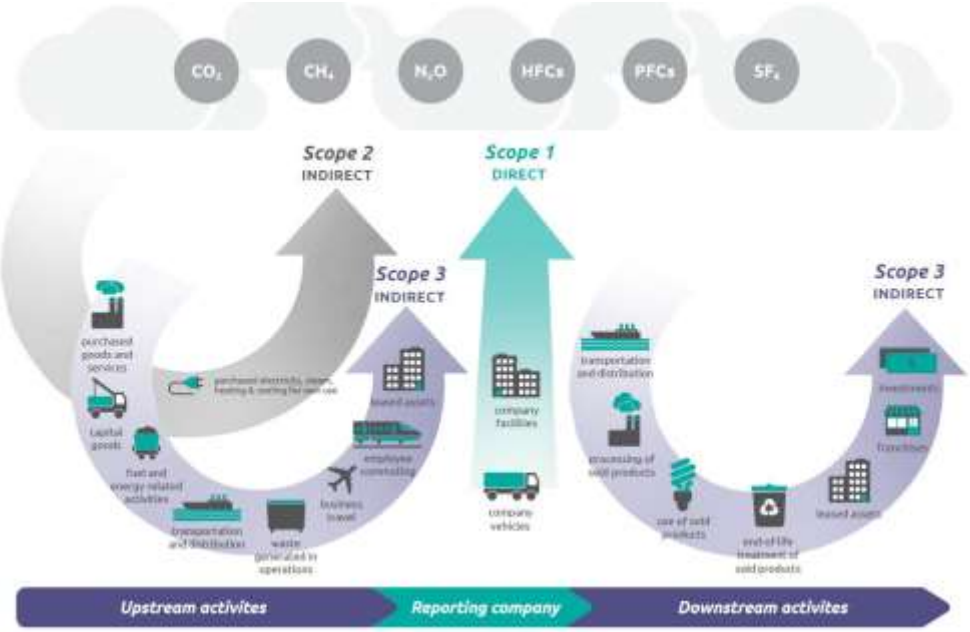


Figure 7: Overview of the World Resources Institutes GHG Protocol accounting methodology.

Within previous plans, the focus has been primarily on the energy consumption associated with the council's own estate (i.e. the area of direct management control and influence over) but it is recognised that there are other emission sources associated with our operations. Thus, scope 1, 2 and the majority of relevant scope 3 emissions sources have been investigated and quantified within this initial planning phase.

As the council familiarises itself with the "enhanced" emissions accounting methodology and builds up a stronger internal system of data gathering, SBC will look to expand the scope of its emissions inventory to include all possible emission sources.

The emission sources included in the 2018/19 baseline are listed below, divided into Scopes 1, 2, and 3 in accordance with the standard, to enable comparison with other organisations.

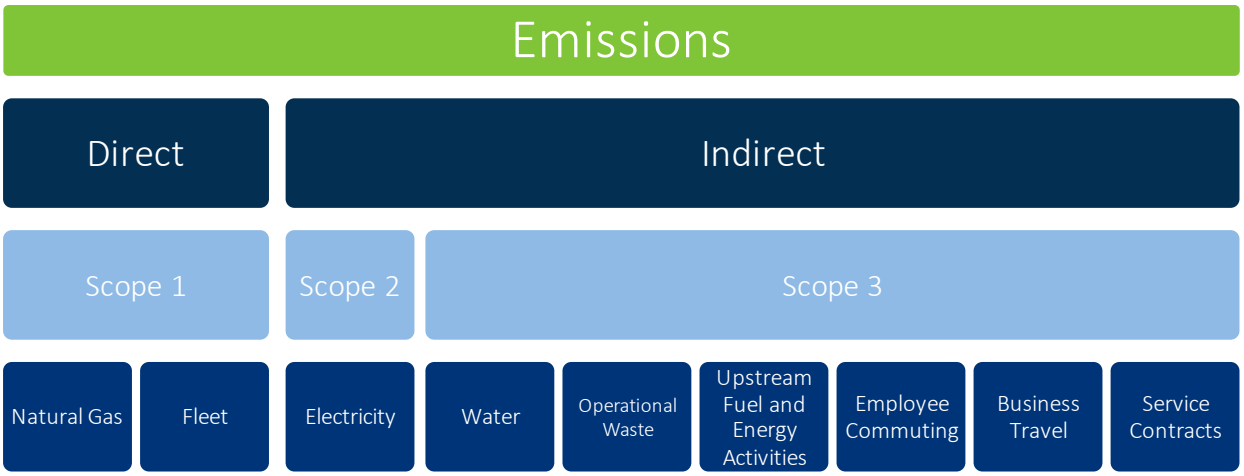


Figure 8: Emission source categorisation in line with GHG protocol

Methodology

In order to calculate a carbon footprint there are two primary inputs, the 'activity' or volumetric data and the associated emission factor. Activity data is the quantification of the action of the emission source, whether that be kWh of electricity consumed or kilometres driven by a vehicle. The emission factor is the metric of kg of CO_2e produced by one unit of the associated activity. Emission factors are provided for a range of activities by the department for business, energy and industrial strategy (BEIS); these factors are updated annually where required.

Numerous other activities are more abstract and require a proxy to either transform the activity data in to a value that can be used with a BEIS emission factor, or a proxy emission factor to use with the available activity data. An example of the former would be using the floor area of a building as activity data, then benchmark data of electricity consumed per m2 as a proxy and finally combine this with the BEIS emission factors. Another example is to use contract values (£) as activity data and a proxy economic based emission factor (in this case EEIO[7]).

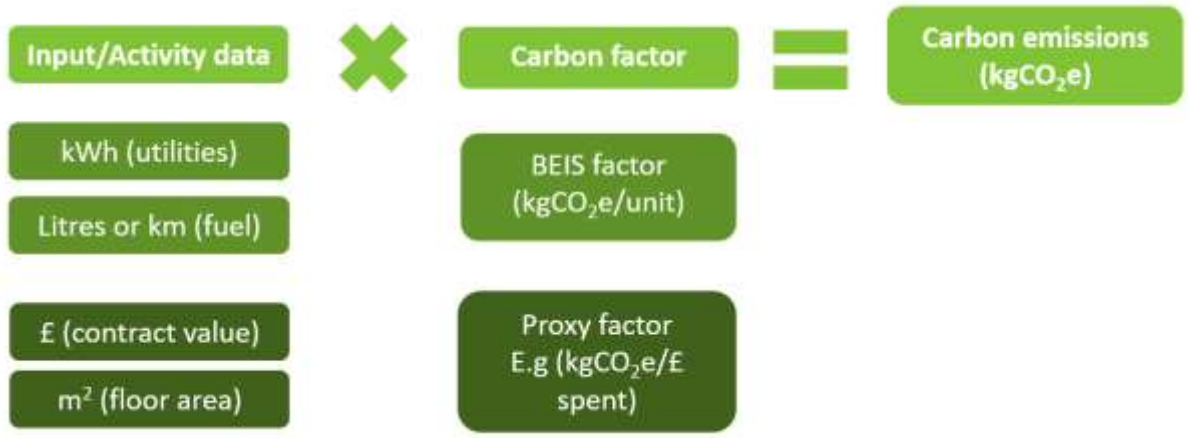


Figure 9: Graphic detailing general calculation methodology to arrive at carbon emissions

Environmentally Extended Input Output

Environmentally Extended Input-Output (EEIO) factors use expenditure mapped to broad economic sectors to provide a proxy for carbon emissions. The methodology developed by the World Resources Institute and Carbon Trust, allows for the calculation of emissions produced for over 19,000 specific goods and/or services, which are linked to 430 broad economic sectors for which emission factors per pound (£) of expenditure are available.

It should be noted that EEIO values provide emissions for sector specific goods/services within broad economic sectors but not for the exact individual goods/services. This means that although being able to provide a broad, first iteration emission value; it is not exact – further analysis of the operations of an individual goods/services are needed to determine a more precise footprint. EEIO factors should only be used where first hand activity data is unavailable / difficult to obtain. These factors have therefore only been used for the councils procured goods and services.

[7] EEIO (environmentally extended input output)

Footprint

The inventory is a record of SBC's greenhouse gas emissions in the 12 month period covering April 2018 to March 2019 (inclusive).

Greenhouse gas emissions are reported in units of carbon dioxide equivalents (CO_2e). This allows the impact of each of the seven main greenhouse gasses to be expressed in terms of the amount of CO_2 that would create the same amount of warming, allowing easy comparison of the impact of different emission types. Throughout this report, all greenhouse gas emissions are given in terms of carbon dioxide equivalent.

Swale Borough Council Footprint

In 2018/19 approximately 2,588 tCO_2e were emitted from the council's own operations and associated supply chain activities. Over 86% of emissions arose from scope 3, supply chain emissions – primarily as a result of the contracts held for procured goods and services. Energy consumed within Swale House itself accounted for approximately 12% of the council's entire scope 1, 2 and 3 footprint.

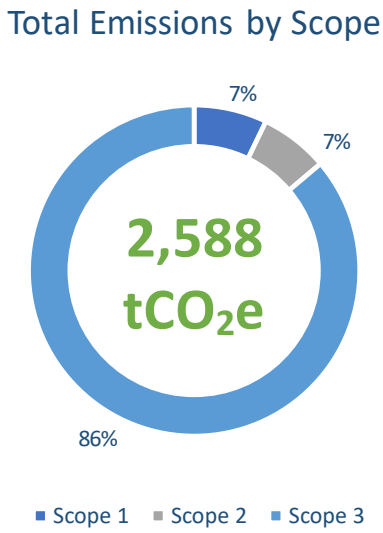


Figure 10: SBC emissions broken down by scope 1, 2 and 3.

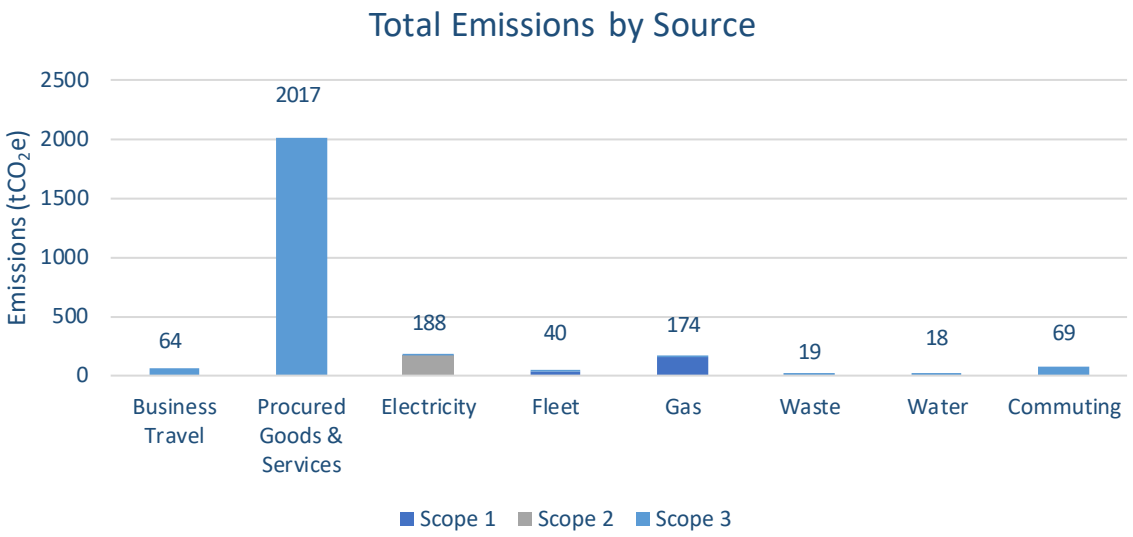


Figure 11: SBC emissions broken down by source and by scope 1, 2 and 3.

The produced footprint totals 2,588 tCO2e for 2018/19, this has been further analysed in terms of its scope and its source. It is clear that the majority of emissions are scope 3 and arise from SBC's supply chain – most notable 'procured goods and services'. Such high emissions from this source is fairly typical for a council and represents the large number of upstream activities that councils procure, contract out or purchase, these typically include building maintenance contracts, waste contracts, and environment and facilities management to name but a few. For Swale borough council the contract with the greatest carbon footprint is 'waste management', this accounts for 59% of the entire procured goods and services footprint. The 'waste management' emissions also only consider the operation of waste refuse vehicles, and not the treatment and storage of the waste itself which falls out of scope of Swale Borough Council.

Commuting and business travel are the other two significant sources of scope 3 emissions, representing just over 5% of SBC's total emissions. Although they fall within the scope 3 categories, the council still has reasonable influence over these through company policy.

Scope 1 and 2 emissions, those that the council have complete control over, account for 14% of total emissions; almost all of this is from energy usage within Swale House and the council owned and operated fleet of vehicles. It should be noted that within electricity and gas consumption there is a small amount of associated scope 3 emissions, these are 'upstream fuel and energy related activities', and relate to the processing, transformation, refining, production and transport & distribution of gas, other fuels and electricity.

5. Carbon Reduction Opportunities

The following section details a provisional list of opportunities identified for carbon emissions savings and the sustainable practices that Swale Borough Council should prioritise for implementation.

By setting a 2025 carbon neutrality target, over 515 tCO_2e will need to be saved each year across scope 1, 2 and 3 on average[8] . In order to achieve this reduction, a provisional list of carbon reduction projects has been identified in this initial planning phase. Four overarching projects have been quantified in terms of energy, carbon and cost saving potential. These projects cover emissions 'hot spots' and relate to: energy consumption in Swale House, fleet electrification, SBC's own waste management, and supply chain. These projects are summarised below:

Project	CAPEX (£)	Financial Savings (£/yr)	Carbon Savings (tCO_2e/yr)	Simple Payback (yrs)
Swale House Refurbishment	£2,342,529 (inc. installation and building costs)	£56,289	194 tCO_2e	41.6 yrs
Fleet Electrification[9]	£130,800	£10,087	26 tCO_2e	12.1 yrs
Waste Management	-	-	6 tCO_2e	-
Sustainable Contracting	-	-	780 tCO_2e	-
Total	**£2,473,329**	**£66,376**	**1,006 tCO_2e**	**37.3 yrs**

Table 2: Summary of capital costs; and energy, carbon and cost savings for proposed projects.

Swale House Refurbishment

Swale House is the operational headquarters for SBC, with approximately 243 full time equivalent staff operating out of the building. The building is deemed a public space with a total usable floor area of 7,063 m^2 and thus is required to have a DEC (display energy certificate) certificate. It is of a 1980's office block design, and has undergone only minor refurbishment to both layout and building service systems since construction (namely boiler upgrades and solar film installation on windows). Despite the building attaining an energy rating of 'D', ranking it as performing "average", anecdotal evidence suggests that there are numerous issues with building services resulting in occupant discomfort – highlighting the potential for energy performance improvement.

[8] Doesn't include any allowance for net accounting/offsetting.

[9] Reflects leasing arrangement only – see table on page 21 for further details

The council has expressed a desire that Swale House undergoes refurbishment to make it a 'zero carbon' building. In practice, this is unlikely to be fully achieved through refurbishment alone with only a handful of meticulously designed new builds achieving this status. Thus, the Carbon Trust has considered and quantified what is believed to be "reasonable" for a building of this age and design in reducing its carbon footprint[10]. It is anticipated, however, that through substantial fabric and building service upgrades, coupled with onsite renewables, the total energy footprint could be reduced by almost 70% (165 kWh/m2 to 45 kWh/m2) – achieving a DEC rating of approximately 'A'/'B'. The following measures have been considered within the Swale House refurbishment project:

i) Cladding

The majority of heat lost to the environment is through the building's walls and roof; by installing external cladding, it is possible to reduce heat loss through conduction and infiltration (drafts) by almost 75%. It is proposed to install cladding that will bring the building's level of heat loss in line with 'CIBSE Part L' guidelines for a high performing new builds. This type of work can generally be carried out with minimal disruption to business and operations.

BEFORE

AFTER

[10] At reasonable cost.

Figure 12: Before and after photos of cladding installation at RAL site, Didcot, Oxfordshire.

ii) Glazing

As part of the external cladding upgrade, it is also proposed that the council replace their current single glazed, metal frame windows with modern triple glazed, argon filled, low emissivity windows. Once again, significant energy savings are available, with the potential to reduce heat loss through windows by almost two thirds. Further savings can be made by reducing the amount of glazed area too, this could be seen as a viable option if a lighting upgrade is put in place (LED lighting offer a better quality of light compared to current fittings).

Upgrades to the fabric (glazing and cladding) should be considered as priority items for any refurbishment, these energy efficiency measures would be able to provide a significant reduction in heat demand. This means that any future heating system installed should be smaller (lower required capacity) and thus cheaper to buy and operate.

iii) Lighting

LED lighting offers significant energy savings over typical fluorescent tube lighting, furthermore the quality of light produced and types of fittings available can make for a more attractive, exciting and comfortable working environment. Furthermore, it is more cost effective to replace current fittings immediately with LEDs as opposed to waiting for current units to fail.

Alongside upgrading the lighting itself it is important to consider an appropriate control system. Installing daylight and/or occupational sensors can ensure that lights are not turned on inappropriately or left on at the end of the working day or over weekends. Such systems are cost effective and a useful means of reducing electricity demand.

iv) Heating Ventilation and Air Conditioning

Through fabric and glazing upgrades, the actual heat demand for the building will be significantly reduced, meaning the current boiler will be oversized and won't run at peak efficiency. To capitalise on the lower heating demand, and the falling carbon intensity of grid sourced electricity it is proposed that a new HVAC system be installed with heat provided by heat pumps and distributed through mechanical ventilation. Such a system would require significant investment, detailed planning, and space for internal ductwork and rooftop plant.

Heat pumps are far more efficient at transforming input energy in to heat, a typical air source heat pump can provide three units of heat for every unit of input electricity, whereas a boiler typically provides only 0.9 units of heat for every input unit of natural gas (less than 100% efficient). Despite the energy and carbon savings, the system however is not likely to be deemed 'financially viable' as the cost of electricity is of 4 to 5 times that of natural gas; however, if electricity is generated on site then heat pumps can be seen as an attractive option. For the purpose of quantifying savings, it is assumed an air source heat pump would be installed with a minimum operational seasonal coefficient of performance of 3.4 (conservative estimate).

Heat pumps are ideal for supplying constant, low temperature heat (approx. 40^{o}C), and thus well suited to providing space heating. Given space and construction constraints it would be easier to install air source heat pumps (ASHPs), as opposed to ground or water source heat pumps; ASHPs can then transfer heat to the air and distributed through mechanical ventilation, or to water and distributed through a traditional wet heating system.

It is anticipated that a gas boiler would still be required to provide the higher temperature water that would be required for hot water services (HWS), although a boiler upgrade to a more modern, efficient model would still provide energy savings. Further measures to moderate flow rate and usage can reduce the heating load of a boiler for HWS.

v) Renewables

Swale House currently has a significant area of flat roof space (estimated to be 1,976m2), this lends itself well for the installation of roof mounted solar photovoltaics. It is anticipated that approximately 50% of roof space could be used to install solar PV, leaving ample space for any future plant and access. Such a system could generate 115,000 kWh of electricity a year, this could supply 25% of current electricity consumption. Once all other measures have been implemented (including moving to an electric based heating system) the solar PV and storage could supply 31% of all electricity consumption.

Given production of electricity may not always coincide with times of demand, it is recommended that a battery storage system is incorporated in parallel with solar PV additionally.

Solar photovoltaics have been selected over a solar hot water heating system for several reasons, although both systems have their advantage and disadvantages. Firstly, the electricity generated by solar PV can be used to provide energy to any building system not just heating services as would be the case with solar thermal. Secondly, electricity can be sold back to the grid, providing a potential source of revenue for Swale House. Lastly, the operation and installation of solar PV requires both less time and money than solar thermal systems, with failure rates much lower too.

However, it is recommended that the council complete an in depth assessment of both technologies and their applicability to Swale House to fully inform any decision making processes.

Summary

A summary of the suggested measures for a Swale House refurbishment, including energy savings and costs, can be found below:

Measure	CAPEX incl. installation (£)[11]	Financial Savings (£/yr)	Carbon Savings (tCO_2e/yr)	Simple Payback (yrs)	Priority
External cladding	£968,589	£19,397	69.1	49.9	High
Glazing upgrade	£565,299	£9,492	39.7	59.6	Medium
Lighting	£102,747	£10,117	19.1	3.7	High
HVAC (once fabric has been upgraded)	£346,695	-£1,753	31.6	N/A	Medium
Renewables and storage	£359,200	£17,253	32.6	18.6	Low
Other & Equipment	£-	£1,783	1.8	0.0	Low
Total	£2,342,529	£56,289	194	41.6	-

Table 3: Summary of individual measures within Swale House refurbishment project

Electric Vehicles

The current fleet operated by Swale Borough Council consists of 14 vehicles, comprised of a mix of diesel vans, pickup trucks and passenger cars. One electric vehicle already exists, as do two 22kW charging stations at Swale House. Vehicles typically have a lease of 3 to 4 years before being replaced, all vehicle leases will have been reviewed by 2022.

To quantify this project, it is assumed that all vehicles will be replaced by comparable electric vehicles (for a list of current and replacement vehicles see appendix 2), and the mileage per vehicle will remain constant. A summary of costs for four 22kW charging stations and increased leasing costs have been calculated and displayed below.

[11] All costs are provisional high-level estimates only. Further stages of feasibility should be progressed to obtain actual costs to take through to outline and full business case development.

Item	Cost (£/yr)[12]	Energy saving (kWh/yr)	Cost saving (£/yr)	Carbon Saving (tCO_2e/yr)	Payback (yrs)
Electric Vehicle leasing	£31,200[13]	94,986	£10,087	26.3	12.1
Charging Station	£1,500				
Total	**£32,700**				

Table 4: Summary of electric vehicle measures within overall electric vehicle project.

Waste Management

Waste production within Swale House by council staff and other occupants is approximately 53,000kg per year (358 kg of waste per employee), almost 60% of this is unrecycled waste and typically sent to landfill. The emissions resulting from landfill waste is 98% of total operational waste emissions (SBC only).

To reduce emissions as a result of waste disposal from Swale House an effective waste management protocol needs to be put in place. This should follow the simple waste hierarchy of 'Reduce, Reuse, Recycle'.

Reduce – Discourage printing unless absolutely necessary; encourage the use of digital, 'soft' note taking; introduce print release functions on printers; ensure double sided and half size pages are default printer settings; make better use of e-copies, skype and publication boards; bring in your own lunch in reusable containers.

Reuse – Use refillable printer cartridges, rechargeable appliances that don't use single use batteries, pens with refillables cartridges, use scrap paper for note taking, have glasses/mugs not plastic/paper cups.

Recycle – Make recycling bins more available throughout the workplace, including for food waste in kitchens. Educate staff on what should go in each recycling bin, introduce online training.

[12] All costs are provisional high-level estimates only. Further stages of feasibility should be progressed to obtain actual costs to take through to outline and full business case development.

[13] This value is the sum of the increase in costs of leasing electric vehicles over the current leasing cost for internal combustion engine vehicles. It is not the total the total cost of leasing electric vehicles. This is for a full four-year lease period.

Action:	Mass of Waste (kg)	% Waste to landfill	Emissions Produced (tCO_2e)	Emissions Saved (tCO_2e)
Current	53,000	59%	18.8	0
Reduce	47,700	59%	16.9	1.9
Recycle	47,700	45%[14]	13.1	3.8
Potential	**47,700**	**45%**	**13.1**	**5.7**

Table 5: Summary of effect of waste measures, organised by the waste hierarchy.

Procured Goods and Services

Emissions resulting from procured goods and services/contracts form a substantial segment of Swale Borough Council's organisational footprint (78% of total emissions in 2018/19 measured using EEIO proxy factors). These emissions are considered scope 3, they are not directly produced by the council, but the council is ultimately responsible for them. Such a significant proportion of emissions arising from procured goods and services is very typical of a council and a representation of the extensive work they carry out across the borough.

It is suggested that Swale Borough Council actively engage with their contractors and supply chain to a) start documenting their carbon footprints and b) ask contractors to set emissions reduction targets. Through these steps it is possible to acquire a more accurate picture of the individual contractors' emissions, an important activity to move away from the use of less accurate and representative EEIO values, as well as being able to forecast their potential emission reductions and thus the council's own.

Furthermore, not only should the council engage with current contractors, they should also set criteria when determining future contractors and suppliers. Such criteria should require that the suppliers/contractors report their scope 1 and 2 emissions; have an emission reduction target; acquire a certain amount of electricity from green tariffs; use electric vehicles; ensure suppliers assess their purchasers through the 'better buying index'.

The final action that the council can take is assessing the necessity of certain suppliers/contractors. Simply reducing the number of contractors/suppliers of the value/quantity of purchased goods and services will result in a scope 3 emission reduction. An example that reduces both waste emissions and contractor emissions, would be to assess the necessity of a supplier for paper or plastic cups.

If the council were to select and account for suppliers/contractors that are considered to represent 'best practice' then scope 3 contract emissions could be reduced by an estimated 39%[15].

[14] 45% is the current UK recycling rate according to DEFRA, hence SBC should aim to achieve this as a minimum. The UK is targeting 50% recycling by 2020.

[15] This is a high-level estimate based on emissions projections of similar contractors across the UK who report annually on their carbon footprint. This percentage saving should be refined through further feasibility with supply chain reduction activities / engagement with contractors on their carbon footprint reporting.

Gap to Target

Based on the potential projects and associated carbon reduction above, the council's footprint in 2025 could be reduced to 1,590 tCO_2e. When factoring in the decarbonisation of the electricity grid this further decreases to 1,473 tCO_2e. This equates to a total reduction of 35% and 43% respectively from the current 2018/19 value of 2,588 tCO_2e. Whilst such a reduction can be deemed excellent progress over a 5-year period[16] this still presents the council with a significant gap to close if they wish to achieve a carbon neutral target.

The effects of the projects on scope 1, 2, and 3 emissions can be seen in the graphs below. Considering scope 1 & 2 emissions only, it is estimated that a ~90% reduction between 2017/18 and 2025 is possible. (includes grid decarbonisation).

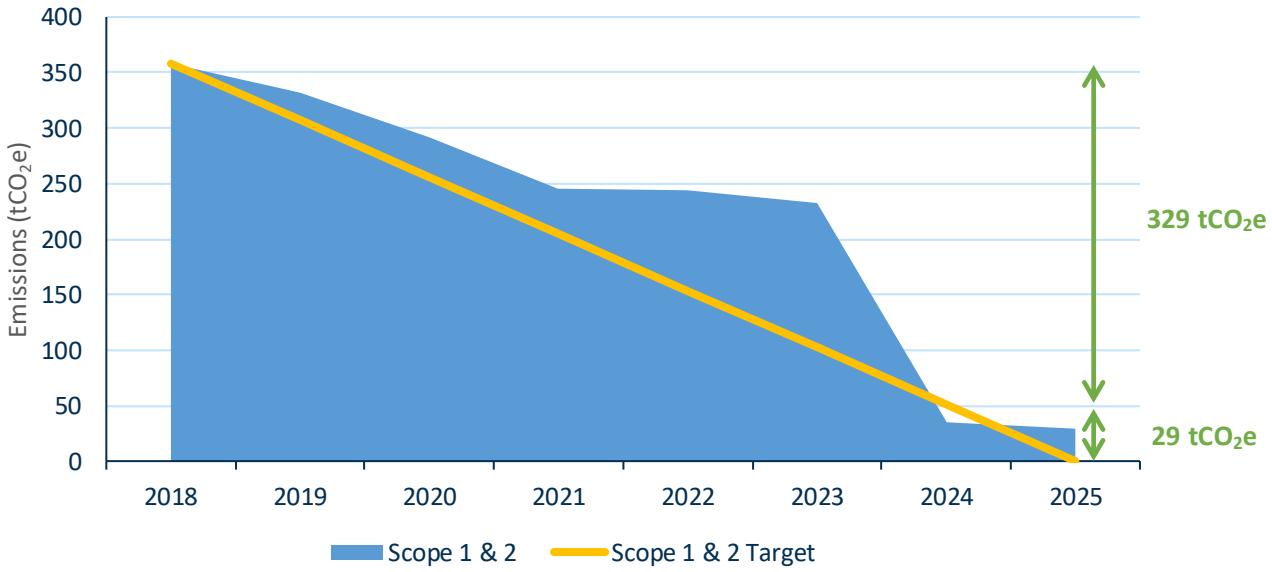


Figure 13: Projection of SBC scope 1 and 2 emissions taking in to account proposed projects and target for carbon neutrality.

[16] Average scope 1&2 5-year CMP reductions for local authorities are typically no more than 25% historically (Carbon Trust propriety info)

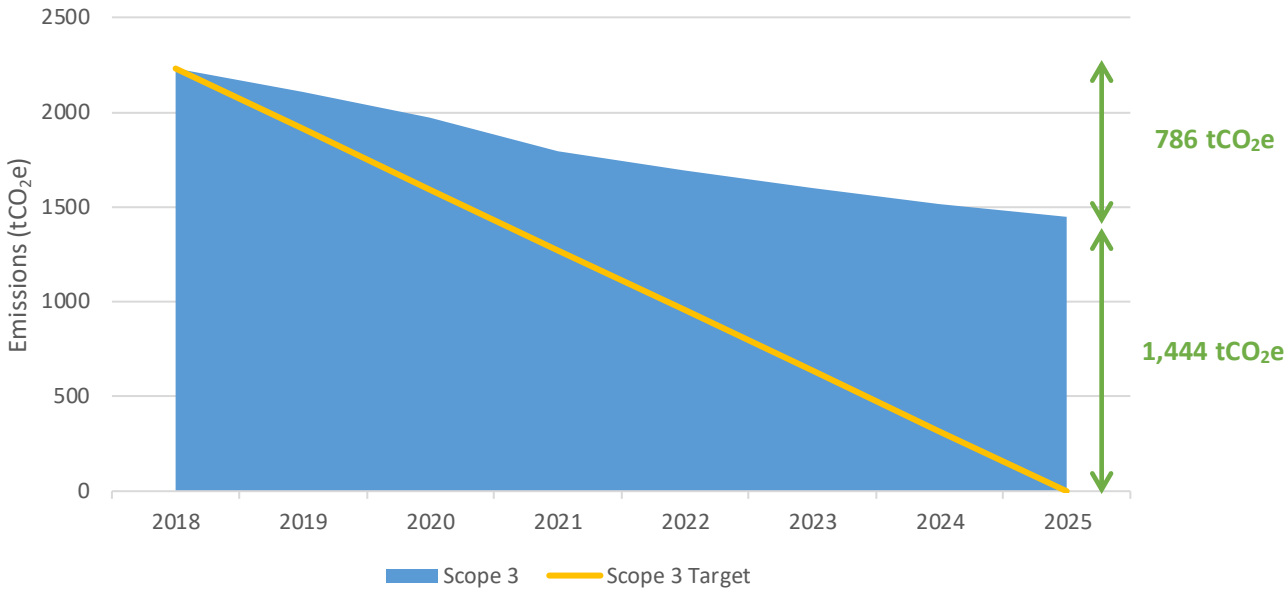


Figure 14: Projection of SBC scope 3 emissions taking in to account proposed projects and target for carbon neutrality.

It is estimated that through a specific contractor/supplier selection process, effective supply chain engagement and planned carbon reduction from current contractors, that scope 3 emissions could decrease by approximately 35% (786 tCO_2e) between 2018 and 2035. This is also under the assumption that in a business as usual case scope 3 emissions would remain constant. For scope 3 emissions a remaining gap to of 1,444 tCO_2e exists, this will likely need to be offset for the council to achieve a carbon neutral target.

In order for the council to achieve its target of being carbon neutral by 2025, any remaining/residual emissions will very likely need to be offset. It should be reinforced here that organisations should aim to reduce emissions as much as possible (firstly through demand reduction, then electrification and renewable energy) before considering offsets.

Based on the implementation of the above measures and the resulting reductions leaving residual emission of 1,473 tCO_2e. If the council were to choose to purchase offsets to address these residual emissions in this scenario, achieving carbon neutrality would cost the council approximately £11,110 – £88,865 per year in offsets through a registered gold standard provider[17].

When considering the future offsetting strategy, SBC should aim to show the level of commitment, ambition, leadership and progressivity through local offsetting schemes where possible. This could include investment in community renewable energy schemes[18], tree planting, wetland restoration, or biodiversity & conservation.

[17] Figures provided by ClimateCare and GLA Carbon Offset Funds (2018)

[18] Project specific carbon accounting to be conducted to avoid double counting

6. Governance and Engagement

To manage the implementation of a carbon reduction programme, it is important that organisational procedures are put in place to maintain a focus on carbon reduction over time. In order to achieve a carbon neutral target, the Council will have to consider dynamic organisational structures to ensure that they remain flexible in the approaches being taken to tackle climate change. A key emphasis should be on enhancing knowledge sharing and integration across internal council-led teams and ultimately focussing on initiatives that can be driven forward by the residents, organisations and businesses across the borough. This section describes the main activities and changes that should be considered in order to embed carbon reduction across the council in the first instance.

Programme Management

The key actions that will facilitate the council's response to declaring a climate emergency will be managed by Cabinet with input from the Policy Review and Development Committee and fall under the responsibility of the Policy Team. A climate change and ecological emergency steering group made up of officers and members from different political parties will oversee day to day delivery. The scope of the steering group is to oversee the implementation of Swale Borough Council's response to declaring a climate emergency so that the carbon neutral target is met within the timescales set out. A key milestone that the steering group must make sure it is continually meeting is ensuring that carbon reduction and awareness of the climate emergency are both maintained and established as an on-going council priority that is considered and addressed during the decision-making process.

A number of recommended key functions that this team should focus on specifically related to carbon reduction are detailed below:

- **Gain** senior endorsement and publication of the Council's Climate Emergency Plan
- **Provide** regular oversight and monitoring of progress towards achieving SBCs carbon neutral target across key delivery teams
- **Ensure** that carbon reduction stays on the high-level agenda at SBC
- **Manage** the expectations of key stakeholders and recognise achievements on carbon reduction across the organisation
- **Be transparent** in the progress being made, both internally within the council and across the wider district

Overall organisation of the council's response will fall to the Project Lead, who will report project highlights, risks and issues to the steering group. It is suggested that the steering group should also make sure the progress of the Plan is reported to senior stakeholders and that the projects within the Plan are continually monitored against pre-determined Key Performance Indicators (KPIs). The Project Lead, and colleagues from the council, should focus on the day-to-day delivery of selected carbon reduction projects. To ensure that carbon reduction and the council's climate emergency is not just seen as the responsibility of a few people in the organisation, but is truly embedded and part of the organisational culture, it is suggested that the steering group work closely with the Council's communications team to disseminate relevant information to staff colleagues.

Stakeholder Engagement

Robust engagement with local stakeholders and communities will be a key facilitator towards successful area wide climate action for Swale Borough Council. The Council should now begin to think of innovative and successful ways through which the wider borough can contribute towards both the council and borough becoming carbon neutral by 2030.

The steering group should ensure that an effective engagement strategy that actively involves local organisations and residents is drawn up. Achieving the greatest possible local input and buy-in will allow SBC to work closely with key stakeholders to identify the areas of the borough that need to be prioritised in order to reduce emissions. It will be important for the Council to remain transparent throughout all engagement activities, to provide stakeholders with the opportunity to contribute towards the planned reduction activities that the Council intends to implement across its own estate and the wider borough.

Building on the work already completed by the steering group and Policy Review and Development Committee, SBC should now focus on completing the following activities as it looks to develop a robust stakeholder engagement plan for the Borough:

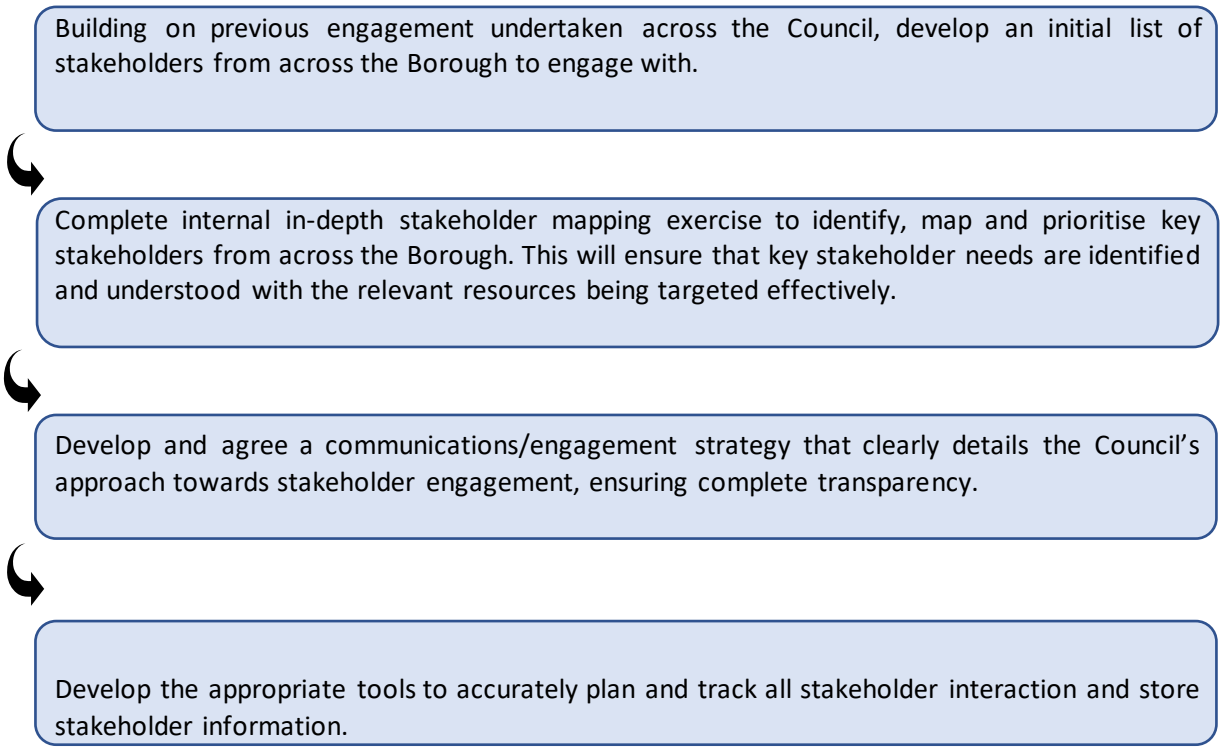


Figure 15: Indicative actions that will facilitate the development of a robust stakeholder engagement plan for the Borough

It will be crucial to engage with multiple stakeholders from across the Borough to; understand their priorities and reflect these in any Borough-wide action the Council delivers; keep them informed throughout; and, secure local buy-in and commitment to project deliveries. The Council therefore has a responsibility to provide the necessary platforms in order to facilitate effective discussion and engagement amongst local actors, to ensure that individuals and communities are collectively working towards assisting the Council and Borough to become carbon neutral by 2025 and 2030.

7. Monitoring and Reporting

Once a carbon footprint has been measured and a target set, a key part of the implementation phase is to ensure that progress is being made against the desired target. Monitoring and reporting is an essential activity that should be undertaken at least annually between the baseline year and target year, and indeed after the target year too.

Monitoring the data should be completed internally on a regular basis. This process should become streamlined as the necessary data sources and associated contacts/owners become familiar with the process and adopt best practice data management. An internal footprint will be undertaken using the 'Carbon Trust Footprint Calculator' (updated emission factors are used). Not only does the footprint need to be monitored but the progress of any carbon reduction opportunities should be actively monitored too, including implementation year, energy reduction and cost savings.

In addition to monitoring the footprint itself, the project team should continually monitor how local plans and policies will influence the ability of the council and the wider borough to reach respective carbon neutral targets. Continually monitoring how implemented/planned policies are likely to affect the Council's footprint will allow the project team to appropriately plan carbon reduction opportunities around selected policies, to ensure that a number of co-benefits can be delivered to the local area.

Reporting the annual carbon footprint is also essential. Not only does it ensure transparency from the council but also accountability if targets are not met. Reporting of results can be presented externally and be factored into annual reports and local plans. Progress reporting should be conducted on an annual basis and communicated to all members of the project team, with further results being published to wider stakeholders across the Borough to ensure full transparency. A key measure of success should be the annual emissions reductions achieved across the Council, alongside the overall progress towards meeting pre-determined KPIs. The necessary processes and mechanisms should also be put in place following key reporting periods, to ensure that progress remains on track towards achieving carbon neutral ambitions e.g. develop a tailored action plan for those areas of the Council that may be failing to meet pre-determined targets and KPIs.

Figure 16: Screenshots from Carbon Trust footprint calculator which will be shared with SBC

8. Carbon Offsetting

Despite the substantial carbon reductions achievable from the implementing projects outlined in this report, the council will still be emitting an estimated 1,481 tCO_2e in 2025. For the council to meet their carbon neutral target they will very likely need to consider offsetting these remaining carbon emissions. There are numerous methods for offsetting carbon emissions, each with their pros and cons, these methods along with the different principles involved in offsetting are discussed below.

Avoided Emissions vs Emissions Removal

Carbon offsetting can typically be categorised within three broad groups: Avoided natural depletion, avoided emissions and greenhouse gas removal. Examples of each of these are given below:

Avoided Natural Depletion

- Avoiding deforestation/protecting forests
- Protecting wetlands
- Protecting peatlands

Avoided Emissions

- Renewable energy projects
- Energy efficiency projects (LED lighting, boiler upgrade, etc.)
- Replacing cook stoves with clean alternatives

Greenhouse Gas Removal

Natural

- Forestation
- Ocean fertilisation
- Mineral Carbonisation

Engineered

- Direct air capture technologies
- Low carbon concrete

Although no definition has been formally agreed and accepted on what it means to be carbon neutral, the current Carbon Trust working definition is based on that provided by BSI PAS 2060[19] accounting standards. Under this definition, to achieve carbon neutrality the council must have a carbon reduction plan set and must then tackle residual emission through any high quality, certified offsetting method. The following sections provide some detail on how to start thinking about accounting for offset emissions, although it should be stated that there currently is no defined standard or methodology on how to account for offset emissions.

Tree Planting

Trees and organic matter are excellent vessels for removing CO_2 directly from the atmosphere and have the ability to fix this carbon through plant growth and directly into the soil. Tree planting as a carbon offsetting programme needs to be implemented carefully, ensuring a variety of tree varieties

[19] https://www.bsigroup.com/en-GB/PAS-2060-Carbon-Neutrality/

are planted to encourage an increase in biodiversity and avoid monocultures. Tree planting can be an activity carried out locally, involving the local community in both the planting of the trees and creating new green spaces for them to enjoy; alternatively, the council can support projects elsewhere in the UK or indeed internationally.

Tree planting as a form of greenhouse gas removals is a developing field. Whilst the science is clear that tress remove CO_2 from the atmosphere, how this is accounted for within carbon accounting has yet to be agreed on. A new accounting standard which explains how to deal with greenhouse gas removal is in development, being led by the World Resource Institute (those behind the GHG protocol) and the Carbon Trust. The new standard is due for public comment in 2021 and is primarily based on the IPCC 2006 Volume 4, Chapter 2 and 4[20].

In the meantime, estimates can be made as to how much CO_2 can be removed through tree planting – although any quoted figure must highlight that it is not in accordance with GHG protocol guidelines on emissions accounting. Important data that must be acquired include:

- Approximate annual tree growth (ha) - this would be based on age and species of the tree
- Location of the forest (the climate will affect the growth rate and subsequent choices of input data)
- Species of the trees, and if there is a mix of species to define the % of each species across the ha covered
- Risk of cutting them down (if they do cut them down, are all parts of the trees removed, do they leave some for decomposition, are the parts that are removed made for long-life or short-life products?).

It is possible then to estimate the lifetime carbon stored in a tree as well as the annual removal of emissions by the tree. For accounting purposes, the annual removal of CO_2 would be used – it would only be possible to use the whole life-time of a tree in a carbon account once.

If you assume a typical tree will absorb 10 $kgCO_2$ every year, the council will need to plant approximately 148,100 trees (to cover to full "offset"). This equates to a land area of almost 0.83 km^2 of woodland that would need to be planted. If thinking locally, this would be the equivalent of increasing the area of Elmley nature reserve by 4% (assuming this increase was all wooded area). When under taking local tree planting projects, it is important to keep records of tree type, number of said type, and age of tree (sapling/mature tree).

To fund tree planting activities elsewhere could cost between £10,000 and £25,000 per year depending on whether the tree planting is carried out internationally or in the UK respectively. There is no reason to suggest the council should only select one option, and the best mix of value, leadership, locality, and ambition may come from investing in a range of carbon offsetting measures.

Renewables

The ability to claim any carbon offsetting through investment in renewable energy is nuanced. This form of offsetting may only count as an offset in certain situations and can only really be used to offset scope 2 emissions.

[20] https://www.ipcc-nggip.iges.or.jp/public/2006gl/

Location versus Market Approach

At present there are two methodologies that can be used to account for scope 2 emissions, a location based or market-based approach. A location-based approach is the most frequently used and uses an emission factor based on all generating supplies of electricity to the grid (national grid). This is the approach that has been used within this report. The introduction of any renewable generators exporting to the grid is captured in a lower UK wide grid emission factor, that everyone benefits from within their carbon accounting.

Alternatively, a market-based approach looks at where the consumer of electricity purchases their electricity come from, such that if a consumer makes the conscious decision to purchase electricity from a 'green' supplier then this is accounted for in their carbon footprint. When a market-based approach is used and the footprint reported, the location-based footprint must always be reported alongside this.

Under a market-based approach if a consumer of electricity wishes to offset their entire scope 2 emissions, then they could simply ensure that they purchase electricity from a 'green' supplier that offers a 100% renewable tariff. Under a location-based approach this form of 'offsetting' wouldn't be possible.

Building Renewables

If the council aims to build any renewable energy generation facilities, then they will be able to potentially claim these as offsetting. Any on site renewables that provide electricity directly to Swale Borough Council owned assets will result in a reduction in electricity consumption (thus reducing the carbon footprint) - this has been suggested as a project for the Swale House refurbishment through installing roof top solar PV.

Building renewable generators where the electricity is exported to the grid or private wired elsewhere, wouldn't typically be considered an offset as this will result in double counting of emissions reductions where these are already captured through renewable energy certificates / guarantees of origin.

Investing in Renewables

Investing in renewables is an excellent means to engage with the local community and enable others to reduce their carbon footprint, an essential activity when considering borough wide emissions. However, as the carbon reductions will be accounted for elsewhere the council itself will not be able to realise any carbon reductions as an offset.

Offsetting Schemes

There are a variety of offsetting schemes available that have been 'gold certified' that can offer businesses and individuals the chance to offset the emissions they produce. Such schemes will involve carbon reduction projects such as tree planting, biodiversity restoration, international renewable installation. Furthermore, the government produces information for voluntary woodland creation projects under the woodland carbon code (WCC)[21].

[21] https://www.gov.uk/guidance/the-woodland-carbon-code-scheme-for-buyers-and-landowners

Engaging with a reputable offsetting provider is recommended to ensure the scheme matches expectations and social values.

Appendices

Appendix 1 – Carbon Inventory

Sources	Scope 1	Scope 2	Scope 3	Total
Business Travel	0.0	0.0	64.1	***64.1***
Contracts	0.0	0.0	2,016.9	***2,016.9***
Electricity	0.0	173.1	14.8	***187.9***
Fleet	32.0	0.0	7.6	***39.7***
Gas	152.8	0.0	21.2	***174.0***
Leased Buildings	0.0	0.0	0.0	***0.0***
Renewables	0.0	0.0	0.0	***0.0***
Waste	0.0	0.0	18.8	***18.8***
Water	0.0	0.0	18.0	***18.0***
Commuting	0.0	0.0	69.0	***69.0***
Grand Total	**184.8**	**173.1**	**2,230.4**	***2,588.3***

Appendix 2 – Project List

Swale House Assumptions

The following is a list of assumptions used in calculating the current system consumptions of Swale House as well as the potential to save from the refurbishment:

Constants

Item	Unit	Value
Average annual temperature difference (external/internal)	°C	10
Specific heat of air	kWh/(kg.K)	0.00027947
Density of air	Kg/m^3	1.225
Specific heat of water	kWh/(kg.K)	0.001105
Density of water	Kg/m^3	997
Water heating system temperature difference	°C	60
Hot water consumption	L/person	15
Solar PV capacity factor	%	10%

Swale House Fabric and systems

Item	Unit	Current	New
Wall U-value	W/m^2.K	1.4	0.2
Window U-value	W/m^2.K	4.5	1.5
Roof U-value	W/m^2.K	0.6	0.15
Air changes	m^3.hr	0.7	0.15
Boiler Efficiency	%	80%	90%
Air source heat pump	COP	-	2.5

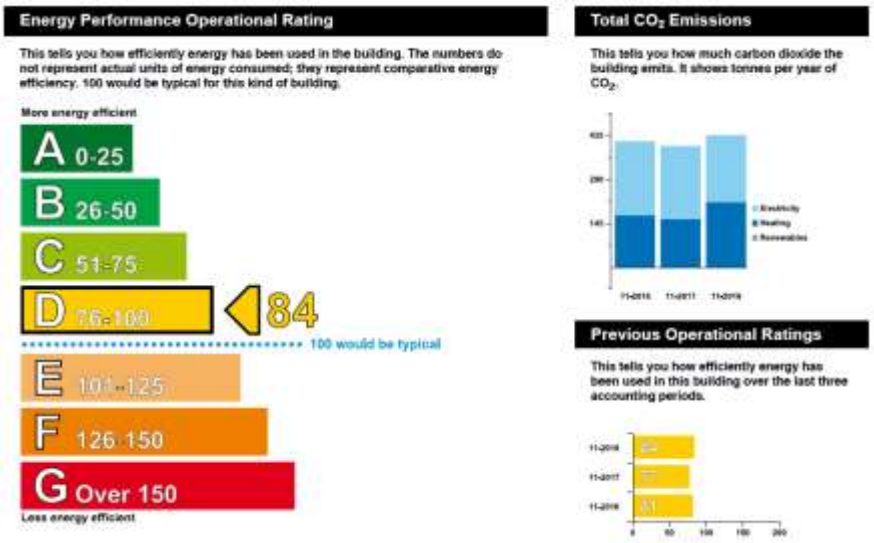
Swale House Dimensions

Item	Unit	Value
Total floor area	m^2	7714
Usable floor area	m^2	7063

Glazed area	m^2	897
Façade area (incl. glazing)	m^2	2991
Roof area	m^2	1976
Solar PV area	m^2	918
Building volume	m^3	18756

Swale House Energy

Non-Domestic Energy Performance Certificate



CIBSE Guideline Benchmarks for Typical Office System Consumption

Table 20.9 Offices: system and building energy benchmarks

System	Delivered energy for stated office type / (kW·h·m^{-2}) per year							
	Type 1		Type 2		Type 3		Type 4	
	Good practice	Typical	Good practice	Typical	Good practice	Typical	Good practice	Typical
Gas/oil heating and hot water	79	151	79	151	97	178	107	201
Catering gas	0	0	0	0	0	0	7	9
Cooling	0	0	1	2	14	31	21	41
Fans, pumps and controls	2	6	4	8	30	60	36	67
Humidification	0	0	0	0	8	18	12	23
Lighting	14	23	22	38	27	54	29	60
Office equipment	12	18	20	27	23	31	23	32
Catering electricity	2	3	3	5	5	6	13	15
Other electricity	3	4	4	5	7	8	13	15
Computer room	0	0	0	0	14	18	87	105
Total gas or oil	79	151	79	151	97	178	114	210
Total electricity	33	54	54	85	128	226	234	358

Note: Type 1: cellular naturally ventilated; Type 2: open plan naturally ventilated; Type 3: 'standard' air conditioned; Type 4: 'prestige' air conditioned

Yellow box highlights the type used as a reference for Swale House, relative values were calculated from the table.

Electric vehicle Register

Existing Model	2017/18 mileage	Contract expiry date	Replacement Model
Ford Ranger 4 x 4 Diesel	9390	August 2020	Iveco Daily (electric cab variant)
Nissan Navara Pick-Up Double Cab - Diesel	N/A	May 2022	Iveco Daily (electric cab variant)
Mitsubishi L200 - Diesel	N/A	April 2022	Iveco Daily (electric cab variant)
		August 2020	Nissan ENV 200
Fiat Doblo - Diesel	9683	August 2020	Nissan ENV 200
Fiat Doblo - Diesel	13081	August 2020	Nissan ENV 200
Fiat Doblo - Diesel	9850	August 2020	Nissan ENV 200
Fiat Doblo - Diesel	17129	August 2020	Nissan ENV 200
Fiat Fiorino Cargo 1.3 Diesel	8183	August 2020	Hyundai Ioniq
Citroen Berlingo 1.6 Hdi – Diesel	10752	August 2020	Nissan ENV 200
Citroen Berlingo 1.6 Hdi - Diesel	9467	August 2020	Nissan ENV 200
Jaguar XF (2L diesel)	3786	27th June 2020	Tesla Model 3
Ford Combo/ Transit	5114	Feb 2020 – cannot extend	Nissan ENV 200
N/A	N/A	N/A	Nissan ENV 200
Peugeot Electric	N/A	N/A	Peugeot Electric