



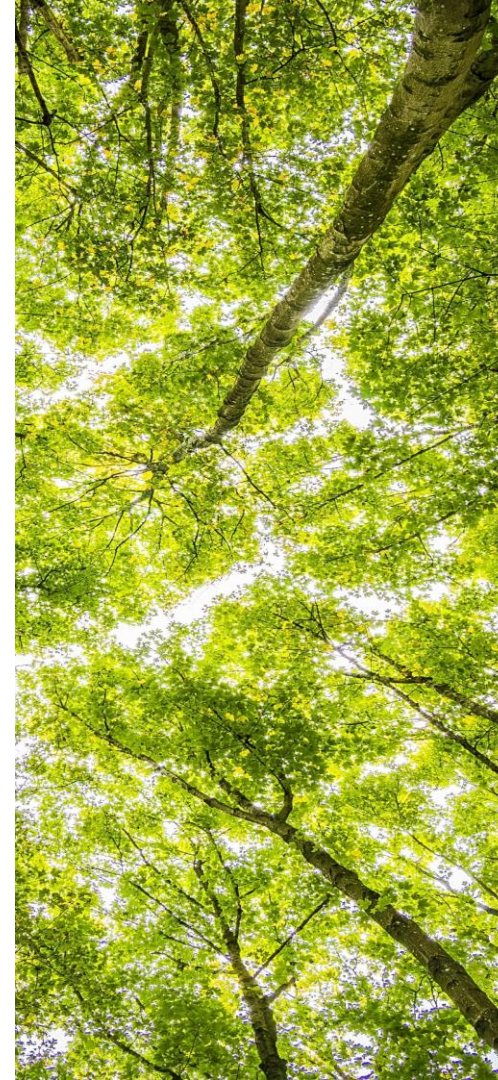
SOUTH
KESTEVEN
DISTRICT
COUNCIL

Carbon footprint and reduction opportunities

South Kesteven District Council

Final report

June 2020



Context to this report








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 summers hotter and drier. 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.

In 2019, the UK Government set a target of achieving net zero emissions by 2050 and many local authorities across the UK declared a climate emergency. 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 climate impacts at both the local and national scale.

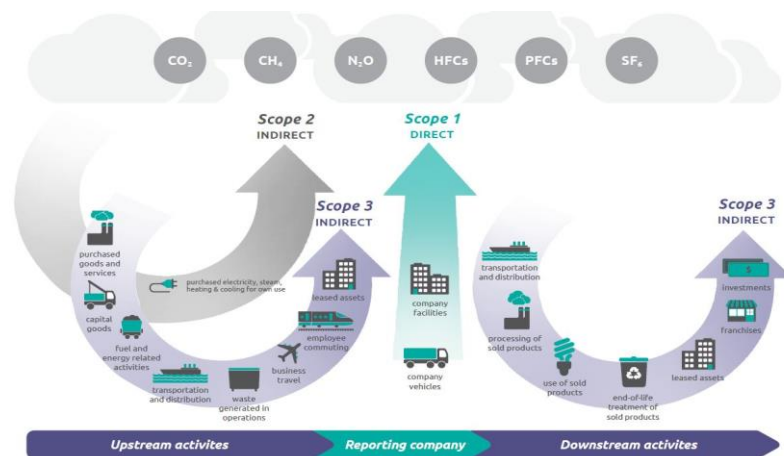
South Kesteven District Council recognises the significant role it can play in helping to accelerate the national transition towards developing a low carbon economy, and declared a Climate Emergency in 2019. This report was commissioned by the Council to help achieve the carbon reduction targets set out in its' declaration.



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- This Carbon Reduction Action Plan forms a key step in South Kesteven District Council's (SKDC) climate emergency response and sets out a number of strategic actions that SKDC should work towards in order to achieve their carbon reduction target. SKDC declared a climate emergency in September 2019, pledging to reduce the organisation's carbon footprint by at least 30% by 2030 and endeavouring to become net-zero carbon as soon as viable before 2050.
- Achieving the 2030 target will reduce emissions from **7,600 tCO₂e in 2018/2019 to a minimum of 5,320 tCO₂e in 2030**. Moving towards this ambition illustrates SKDC's recognition of the wider climate emergency we are all facing, whilst showing the Council's local leadership role towards climate change action.
- This action plan suggests a number of projects that, alongside the expected decarbonisation of the national electricity grid, will contribute to achieving this carbon reduction target.



Overview of the World Resource Institutes GHG Protocol accounting methodology

Emissions included within the carbon footprint and targeted with projects:	Scope 1	<ul style="list-style-type: none"> • Gas consumption for space and water heating in buildings • Council fleet fuel consumption
	Scope 2	<ul style="list-style-type: none"> • Electricity consumption in buildings
	Scope 3	<ul style="list-style-type: none"> • Energy, waste & water consumption from leased buildings (i.e. leisure centres) • Upstream emissions from natural gas, vehicle fuel & electricity • Business travel in non-Council fleet vehicles • Third-party disposal and treatment of waste generated in Council-controlled operations • Supply and subsequent treatment of water consumed by the Council's operations

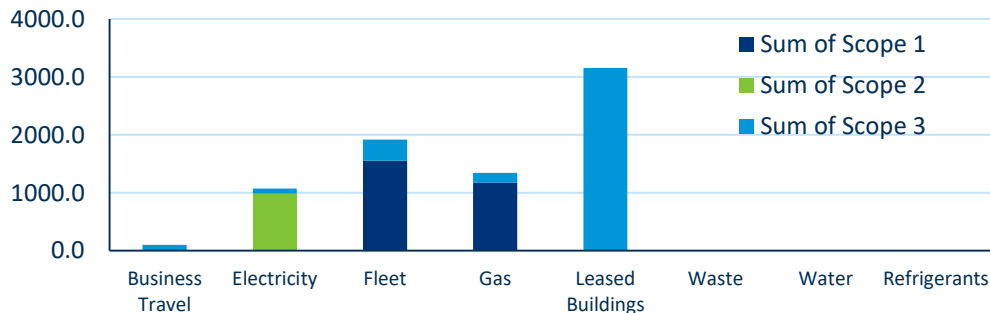
Carbon footprint overview

South Kesteven District Council's footprint for the FY 2018/19 was calculated to be **7,600 tCO₂e**

Four key emission categories make up 98.5% of the total footprint:

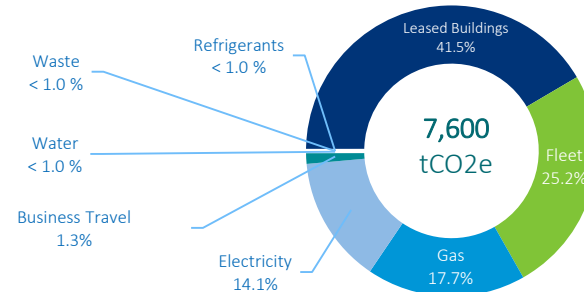
1. **Fuel consumption** in the Council's fleet (1,918 tCO₂e)
2. **Gas consumption** in buildings (1,344 tCO₂e)
3. **Electricity consumption** in buildings (1,072 tCO₂e)
4. **Leased assets (leisure centres)** (3,157 tCO₂e)

Emissions by scope / tCO₂e



SKDC emissions by source and scope.

% of total emissions



SKDC emissions by source

- The carbon reduction target set by the Council contains all of the stated emission categories here, including emissions from sites/assets outside of the Council's direct operational control (scope 3 emissions)
- Scope 3 emissions make up 51%** of the total footprint. The Council will therefore have to integrate carbon management into its' interactions with contractors and operators to achieve its' decarbonisation targets, as well as focusing on the assets under direct operational control.

N.B. For the FY 18/19 footprint, 'Leased Buildings' is entirely made up of leisure centres owned by the Council & operated by a third party.



Carbon reduction opportunities overview

To achieve the emission reduction target of at least 30% by 2030, **the Council needs to reduce scope 1, 2 and selected scope 3 emissions by approximately 190 tCO₂e /year** (average annual reduction from 100% down to 70%). The following target areas have been identified across the council, and relevant reduction opportunities identified for each. These projects will assist SKDC on the pathway towards the goal:



Streetlighting - Upgrading all streetlighting under SKDCs control to LED and introducing advanced controls



HRA Assets - Conducting feasibility assessments of the potential for LED upgrades and electrification of heating systems



Fleet Management - Roll out of regular driver training and comprehensive telematics



Fleet Electrification - Electrifying appropriate vehicles within SKDCs large fleet



Leisure Centres - Conducting feasibility assessments of the potential for energy efficiency and renewable energy measures



St Peters Hill - Roll out of energy efficiency and renewable energy measures



Guildhall - Roll out of energy efficiency and renewable energy measures



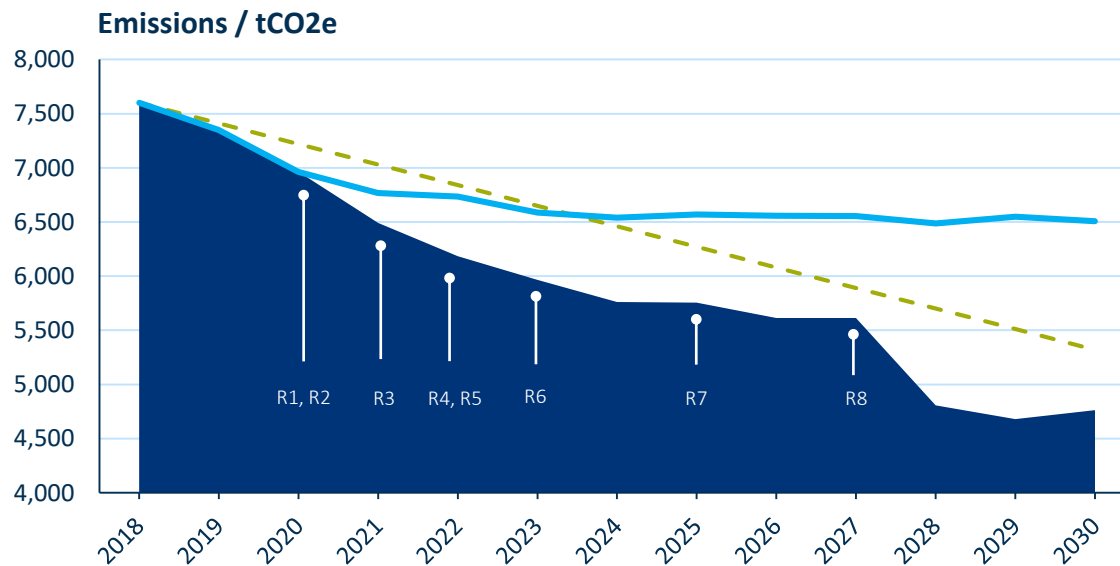
Stamford Arts Centre - Roll out of energy efficiency measures

- The projects identified in this plan have the potential to reduce SKDC emissions from 7,600 tCO₂e/year to 4,763 tCO₂e/year by 2030. **This equates to an estimated total reduction of 37% from the current 2018/19 footprint.**
- The total cost to implement the above projects is estimated to be **£3.3m**, not including any costs associated with improvements required to decarbonise the Leisure Centres. All projects require further detailed assessment and in particular, those related to HRA assets and Leisure Centres currently based on high level remotely assessed information and benchmarks only.

Overview of the Carbon Reduction Pathway

Projection of total SKDC business as usual emissions, the effect of proposed projects and the 30% reduction by 2030 target.

NB. projected grid decarbonisation is included within the BAU pathway.



R1 – St Peters Hill measures
R2 – Guildhall measures

R3 – Fleet management measures
R4 – HRA measures

R5 – Stamford Arts Centre Measures
R6 – Streetlighting measures

R7 – Fleet Electrification measures
R8 – Leisure Centre measures

Projects have been phased from lowest to highest costs in terms of pounds spent per ton of carbon saved (£/tCO₂e abated - estimated costs only). In reality, implementation phasing will be dependent on a number of factors not yet assessed e.g. available funding, technology maturity, building lease terms etc.

Next Steps

- Building on the analysis and suggestions provided throughout this action plan, it is now important for SKDC 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 more confidentially the provisional opportunities identified within. Considering the current emission 'hot spots' (certain Council owned buildings, fleet and leisure centres), SKDC should prioritise and coordinate efforts towards these emissions sources in the first instance, and use the contents of this Carbon Reduction Action Plan for further iterations of project development.
- The Council should use the initial quantifications (energy, carbon and cost saving potential) provided as a building block for the development of further detailed business cases going forward. The results within should be clearly communicated with the limitations to what has been done explained and shared with key decision makers from across the organisation.
- Putting in place an early immediate plan that builds on the findings of this Carbon Reduction 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.





Section 1: Council Target

South Kesteven District Council has set a target of reducing its carbon footprint by at least 30% by 2030, as well as endeavouring to become net-zero carbon as soon as viable before 2050. This target covers those emission sources that are under both direct and indirect control of the Council (Table 1).

The ambition of South Kesteven District Council demonstrates the intention of the Council to act against the causes and impacts associated with climate change. The Council must now work towards 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 Action Plan therefore details initial actions and key mechanisms required in order to work towards reducing emission by at least 30% by 2030. It builds on the Carbon reduction plan developed by SKDC in 2012 and reflects the Council’s newly declared climate commitments, progress and latest developments.



The first step in developing the action plan is establishing an up-to-date carbon baseline, particularly as some of this data has not been collected previously for SKDC. This provides the reference from which to start form and a full analysis of the current emissions present, their magnitude and who is responsible for them.

Scope 1	<ul style="list-style-type: none">Natural GasFleet
Scope 2	<ul style="list-style-type: none">Electricity
Scope 3	<ul style="list-style-type: none">WaterOperational WasteBusiness TravelLeased assets

Table 1: Footprint boundary for South Kesteven District Council’s 2030 carbon neutral target

Section 2: Carbon footprint

This section provides an inventory of SKDC's greenhouse gas emissions for the financial year 2018/19 – the 'baseline' against which future progress will be evaluated.

Scope

SKDC's footprint has been calculated according to the World Resources Institute (WRI) Greenhouse Gas (GHG) Protocol, and aligns to the following accounting definitions:

- 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 (figure 1):

- **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. Transmission and distribution losses) not covered in Scope 2, outsourced activities, waste disposal, etc

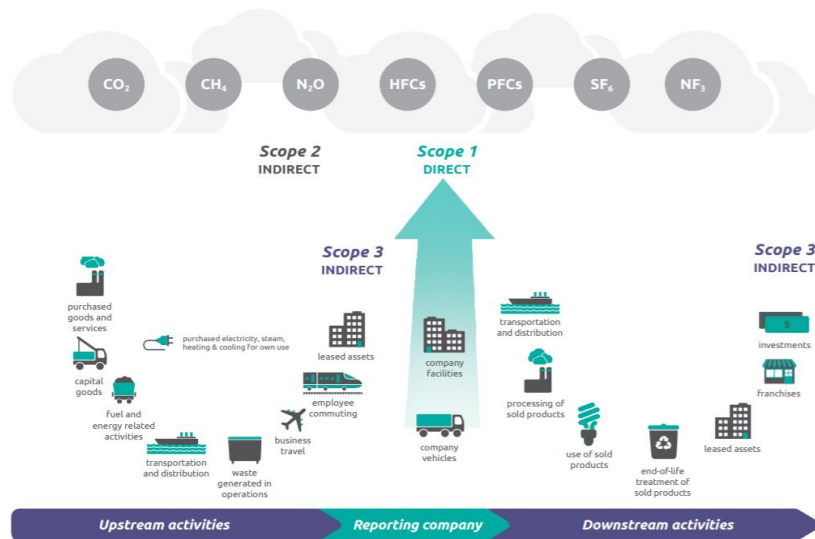


Figure 1: Overview of the World Resource Institutes GHG Protocol accounting methodology

Carbon Footprint Methodology

Calculating a carbon footprint

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

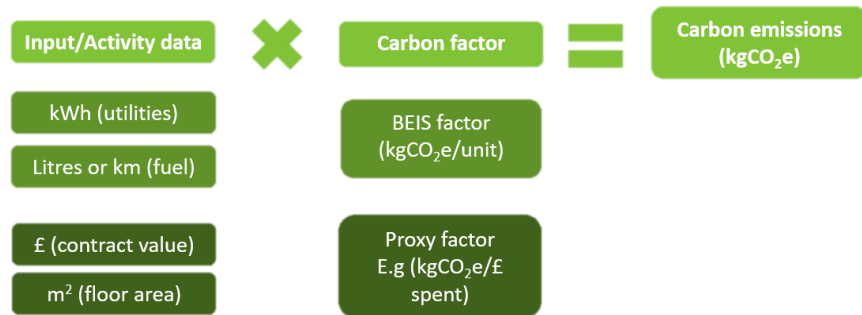
- Where possible, real activity data should be collected throughout the reporting period for use in the footprint calculation.
- Emission factors are updated annually and published by the UK Government's department for Business, Energy and Industrial Strategy (BEIS).

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 building.
- When input data is scarce, proxy factors can be used in place of the BEIS factors to approximate emissions from the available input data (e.g. contract value).

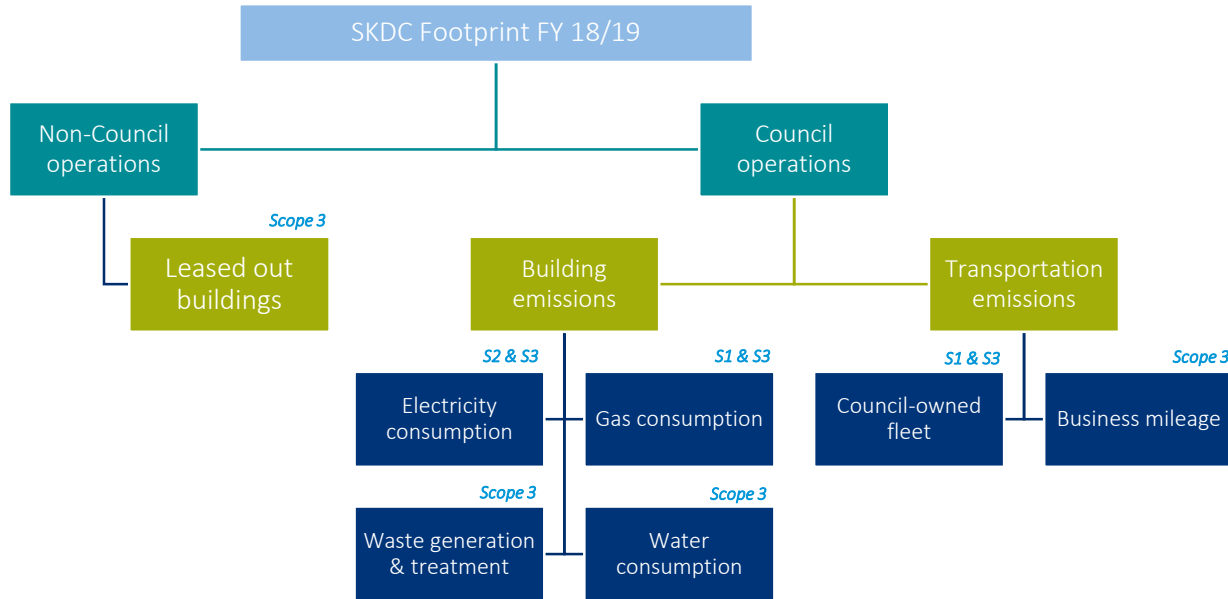
In footprinting a common unit of carbon dioxide equivalent (CO₂e) is used, which allows the impact of each of the seven main greenhouse gasses to be expressed in terms of the amount of CO₂ that would create the same amount of warming

Emissions are calculated by multiplying activity data by an emissions factor



General calculation methodology to calculate carbon emissions

Scope of carbon footprint



Scope 1 emissions [S1]:

- Gas consumption, typically space and water heating in buildings
- Council fleet fuel consumption

Scope 2 elements [S2]:

- Electricity consumption in buildings

Scope 3 elements [S3]:

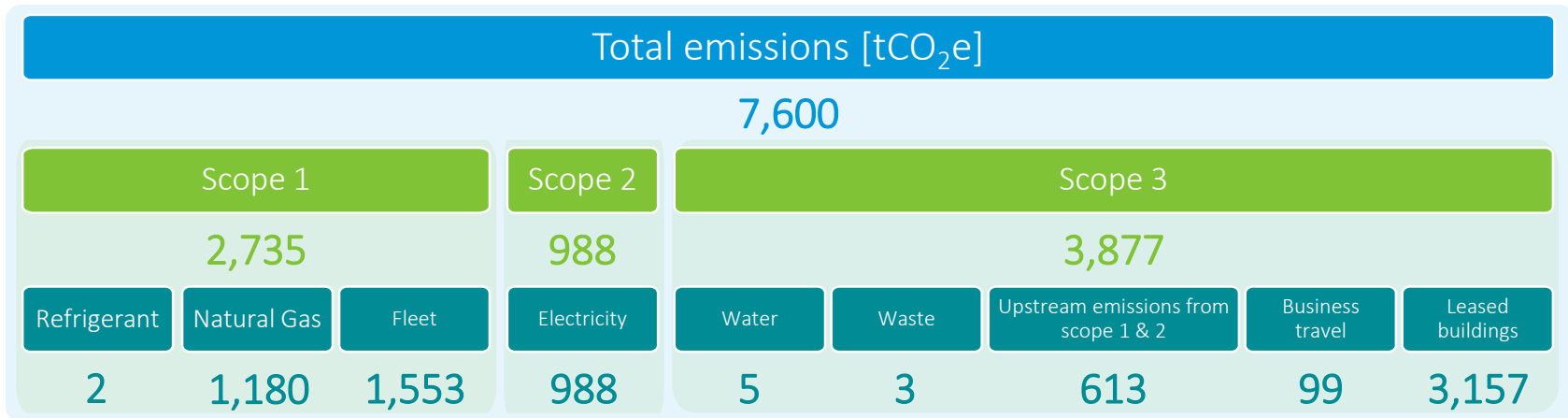
- Business travel in non-Council fleet vehicles
- Third-party disposal and treatment of waste generated in Council-controlled operations
- Supply and subsequent treatment of water consumed by the Council's operations
- Energy, waste & water consumption from buildings leased to a 3rd party operator (i.e. leisure centres)
- Upstream emissions from natural gas, vehicle fuel & electricity

South Kesteven District Council Footprint FY 18/19

In the 12 month period Apr' 2018 – Mar' 2019, **7,600 tCO₂e** were emitted from the council's own operations and associated activities

- **Scope 1:** gas (primarily for heating buildings) and transport fuel consumption in the Council's own fleet;
- **Scope 2:** electricity consumption within SKDC buildings used by SKDC staff;
- **Scope 3:** waste generation, water supply and treatment, business travel (arising from SKDC operated buildings, journeys completed by SKDC staff and councillors on behalf of SKDC activities), leased assets, and refrigerants.

The Council will need to reduce their footprint to at least 5,320 tCO₂e by 2030 to achieve their carbon reduction target, representing an average annual reduction of 190 tCO₂e / year

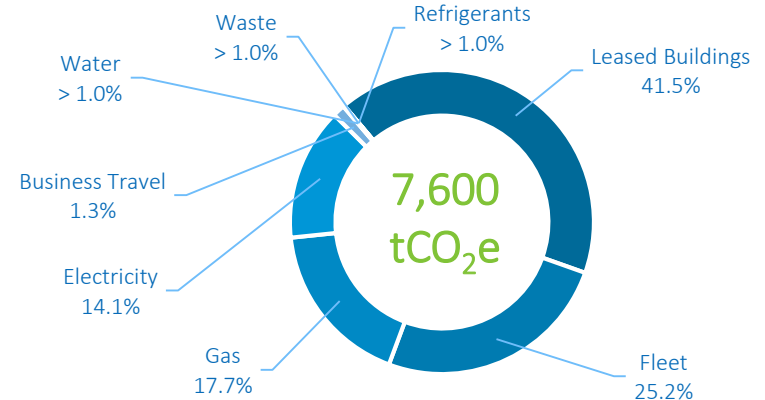
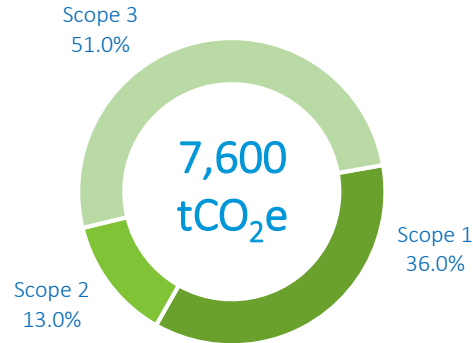


South Kesteven District Council Footprint FY 2018/19

SKDC's footprint is primarily made up from four emission categories, so-called **emission hotspots**:

- 31.2%** Emissions associated with **electricity** and **gas consumption** in Council-operated buildings
- 25.2%** Emissions from fuel consumption in the Council's **vehicle fleet** make up a quarter of the total footprint
- 41.5%** The majority of emissions come from **leased buildings** that Council owns but are leased and operated to a third-party.

These emission hotspots should be at the forefront of the Council's carbon reduction efforts, and are the focus of the recommendations made in this report.



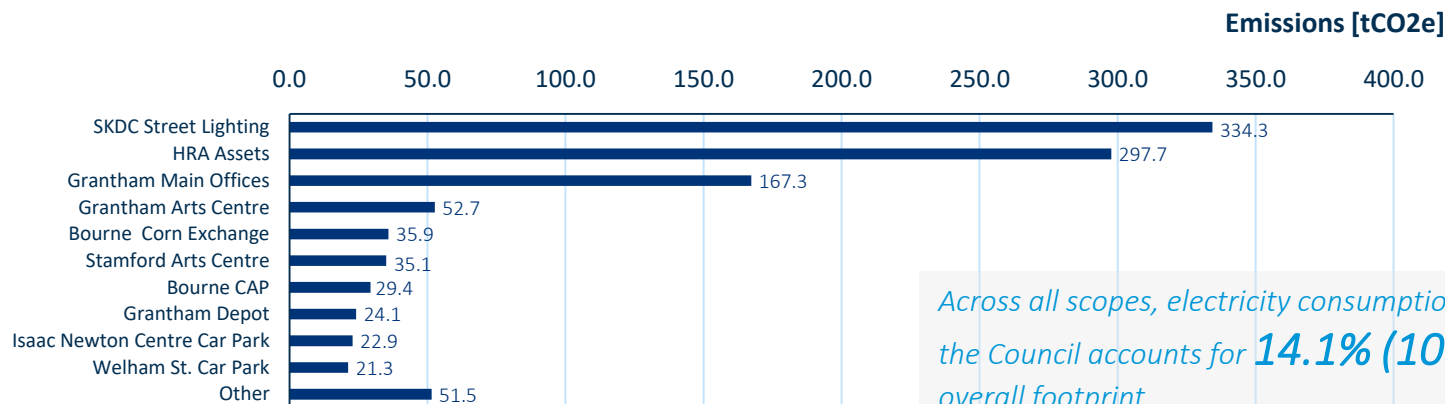


Hotspot 1: Electricity consumption in Council-operated buildings

In 2018/19, the Council consumed **3,489,764 kWh** of electricity in its operated buildings. These emissions calculated for electricity generation are associated with the generation, and transmission and distribution of electricity.

First and foremost, this should be reduced through energy efficiency measures. However the **emission factor for purchased electricity is reducing** as conventional power generation from coal and gas is replaced by low-carbon generation (e.g. from renewables and nuclear). This will result in reduced emissions, even during a business as usual approach.

As the carbon intensity of electricity reduces it will become more **beneficial in terms of emissions to use electricity as a fuel** in the place of gas, diesel etc. This electrification of heating and transport sectors will likely cause this electricity consumption to increase by 2030.



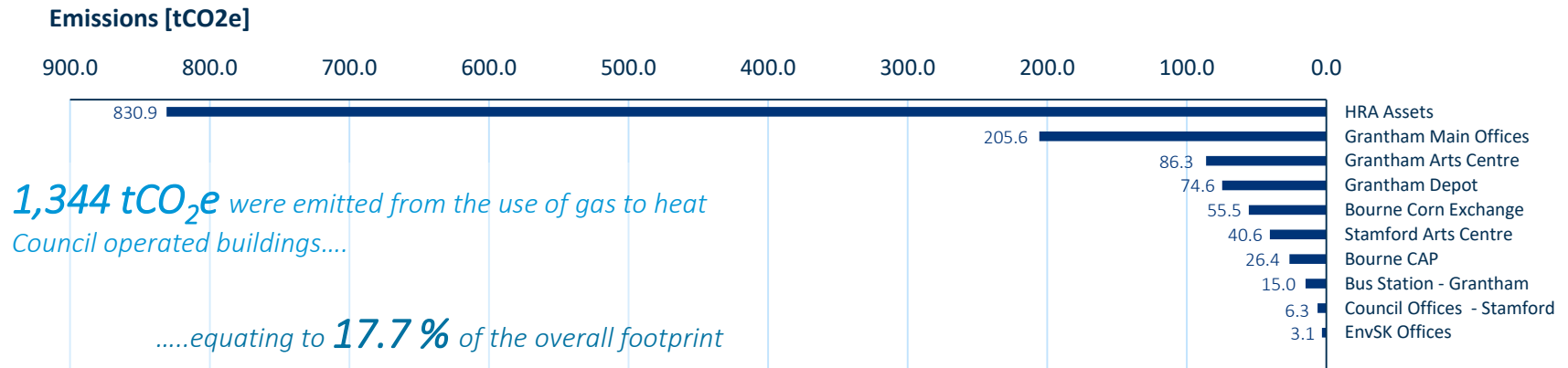
Across all scopes, electricity consumption from assets operated by the Council accounts for **14.1% (1072 tCO₂e)** of the overall footprint.

Hotspot 2: Gas consumption in Council-operated buildings

Gas is required for space and water heating in buildings. The Council consumed **6,415,665 kWh** of gas in the financial year, 61.8% of which was in Housing Revenue Account (HRA) assets.

As the national grid decarbonises, it is recommended that **heat sources are electrified** where possible (e.g. through the installation of heat pumps). The Council should consider electric heating for all new-builds with high energy performance.

For existing buildings, where possible a **fabric first approach** should be taken and retrofit actions should be performed to reduce heat loss and drafts before electrification (see appendix 2 for further explanation).



Hotspot 3: Council vehicle fleet

The Council own and operate a large fleet of **155 vehicles**. EnvironmentSK operate a further 25 vehicles, which have been included in this footprint.

23 of the vehicles are large waste management vehicles, which account for 52.3% of total fleet emissions due to their size and high mileage.

The majority of vehicles (176) are diesel powered, the remainder are petrol (2) and electric (2). The common decarbonisation pathway for transport is electrification, and the share of electric vehicles in the Council's fleet will have to grow to achieve decarbonisation targets. The roll-out of infrastructure (e.g. charging points) will be necessary to support this roll out.



Hotspot 4: Energy use in leased buildings – leisure centres

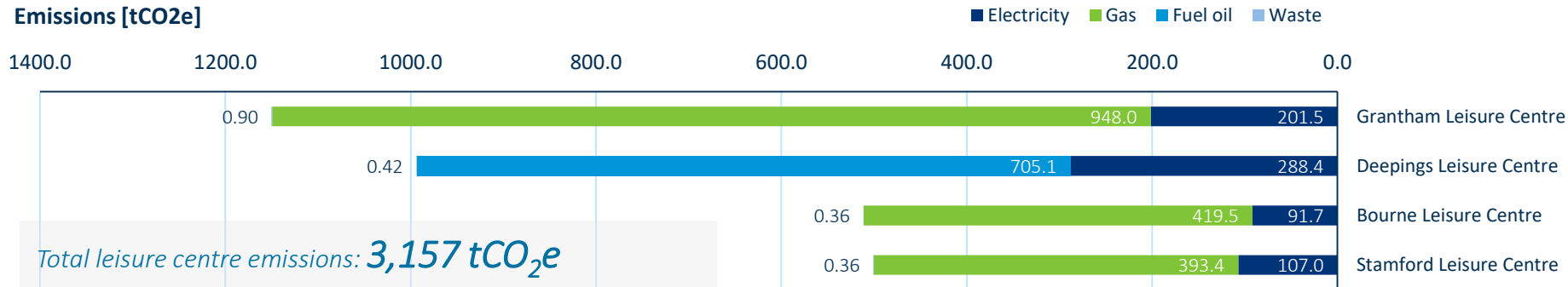


The Council own and lease four leisure centres (LC) to a third-party operator. The operation of leisure centres is inherently energy intensive, and accounts for 41.5% of the Council's total footprint.

Plans for new LCs in the District present an opportunity to significantly reduce the Council's emissions, and best-practice energy efficiency design should be mandated for any new centre.

For the existing centres, illustrative potential energy reduction has been presented to show the types of reductions that would be required at these sites for SKDC to meet its carbon reduction goal (see section 3)

Emissions [tCO₂e]



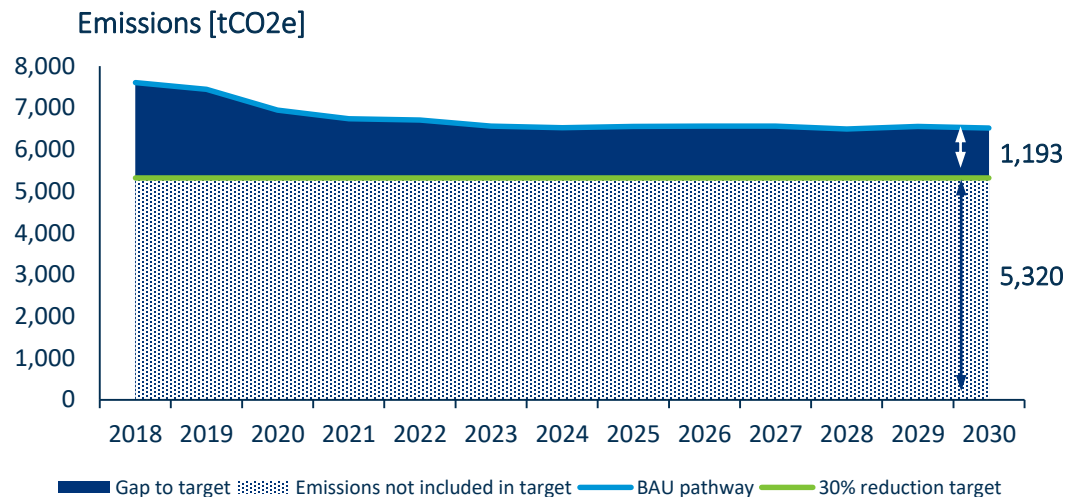
2030 Carbon reduction target

- South Kesteven District Council are targeting at least a 30% reduction by 2030 for their **scope 1, 2 and selected scope 3 emissions from a baseline of 7,600 tCO₂e**.
- The carbon intensity of the UK's electricity supply is reducing as renewable generation (e.g. wind, solar) is replacing traditional fossil fuels (e.g. coal, natural gas). Therefore, if the council were to maintain a business as usual (BAU) case, where energy consumption remains constant, electricity emissions will still decrease as a result of this background electricity grid decarbonisation.

*In a 'do nothing' scenario, SKDC's grid supplied electricity emissions are **expected to reduce by 1,087 tCO₂e** as a result of greener electricity from the national grid.*

- Beyond this, a further **1,193 tCO₂e** reduction would be needed to achieve at least a 30% carbon reduction, or **5,320 tCO₂e** annual emissions in 2030
- The BAU scenario assumes that the Council's operations, number of buildings and estate does not change from the baseline year 2018/19 in subsequent years.

Projection of total SKDC business as usual emissions (including grid decarbonisation), the Council's 2030 carbon reduction target and the associated gap to target



Section 3: Carbon Reduction Opportunities

- The following section details several opportunities for carbon emission savings that SKDC should prioritise for implementation. Background information and assumptions behind calculations can be found in Appendix 2.
- By setting a minimum 30% target from a baseline of 7,600 tCO₂e/year in 2018/19, an average 190 tCO₂e will need to be saved each year across the scope 1,2 and selected 3 emission sources included in the Council's 2030 baseline. Eight overarching areas have been quantified in terms of energy, carbon and cost saving potential. These projects cover emissions 'hot spots' and relate to:



Streetlighting - Upgrading all streetlighting under SKDCs control to LED and introducing advanced controls



HRA Assets - Conducting feasibility assessments on the potential for LED upgrades and electrification of heating systems



Fleet Management - Roll out of regular driver training and comprehensive telematics



Fleet Electrification - Electrifying appropriate vehicles within SKDCs large fleet



Leisure Centres - Conducting feasibility assessments of the potential for energy efficiency and renewable energy measures



St Peters Hill - Roll out of energy efficiency and renewable energy measures



Guildhall - Roll out of energy efficiency and renewable energy measures

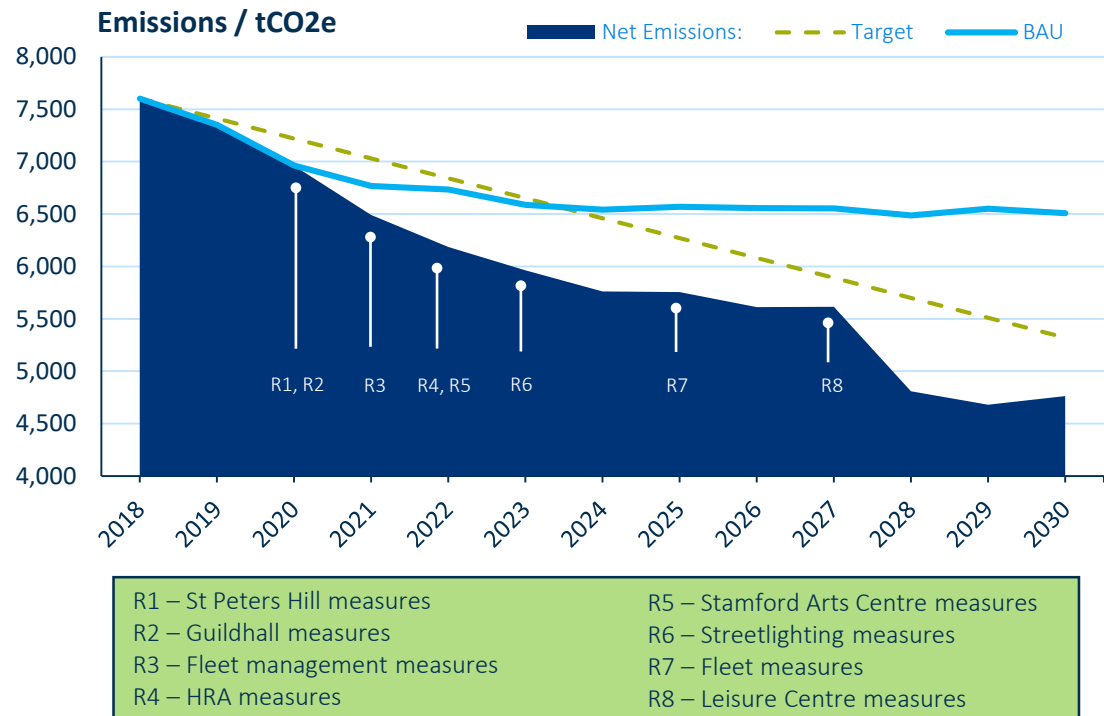


Stamford Arts - Roll out of energy efficiency measures

2030 Carbon Reduction Pathway

- Based on the potential projects and associated carbon reduction above, alongside the expected decarbonisation of the national electricity grid, the council's footprint in 2030 could be reduced to 4,763 tCO₂e/year. This equates to a **total reduction of 37 % from the current 2018/19 footprint of 7,600 tCO₂e/year**.
- Indicative staged project implementation of the 8 priority project areas and the associated decarbonisation pathway from the 18/19 baseline can be seen in Figure 2.
- The overall cost of achieving the reductions is currently estimated at £3.3million. This doesn't include the decarbonisation of energy consumption in leisure centres, which will drive up the cost significantly where the SKDC bears such improvement and upgrade costs.

Figure 2: Projection of the total SKDC business as usual emissions (incl. grid decarbonisation), the effect of proposed projects and the carbon neutral target



Projects have been phased out from lowest – highest costs in terms of pounds spent per ton of carbon saved (£/tCO₂e abated estimated costs only). In reality, these projects would be appropriately phased out over a prolonged project timeline and dependent on a number of factors not assessed here e.g. available funding

2030 Carbon Reduction Pathway - Projects

- In consultation with the Council, projects have been phased according to the estimated cost per tonne of carbon dioxide abated (CAPEX £/tCO₂e), with the most cost efficient projects deployed first.
- The costs and emissions provided in this report are estimates, and the order (CAPEX / tCO₂e) may be subject to change when actual quotes are received as the projects progress.

	Estimated CAPEX GBP	Annual emissions saving tCO ₂ e	£ / tCO ₂ e	Annual cost saving GBP	Payback Years
St Peters Hill measures	265,000	193	1,376	18,344	14.4
Guildhall measures	116,200	81	1,431	9,258	12.6
Fleet management	468,000	286	1,636	110,283	4.2
HRA measures	280,000	165	1,702	16,977	16.5
Stamford Arts Centre measures	18,000	9	2,006	3,583	5.0
Streetlighting	718,600	199	3,615	62,769	11.4
Fleet electrification	1,464,000	146	10,055	57,706	25.4
Leisure Centre measures	TBC	840	TBC	147,396	TBC

Street Lighting Reduction Opportunities

SKDC has responsibility for 3,593 street lights across the district. The majority of lights are 35W (or 36W) low pressure sodium lamps. No information has been received regarding their state of repair (or column upgrade needs). Conservative energy savings of 40% are assumed achievable by upgrading all lamps to appropriate LED alternatives. Additional savings will also be possible through implementing “control” savings such as dimming and/or trimming. Beyond energy and carbon savings, SKDC would also benefit from reduced maintenance and lamp replacement lifecycle costs facilitated by the additional burn hours that LED alternatives bring over traditional streetlights.

Illustrative energy and cost savings for a full LED upgrade with 50% dimming between 00:00-06:00 are detailed below. Maintenance savings and potential savings through centralised management or trimming have not been included. A full detailed feasibility assessment should be conducted to ascertain more accurate costs and savings before moving forward with these measures. Funding support may be available through Salix (<https://www.salixfinance.co.uk/loans/street-lighting>).



Streetlighting Upgrades

- LED upgrade of 3,593 existing low pressure sodium 35W lamps
- Running circuit wattage with charging load equates to 58W power requirement
- LED alternative would draw 35W (no circuit loss) and is dimmed by 50% between 00:00-06:00
- **199 tCO₂/year 1 estimated saving**
- £718,600 estimated capital cost (£200/lamp inc. installation)
- 569,282 kWh/year saving
- £62,769/year cost saving (@ 11p/kWh)
- Further assumptions and info can be found in Appendix 3.

HRA Carbon Reduction Opportunities

Electricity and gas consumption at HRA assets creates 1,169 tCO₂e of emissions equating to approximately 15% of the baseline (including upstream emissions).

- The majority of the emissions arise from ~4 GWh of gas consumption (80% of carbon emissions from HRA assets)
- ~1GWh of electricity is also consumed (20% of carbon emission from HRA assets)

Limited information has been received about the breakdown of energy consumption, number of sites, technologies, etc. therefore assumptions have been made. Table 2 provides an indication of where energy is consumed. Water heating (i.e. non space heating) and “other” electrical energy (plug points, lifts etc.) have been assumed. It is also assumed that 100% of the energy consumption is associated with communal areas. SKDC should gather a detailed list of sites, disaggregated energy consumption readings and associated M+E equipment to move forward with understanding the potential for carbon reduction of HRA assets.

For illustrative purposes however, the savings from an upgrade of 50% of the lighting to LED and electrification of 25% of the gas use is presented (and included nominally within this action plan). These figures should however be updated using calculations based on actual figures in future iterations of this plan. Further assumptions can be found in Appendix 3.

Demand profile	kWh	% of use	tCO ₂
Communal Heating - Electric	401,010	8.1%	140
Communal Lighting - Electric	511,174	10.4%	178
Communal - Electric Other	56,797	1.2%	20
Space Heating – Gas	3,767,175	76.3%	789
Water Heating – Gas	198,272	4.0%	42
TOTAL	4,934,428	100%	1,169

Table 2: Demand profile breakdown



LED lighting upgrade

- Upgrade 50% of existing fittings to LED units
- **36 tCO₂/year saving**
- 102,235 kWh/year saving
- £12,268/year cost saving
- £80,000 nominal cost



Electrify heating system

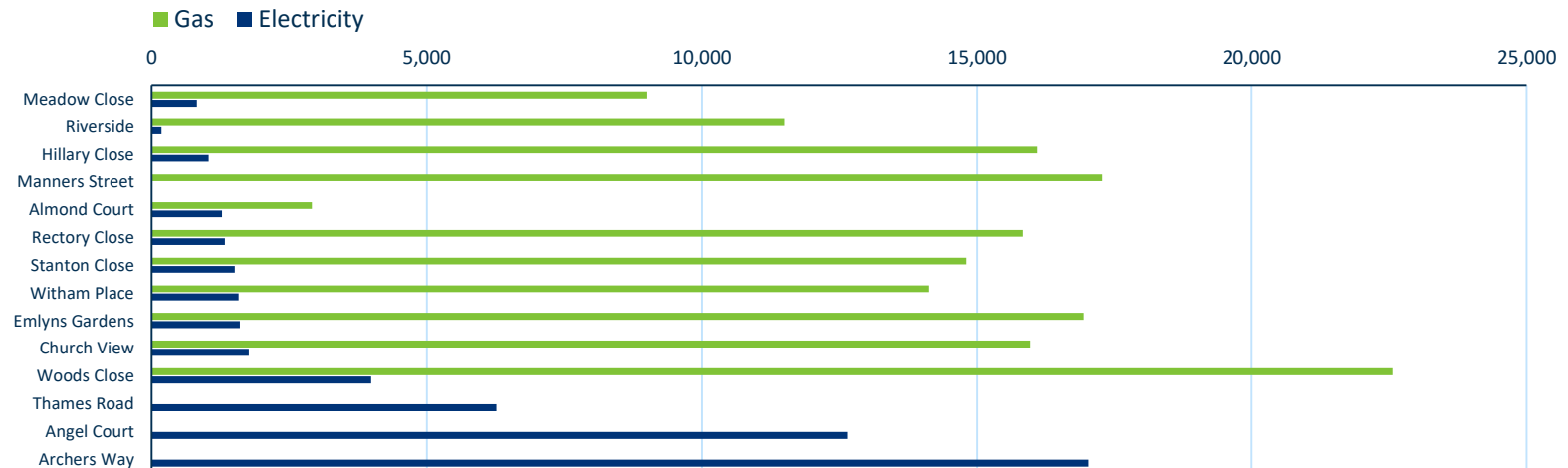
- Electrification of 25% of gas consumption
- **129 tCO₂/year saving**
- 745,587 kWh/year saving
- £4,709/year cost saving
- £200,000 nominal cost

HRA Hotspots

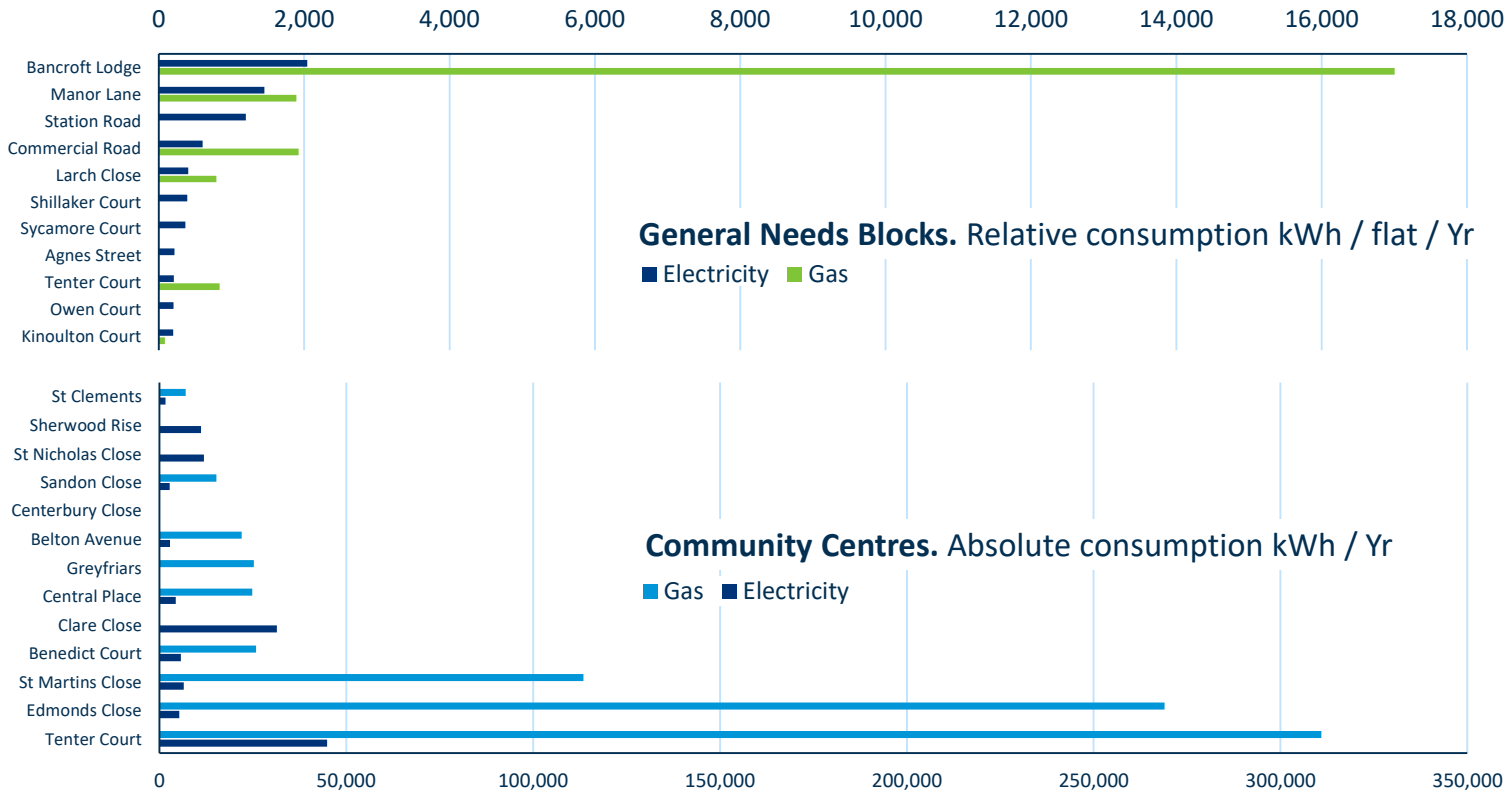
The Council's HRA assets include 32 General Needs Blocks, 22 Sheltered Houses, and 14 Community Centres. Actions related to these assets should be prioritised by assessing performance relative to the overall stock, and a benchmarking exercise should be undertaken to identify the worst performing assets. The exercise should be sensitive to the typical use of the buildings, floor area, number of inhabitants etc.

A preliminary benchmarking exercise has been performed based on data made available by SKDC. For General Needs Blocks & Sheltered Housing, benchmarking was performed on a kWh/flat/Yr basis. This exercise should be extended by the Council to account for other factors that exist but where data was not available for this report (e.g. SKDC boundaries of responsibility, floor area, typical use). As seen below, potential carbon reduction focus areas would be on high gas consumers such as Woods Close and Manners Street to better understand reasons for apparently poor energy performance. These sites could be targeted for heat electrification pilot projects (e.g. heat pumps). Please note that this data was provided retrospectively, and does not relate to the financial data utilised for the initial footprint.

Sheltered Housing. Relative consumption kWh / flat / Yr



HRA Hotspots



Community centres have been assessed on an absolute basis as data for suitable benchmarks (e.g. floor area) was not available. In the absence of any generally acceptable data, a qualitative review of the building's use, operating hours etc. should be performed to identify poor performers. Bancroft Lodge, Tenter Court and Edmonds Close should be investigated as a priority to understand reasons for relatively high gas consumption and potential options for efficiency improvements and/or low carbon heat sources such as heat pumps.

Fleet vehicle management Carbon Reduction Opportunities

Driver style has a big impact on fleet fuel efficiency and driver training can reduce fuel consumption and emissions, as well as maintenance costs and risks of accidents. Typically training can save around 6-7% (6.5%* has been assumed for our calculations). Sustaining these savings is challenging, but we have assumed that all drivers of fleet vehicles attend the training twice between 2021 and 2030.

Telematics systems including GPS tracking are a useful fleet management tool, providing drivers with live feedback and guidance on driving behaviour as well as providing more accurate tracking of fuel consumption and costs. Research suggests that fleets could save 9% in fuel savings by switching to telematics**.

Using telematics to monitor fuel consumption and driver behaviour can be used to tailor driver training initiatives. Additionally, the use of telematics to determine vehicle performance and maintenance schedules reduces the time a vehicle is running inefficiently



Driver training – regular training course for all vehicle operators

- 125 tCO₂/year saving
- £36,000 estimated cost
- £48,000 saving (difference between current fuel costs and reduced fuel costs)



Comprehensive telematics

- 161 tCO₂/year saving
- £432k estimated cost (over the next 10 years = £20/month/vehicle)
- £62,221 saving/year (difference between current fuel costs and reduced fuel costs)

Further details, guidance and background assumptions can be found in Appendix 3.

*Department of Transport, 2016, Efficient Driving https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/509972/efficient-driving-rapid-evidence-assessment.pdf

**Fleetworld, 2018, Telematics could offer 9% fuel savings to fleets <https://fleetworld.co.uk/telematics-offer-9-fuel-savings-to-fleets/>

Fleet vehicle electrification Carbon Reduction Opportunities

The current fleet operated by South Kesteven District Council consists of 180 vehicles, the majority of which are diesel fuelled. The Council operate three small electric vehicles. Electrification of the fleet would lead to significant carbon reduction. To quantify this opportunity, it has been assumed that all “Responsive Repairs” vehicles (totalling 48 currently diesel vehicles) will be replaced by comparable electric vehicles (EVs) from 2026 and that mileage will remain constant. Rollout could start prior to 2026, if suitable comparable vehicles are available.

Currently the majority of fleet is owned by the Council and not operated on a lease basis. The estimated capital costs below show two procurement alternatives 1) outright ownership and 2) leased. The cost of electric vehicle charging points and supporting infrastructure is included in the costs.

Deep electrification of the fleet is not immediately viable for SKDC; the nature of the district requires long rural journeys, and a significant proportion of the fleet is stored remotely at operators’ home addresses. For vehicles less suited to electrification in the short-term (e.g. refuse collection vehicles), biofuels or hybrid cars are an effective way of decarbonising fleet emissions. For 2019, emissions associated with biodiesel and plug-in hybrids were ~99% and 35% lower than conventional diesel respectively. With the current constraints & maturity of large EV technology the Council should assess the suitability of biofuel and hybrid solutions in the short-medium term, whilst closely monitoring the costs and maturity of the EV market, particularly for larger vehicles. Where and when the circumstances allow, the Council should prioritise wholly-electric vehicles.



Fleet electrification

- Full electrification of council fleet of vehicles and installation of charging points
- **146 tCO₂/year saving**
- Capital Costs
 - a) £1.46m estimated cost (outright purchase x48 vehicles)
 - b) £168k estimated cost (annual lease costs x48 vehicles)
- £57,700/year cost saving (difference between electricity and diesel running costs)



Further details, guidance and background assumptions can be found in Appendix 3.

Leisure centre Carbon Reduction Opportunities

The emissions associated with SKDCs four Leisure centres represent the single largest source of emission within the measured baseline. This equates to approximately 41.5% of the total 7,600tCO₂e in 2018/19. Emissions arising from SKDC leisure are deemed to be scope 3 emissions due to the operational “ownership” of those energy sources residing with the management companies who run the centres. As such these emissions are deemed “downstream leased assets” according to the GHG protocol. The management of their energy consumption is outside of SKDC’s direct sphere of influence. Nonetheless SKDC has chosen to incorporate the associated emission within the chosen “at least 30%” reduction target by 2030.

An in-depth assessment and prioritisation of energy reductions potential should be conducted at all leisure centres to update the potential carbon emission reduction within this plan. This will require planning and liaison with the management companies and alignment with future development plans.

A few simple energy efficiency measures can reduce energy consumption however. Although specific measures for reducing energy consumption should be identified through more detailed assessment:



- Maintaining air and water temperatures of swimming pools within (CIBSE¹) recommended temperatures
- Regularly cleaning of swimming pool filters
- Installing pool covers for when pools are not in use
- Explore renewable energy heat source potential



- Switching off fitness machines during quieter times and overnight
- Installing the most efficient exercise equipment available
- Roll out of LED lights across all areas
- Comprehensive monitoring and targeting of energy use through appropriate energy management system

Leisure centre Carbon Reduction Opportunities

To provide an illustrative yet practical reduction from leisure centres within this action plan the following has been assumed:

- An improvement in the kWh/m² of 20% for Grantham and Bourne Leisure centres (currently DEC rating C and D respectively)
- An improvement of 45% for Stamford leisure centre (currently DEC rating F)
- A fuel switch from oil based heating to gas and an overall improvement of 20% of kWh/m² for Deeping Leisure.

Nominal carbon savings equate to **840tCO₂e / year and almost £150k in cost savings**. Capital costs are impossible to estimate at this stage.

Further details can be found in appendix 3.

Grantham Leisure centre

- Existing: 832 kWh/m²
- New: 665 kWh/m²
- **235 tCO₂/year saving**
- 1,036,104 kWh/year saving
- £42,892/year cost saving
- £TBC cost

Bourne Leisure centre

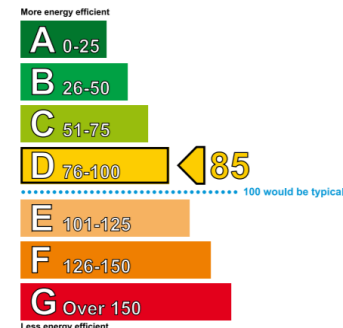
- Existing: 1,208 kWh/m²
- New: 967 kWh/m²
- **105 tCO₂/year saving**
- 460,092 kWh/year saving
- £19,177/year cost saving
- £TBC cost

Stamford Leisure centre

- Existing: 2,114 kWh/m²
- New: 1,163kWh/m²
- **232 tCO₂/year saving**
- 1,001,581 kWh/year saving
- £44,157/year cost saving
- £TBC cost

Deeping Leisure centre

- Existing: 868 kWh/m²
- New: 600 kWh/m²
- **268 tCO₂/year saving**
- 590,414 kWh/year saving
- £41,171/year cost saving
- £TBC cost



St Peter's Hill Carbon Reduction Opportunities

South Kesteven District Council's main office (St Peter's Hill) was built in the 1970s and extended to include SK House in the 1980s. The two buildings were separated during a refurbishment to SK House in 2018/19, during which upgrades to the plant room and building management system were made. St Peter's Hill is currently heated using a series of No.10 boilers (c. 1980s) although some are decommissioned, and less than 10% of lighting is met with high efficient LED fittings. The building therefore offers significant opportunity for decarbonisation.

In total, the projects identified for St Peter's Hill have the potential to reduce SKDC's emissions by **162 tCO₂e** per year, whilst saving **924,767 kWh** and **£18,344** annually at a total capital cost of **£265,000**. Further details of these projects can be found in Appendix 3.

1. Energy management with aM&T



- Implementation of enhanced energy management systems across the site
- **6 tCO₂/year saving**
- 20,224 kWh/year electricity saving
- 1,436 GBP/year cost saving
- £0 capital cost

2. Lighting upgrades



- Upgrade all existing fittings to LED units
- **30 tCO₂/year saving**
- 84,499 kWh/year electricity saving
- 9,644 GBP/year cost saving
- £50,000 capital cost

3. Solar PV installation



- Assessment and installation of Solar PV units across the existing roof spaces
- **20 tCO₂/year saving**
- 58,020 kWh/year electricity saving
- 6,622 GBP/year cost saving
- £60,000 capital cost

4a. Upgrade heating system: gas boiler



- Replacement of existing boiler system with more efficient gas boilers.
- **51 tCO₂/year saving**
- 243,070 kWh/year gas saving
- 5,024 GBP/year cost saving
- £35,000 capital cost

4b. Upgrade heating system: ASHP



- Electrification of heating system with an air source heat pump (ASHP)
- **137 tCO₂/year saving**
- 762,024 kWh/year gas saving
- 643 GBP/year cost saving
- £150,000 capital cost

Guildhall Arts Centre Carbon Reduction Opportunities

The Guildhall Arts Centre is located in Grantham, and part of the cultural services provided by the Council. It's primary purpose is the promotion and offering of arts' experiences, however the building is also used by the community for various workshops, meetings, parties etc. The building's long operating hours make it a priority case for refurbishment to achieve both decarbonisation and occupier comfort; it's operation is currently typical for a building of its' nature (DEC rating of 99).

In total, the projects identified for the Guildhall Arts Centre have the potential to reduce SKDC's emissions by **81 tCO₂e** per year, whilst saving **382,704 kWh** and **£9,258** annually at a total capital cost of **£116,200**. Further details of these projects can be found in Appendix 3.

1. Energy management with aM&T



- Implementation of enhanced energy management systems across the site
- **3 tCO₂/year saving**
- 12,654 kWh/year electricity saving
- 821 GBP/year cost saving
- £3,000 capital cost

2. Lighting upgrades



- Upgrade all existing fittings to LED units
- **11 tCO₂/year saving**
- 12,654 kWh/year electricity saving
- 4,132 GBP/year cost saving
- £10,000 capital cost

3. Solar PV installation



- Assessment and installation of Solar PV units across the existing roof spaces
- **3 tCO₂/year saving**
- 9,670 kWh/year electricity saving
- 1,230 GBP/year cost saving
- £10,000 capital cost

4. Upgrade AHU fans & VSDs



- Upgrade to EC plug fans and variable speed control in the air handling units
- **8 tCO₂/year saving**
- 22,714 kWh/year electricity saving
- 2,889 GBP/year cost saving
- £8,200 capital cost

5a. Upgrade heating system: gas boiler



- Replacement of existing boiler system with more efficient gas boilers.
- **20 tCO₂/year saving**
- 96,846 kWh/year gas saving
- 2,152 GBP/year cost saving
- £20,000 capital cost

5b. Upgrade heating system: ASHP



- Electrification of heating system with an air source heat pump (ASHP)
- **55 tCO₂/year saving**
- 305,182 kWh/year gas saving
- 184 GBP/year cost saving
- £85,000 capital cost

Stamford Arts Centre Carbon Reduction Opportunities

The Stamford Arts Centre is a Grade II listed building. The building forms part of the Council's cultural offering, and is formed of a 166 seat theatre, a large ballroom, and several other multi-functional rooms. Each year, the Arts Centre attracts approximately 750,000 visitors. The ballroom has recently been refurbished with an efficient HVAC system, however much of the building requires supplementary portable electric heaters. The gas-heated sections of the building are heated using recently installed boilers. Efficient LED lighting is sparsely rolled out in the Centre. The listed status of the Arts Centre restricts many of the measures that can be deployed, particularly to the external fabric. The measures suggested are sensitive to this practical constraint, and offer a strong business case for implementation. In the long run, SKDC should commission an internal insulation survey in order to ascertain the possibility of improvements to heat loss levels through secondary glazing and other internal insulation measures. This will in turn reduce the need for expensive electrically heated portable systems which are estimated to account for 20% of electrical use on site.

In total, the projects identified for Stamford Arts Centre have the potential to reduce SKDC's emissions by **9 tCO₂e** per year, whilst saving **26,231 kWh** and **£3,583** annually at a total capital cost of **£18,000**. Further details of these projects can be found in Appendix 3.

1. Energy management with aM&T



- Implementation of enhanced energy management systems across the site
- **2 tCO₂/year saving**
- 7,041 kWh/year electricity saving
- 848 GBP/year cost saving
- £3,000 capital cost

2. Lighting upgrades



- Upgrade all existing fittings to LED units
- **7 tCO₂/year saving**
- 19,190kWh/year electricity saving
- 2,735 GBP/year cost saving
- £15,000 capital cost



Other Emissions – Grantham Depot and other sites Carbon Reduction Opportunities

SKDC operates a number of smaller sites (in terms of carbon emissions) including the Depot where vehicle and workshop operations are based. The Depot accounts for approximately 100 tCO₂e equating to >1% of overall emissions. A provisional site visit was conducted although full access was not granted and currently there remains uncertainty around the metering arrangements for the 3 buildings on site. In addition, it has been indicated that the future of the site is in question and it is likely that SKDC will need to relocate to facilitate more space for vehicles and workshop areas. As such it is not recommended that any significant investment is made at the Depot until future considerations are taken into account. However there are a number of low cost or “no regret” actions that should be considered at this site (and others not specifically highlighted) alongside the larger capital investment decisions elsewhere that have been highlighted above. These primarily concern the treatment of the energy consumption at all sites as a controllable resource by implementing management procedures such as those outlined below. These have not been quantified in terms of savings but remain important.

Monitoring and reporting:

- Regular collection of energy consumption and cost data through automatic metering monitoring and targeting (aM&T) systems
- Analysis of consumption against energy drivers (e.g. occupancy levels, external temperature), time and utility bills
- Regular (annual) reporting



Energy policy

- Agreed by senior management
- Communicated to all employees
- Reviewed at least every 3 years
- Quantitative improvement targets.



Addressing energy waste

- Including suggestions for changes (lights left on, over-heating, over-cooling, water leaks)
- Job/Priority sheets for reducing energy waste (e.g. repair leaking/dripping taps)
- Maintenance schedules to include reducing energy wastage
- Operating instructions to include energy use issues (e.g. nightly shut down procedures). Active reporting systems



Appointment of senior staff member with responsibility for energy and energy champions appointed

- Clear job description & assigned adequate resources for designated person
- Regular management meetings to review energy use



Other Emissions – Business travel Carbon Reduction Opportunities

The emissions associated with business travel on behalf of SKDC currently total **99 tCO₂e**. Whilst proportionally and in terms of prioritisation, there are more carbon intensive hotspots the Council should target, the following opportunities should be considered to encourage a reduction business travel associated emissions. These opportunities largely revolve around reducing the total journeys and mileage being completed by Council employees.

- The use of Skype and MS Teams (and other video conferencing tools) are a great way to cut down on face to face meetings.
- Car sharing and encouragement on the use of public transport where possible should also be investigated.

Ultimately SKDC will need to engage with its employees to better understand the practical implications of reducing its business travel footprint.



Remote working



Video conferencing



Car sharing Incentives



Encourage use of public transport



Employee engagement

Other Emissions – Waste Carbon Reduction Opportunities

Whilst waste accounts for only a very small proportion of overall carbon emission measured in the baseline, it is a tangible emission source that many employees will be aware of and can contribute to. The following measures can be considered as part of this action plan to begin dealing with waste. Waste is a controllable resource that can be reduced through concerted effort and action .



Quantify – By understanding the volume and types of waste produced it is possible to fully attribute a cost to this. It is necessary to understand costs of purchasing products and subsequent disposal. This data can then be annualised to understand the impact and prioritise action areas. Site specific waste audits of all buildings will build an understanding of the type and volume of waste arising. Where appointed, working with the waste contractor, will increase understanding of how waste is managed, where it goes and how much this costs.



Use a suitable waste management company – There may be another waste management company which suits your organisation better. In order to establish whether your current service provision is fit for purpose, compliant and offers value for money, a number of key questions should be asked: How often are bins collected? Are they full when collected? (You could be paying for empty or nominally empty bins being emptied). Are there any discounts/more favourable rates available for segregating recyclable waste? Does your contractor offer complementary additional services to help manage or reduce your waste such as waste audits or waste prevention planning? How and when will 'Duty of Care' documentation be provided?



Improve recycling management– Clearly label recycling bins to show where and what can be recycled. You should check the contents of your recycling bins regularly to ensure that the recyclables are not contaminated. Ensure everyone understands the cost benefits of recycling correctly. Consider removing or reducing the number of waste bins around your premises. To aid corporate approval, develop the business case for restricting the residual waste capacity inside the premises.

Other Emissions – Water Carbon Reduction Opportunities

Whilst water also accounts for only a very small proportion of overall carbon emission measured in the baseline, it is another tangible emission source that many employees will be aware of and can assist with reductions. The following measures can be considered when as part of this action plan to begin dealing with water as a controllable resource that can be reduced through concerted effort and action.



Stop dripping taps – A dripping tap can waste more than 5,500 litres of water per year. To help identify leaks and other water losses take meter readings last thing at night and first thing in the morning to ascertain how much water is being used outside working hours. Check your pipes and contact your water supplier to help locate leaks. The savings from tap maintenance or replacement may be worth the investment.



Install water reducing kit in washrooms – Cistern dams, flow restrictors or percussion taps can all reduce water and costs. Consider installing taps that are self-closing or with infrared sensors; as well as reducing water use they can improve hygiene. Consider the cost benefit of procuring water reducing kit on a site by site basis. Expertise and resource is needed to select items to procure given the number of offerings on the market.



Regularly maintain water systems and lower the water pressure – Regular maintenance of taps will ensure that soap deposits and scale does not cause leaks or jammed taps. A flow rate of 5-6 litres per minute is adequate for hand washing. Tap aerators and flow restrictors are low-cost solutions which can reduce water use by up to 70%.

Beyond 2030

Looking beyond 2030, the Council has committed to endeavouring to become net-zero carbon as soon as viable before 2050. This report has not explored the potential pathway to achieving this target. There are several areas the Council would need to explore further to determine how to reach this ambition.

- **Defining net-zero** – as per the definition (below) it is necessary to further define this target. There are a several methods and we would suggest exploring this as an additional piece of work.
- **Defining the pathway to 2050** – Once the target is defined, this means extending analysis conducted to 2030 (as per slide 19 and 21) to 2050 to understand the scale of emissions reduction challenge.
- **Identifying projects to reach net-zero**
 1. Deeper application of existing projects such as more comprehensive and sooner electrification of the fleet (e.g. before 2035).
 2. New projects to reduce emissions through energy demand reduction, electrification and renewable energy such as smart battery storage technologies, vehicle to grid (V2G) applications for electric vehicles and Council lead district heating and cooling networks.
 3. Only after reducing emissions as much as possible, considering offsetting any remaining/residual emissions.

Definition of a net zero organisation:

“A net-zero organisation will set and pursue an ambitious **1.5°C aligned Science Based Target** for its **full supply chain** emissions. Any remaining hard-to-decarbonise emissions can be compensated with certified **greenhouse gas removal (GGR)**’

(Draft Science Based Target Initiative /Carbon Trust definition)

Further explanation and exploration:

www.carbontrust.com/news-and-events/insights/net-zero-an-ambition-in-need-of-a-definition



Section 4: 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 the carbon reduction 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.

Governance

The Cabinet Member for Commercial & Operations is the Cabinet lead for climate change and will continue to champion the Council's response to climate change and carbon reduction. The Climate Change Action Task & Finish Group is charged with developing carbon reduction options and proposing these to the Environment Overview & Scrutiny Committee, in turn, the Environment Overview & Scrutiny Committee will then make recommendations to Cabinet.

It is intended that carbon reduction initiatives will be mainstreamed in to Council-wide strategic, service and project plans to ensure that these are actively factored in as part of the core objectives of each of these with clear accountability held by those delivering these – for example, any leisure centre reduction measures would be expected to form part of the leisure centre programme plans. All Overview & Scrutiny Committees would have a role in informing, scrutinising and strategically monitoring this across their relevant remits. To support this, all decision reports also have a climate change impact assessment.

General coordination, oversight and advice will continue to be provided by the Sustainability and Climate Change Officer with support from the Council's Performance Lead officer to provide climate/carbon performance data across all areas. Council-wide updates on progress against the Council's carbon reduction targets could be reported to Environment Overview & Scrutiny Committee, via an annual position statement report.



Section 4: Governance and Engagement

Stakeholder Engagement

Robust engagement with stakeholders from across the Council will be a crucial for successful climate action implementation. The Council should explore innovative ways through which the whole organisation can contribute towards achieving carbon neutrality by 2030.

Achieving the greatest possible input and buy-in will allow SKDC to work closely with all stakeholders to identify the areas of the Council to prioritise 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.

Developing a robust **stakeholder engagement plan** should build on previous engagement to:

- Develop an initial list of stakeholders from across the Council to continually engage
- Complete internal in-depth stakeholder mapping exercise to identify, map and prioritise key stakeholders from across the Council. This will ensure that key stakeholder needs are identified and understood with the relevant resources being targeted effectively.
- Develop and agree a communications/engagement strategy that clearly details the Council's approach towards stakeholder engagement, ensuring complete transparency.
- Develop the appropriate tools to accurately plan and track all stakeholder interaction and store stakeholder information.



Section 5: Monitoring and Reporting

Once a carbon footprint has been measured and a target set, measuring progress is an important part of implementation. Monitoring and reporting are essential activities that should be undertaken at least annually between the baseline year and target year, and beyond.

Monitoring

Collecting 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. The 'Carbon Trust Footprint Calculator' provides a tool to collect data and calculate an updated footprint (using updated emission factors where necessary).

Not only does the footprint need to be monitored but progress with implementing carbon reduction opportunities should be actively monitored too, including implementation year, energy reduction and cost savings. In this way, successful projects can be reported on in quantitative as well as a qualitative way. This can help to drive momentum and support securing budget towards future measures.

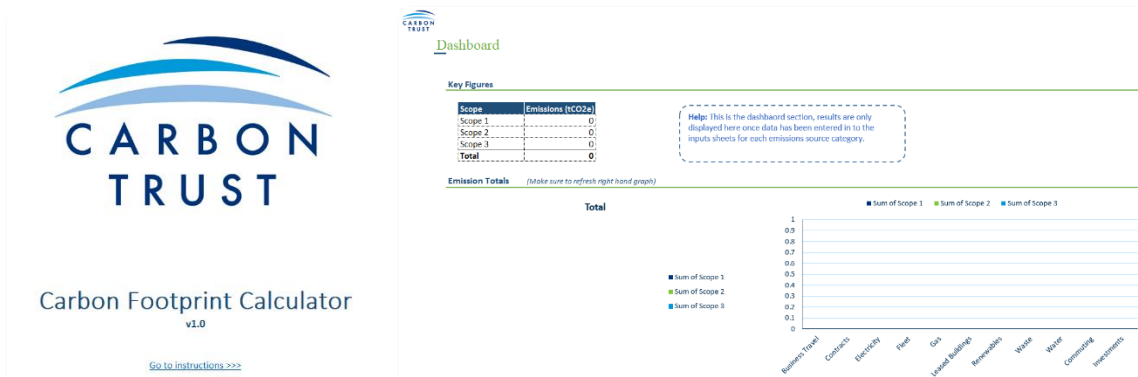
In addition to monitoring the footprint itself, the project team should continually monitor how local plans and policies will affect the Council's footprint and affect the ability of the Council to reach respective carbon reduction targets. This will help the project team to identify other potential carbon reduction opportunities and ensure that any carbon reduction co-benefits of specific policies can be delivered.

Section 5: Monitoring and Reporting

Reporting

Annual reporting of the carbon footprint is essential. Not only does it ensure transparency but can also identify any arising issues which could prevent the target being met. A key measure should be the annual emissions reductions achieved across the Council, alongside the overall progress towards meeting the target, and implementation of carbon reduction opportunities.

Internal and external reporting processes and mechanisms should be established as part of the programme management. As a minimum progress should be reported annually and communicated to the X team as part of ongoing programme management. Communicating more widely with stakeholders across the District will ensure transparency and demonstrates progress towards targets. The footprint and progress can also feed into annual reports and local plans.





Appendices

1. Excluded emission sources
2. General notes
 - Capital costs
 - Decarbonising heat
3. Further information and assumptions:
 - Street lighting
 - HRA assets
 - Fleet management
 - Fleet electrification
 - Leisure centres
 - SKDC buildings



Appendix 1: Excluded emission sources

Some emission categories are not relevant to a Council's operations and have therefore been excluded from this footprint.

In future, SKDC could consider exploring expanding its footprint to include supply chain/scope 3 emissions the emissions, such as employee commuting, procured service and investments. This would require additional data.

Emission Source		
Scope 3	Capital goods	Out of scope: Does not play a key role in the Council's operations.
	Upstream leased assets (3 rd party owned, Council operated – Leisure Centres)	Included
	Employee commuting	Excluded from scope of this report
	Procured services (contracts)	Excluded from scope of this report
	Franchises	Out of scope: No franchises controlled by the Council
	Investments	Excluded from scope of this report
	Downstream transportation and distribution	Out of scope: No sold goods distributed by the Council
	Processing of sold products	Out of scope: Not applicable to the Council's operations
	Use of sold products	Out of scope: Not applicable to the Council's operations
	End-of-life treatment of sold products	Out of scope: Not applicable to the Council's operations

Appendix 2: General notes



Capital Costs

- The capital costs stated in this report are based on the application of technical principles and professional evaluation. The professional evaluations are based on information available and are conditioned by data limits, scope of work and time.
- Whenever possible, calculation of energy and economic savings has been performed. Similarly, approximate capital costs were estimated which can be used to derive simple payback.
- All suggested projects require verification and detailed assessment prior to proceeding with implementation.
- It would be prudent to conduct detailed life cycle assessments particularly for high capital value projects factoring in a number of variables that are not included within to derive more sophisticated metrics such as NPV and IRR for improved evaluation and prioritisation.

Decarbonising Heat

- The majority of decarbonisation pathways include the electrification of heat sources (e.g. replacement of gas boilers with electrically-powered heat pumps).
- Heat pumps output at a lower temperature compared to gas boilers and their operation is therefore more sensitive to the energy efficiency of the building.
- Before electrification is considered, a building's fabric (e.g. air tightness, insulation, ventilation) should first be considered and upgraded where necessary to ensure that an appropriately sized heat pump can efficiently meet the heat demand of a building.

Appendix 3: Further information and assumptions - Streetlighting LED



- When selecting new lights, it is essential the quality of light is considered, not just its energy consumption. There are many measures used to evaluate the effectiveness of lighting besides the energy it consumes and SKDC should be careful to ensure the quality of lighting is not compromised. Indicators and technical terms used to evaluate the quality of lighting besides energy consumption include (but are not limited to) light output, lighting intensity and glare, light density, light pollution, good colour rendering levels and colour temperature. In addition lighting design software can be used to simulated new lighting schemes (renders) and manufacturers or independent lighting designers should always produce comparative renders of the existing and planned lighting, especially if the existing columns are being retained.
- Additional benefits of LEDs include more focused light which improves night-time visibility (and therefore reduces vehicle accidents), and reduces light pollution for local residents. Their significantly longer life expectancy (10 to 12 years for LED v 3 - 6 years for conventional lighting) means reduced maintenance costs, fewer lamp renewals, less scouting and physical monitoring.
- It has been assumed 40% of energy would be saved by converting street lights to LED. The actual energy saving realised will vary according to many factors including the difference between the wattage of the current luminaire and the LED proposed. Before selecting an LED replacement, the quality of light must be respected, the light output must be equivalent or better and the lamp should have a colour rendering index greater than 70. The use of white light sources (lamps with a colouring index greater than 60) allow a lower lighting class to be used on residential roads which also brings about potential savings in energy consumption.
- A cost of £0.11 per kWh has been used, which was derived from the data collection. The implementation cost is based on £200 per LED luminaire (£150 for a 35W LED equivalent and £50 per unit installation fee). It assumes that column replacements will not be needed given many suppliers offer an LED luminaire-only replacement solutions meaning the column doesn't have to be replaced.
- It must be noted that LED project costs are also influenced by other installation costs, survey costs, adviser costs, dimming and trimming technology and a central management system (CMS) therefore the estimated figure may not reflect total actual costs.
- The calculations assume lamps are not currently dimmed. It is estimated that a further 33% reduction would be achieved by dimming all lamps to 50% of their output between 00:00-06:00. Its is assumed all streetlights are upgraded to LED by 2022.

Appendix 3: Further information and assumptions - HRA Assets



- Limited information has been received regarding the number of sites, disaggregated energy consumption, systems/technology/plant involved and specification of energy using equipment.
- SKDC should seek to ascertain in the first instance whether all energy quoted under this emissions source resides within communal areas or includes energy consumed within tenant areas e.g. communal heating systems for flats.
- LED lighting upgrade figures assume that 50% of the quoted energy consumed for lighting is currently provided by fluorescent style lamps and can therefore be upgraded to LED creating a 40% reduction in energy use.
- It is estimated that 35kW of LED would be required to upgrade the associated lighting at a cost of £2,500/kW of LED.
- The electrification of heating system estimate is not based on any actual data and significant further investigation is required to ascertain the costs, savings and practicalities of such upgrades.
- Due to the significant up-front costs associated with electrifying heat, it is important that the Council undertakes robust planning and feasibility assessments to ensure the installation of systems delivers both energy and cost savings. This includes a robust assessment of necessary building fabric and oversized heat emitters to cope with lower temperatures that heat pump systems generally operate at.
- This illustrative estimate assumes that 25% of the current gas heating demand could be upgraded with heat pumps alternatives meeting with a co-efficient of performance (COP) of 3.6 providing a target demand of 706,345kWh (determined from assuming the current gas fired heating system is 75% efficient).
- Cost are based on a nominal £200,000 and will vary significantly depending on the nature of the situation which is deemed outside this assessment.
- Year 1 carbon reduction figures are based on 2018/19 carbon factors and factor in the reduction of grid emission going forward.
- It is assumed that the carbon savings associated with HRA measures are fully implemented from 2023.

Appendix 3: Further information and assumptions - Fleet management



Driver training

- To quantify this opportunity, it is assumed that 180 drivers (one driver per vehicle) undertake 2 training between 2021 and 2030.
- Each course of training is estimated to cost ~£100 (a market snapshot show costs vary but this is conservative estimate).
- Research shows that fuel efficiency improvements were greater when driver were trained more than once*.
- In terms of overall carbon reductions, up to 25% reduction is possible*, but more realistically the reduction is estimated to be between 5-10% in the long terms. We have assumed an 6.5% long term reduction*.

Telematics

- It is assumed that improved or new telematics would be used for all 180 fleet vehicles, and that the cost of this would be £20/month per vehicle*** to provide driver management, in-depth live tracking, traffic updates, sophisticated reporting, maintenance tracking and driver safety analysis.
- The impact of telematics in terms of savings can vary*, we have assumed a 9% fuel saving**.
- It should be noted that use of telematics is not solely about technology instalment. Adoption of telematics need to be designed to the needs of the Council and engage with employees on the benefits to be deliver savings.

Fleet policy

- A formal fuel efficient fleet policy is a commitment to reducing dependency on fuel across the organisation. It should provide the framework and roadmap for taking action to reduce fleet fuel consumption going forward, and set targets for continual year-on-year improvements.

Case studies: [Dumfries and Galloway Council](#), [Leeds City Council](#)

Guidance: [Guide to managing grey fleet mileage](#), [Guide to Telematics](#)

*Department of Transport, 2016, Efficient Driving https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/509972/efficient-driving-rapid-evidence-assessment.pdf

**Fleetworld, 2018, Telematics could offer 9% fuel savings to fleets<https://fleetworld.co.uk/telematics-offer-9-fuel-savings-to-fleets/>

***Expert Market, 2020, Vehicle Tracking Costs 2020, <https://www.expertmarket.co.uk/vehicle-tracking/vehicle-tracking-systems-cost>

Appendix 3: Further information and assumptions - Electrification of Council fleet



Electric Vehicles

- To quantify this opportunity, it is assumed that all responsive repair vehicles will be replaced by comparable electric vehicles, and that the mileage will remain constant.
 - There are 50 responsive repair vehicles within the total fleet of 180 vehicles (of which 2 are currently electric)
- The location of Council's depot may change in the next few years replaced by a new depot. We understand discussions around this are ongoing within the Council. We are also aware that some fleet vehicles are taken home by employees, the cost of charging infrastructure related to home charging has not been taken into account.
- Some of the vehicles proposed for replacement are larger vans, for which the commercially viable models are currently emerging, therefore it may take some time for the Council to replace these vehicles.
 - Car derived (small) and medium electric vans (up to 2.2 tonnes) have been available for some time. A variety of models are now available from different manufacturers, each with their own performance specifications.
 - At present, there is a very limited range of large 3.5 tonne electric vans available, however projections indicate that this is likely to change as whole markets transition towards electric vehicles. A number of vehicle manufacturers have actively been testing and trialing a variety of electric light commercial vehicles (LCVs), however the majority of these are still considered to be in their prototype phases. The cost of such vehicles is the predominant barrier, and it is estimated that currently they are at least twice as expensive as the equivalent diesel van. This is likely to reduce over time as the market develops.
- A conservative approach has been taken in terms of the implementation timeline, this could of course begin sooner with more vehicles delivering greater carbon savings. Waste vehicles will be the most challenging to electrify but SKDC should keep this under close consideration given the associated carbon emissions. Trials have begun elsewhere in the UK (<https://resource.co/article/sheffield-trials-waste-powered-electric-bin-lorries>)
- One of the simplest ways of reducing LCV fleet emissions and costs is to downsize the vehicles where possible. When vehicles are due for replacement the current usage should be robustly and independently reviewed and the need for large vans challenged. The impact of this approach has not been included in calculations.

Appendix 3: Further information and assumptions - Leisure Centres



- SKDC have decided to include leisure leased asset portions of their operations within their core footprint and target. Many councils are now beginning to include previously unmanaged and unmeasured resources from their scope 3 footprint, such as outsourced leisure operations into their plans. SKDC should however be commended for the decision to include the centres within the target.
- At present, limited information has been provided regarding the energy efficiency and energy management status of the leisure centres outside of the associated energy consumption. All sites are known to be managed by an external management company.
- Display Energy Certificates for each centre were however obtained online to determine the associated energy intensity per m² for the reported year 18/19.
- To provide an illustrative yet realistic target for each leisure to contribute to the 30% reduction target, it has been suggested that for Grantham and Bourne Leisure centres a reduction of 20% in electricity and gas use needs to be achieved (DEC rating C and D respectively). In these instances it is likely that the improvements would bring about an uplift in the DEC ratings to B and C respectively which is deemed a realistic target (not modelled and could go further).
- The current DEC rating of an F at Stamford Leisure centre indicates poor energy performance and it is assumed for the purposes here that a 45% improvement in the energy intensity could be achieved improving the DEC rating to a D.
- Given the presence of an Oil based heating system at Deeping Leisure centre, the assumption is made that this can be switched to Gas (although electrification inline with other section of this report should seriously be considered in the first instance) and an overall improvement of 20% could also be achieved.
- The cost of achieving these improvements has not been estimated to the lack of site level information and the high level nature of the above. It could be assumed however that to achieve such reductions £1000-£2000 per ton of carbon saved (840 in this illustrative example) may be required equating to £840,000 - £1,680,000. Costs involved could however be many orders of magnitude higher depending on a wide variety of factors.

Guidance: [Hospitality sector energy saving guide including leisure and fitness facilities](#)

Appendix 3: Further information and assumptions - SKDC buildings



The energy performance of the visited sites conformed to a similar standard. In general, there was no/limited building management system in place, < 10% LED light fittings and no on-site renewable energy generation. Additionally, St Peter's Hill and the Guildhall Arts Centre are both entirely or partially heated by boilers over 20 years old. Many of the suggestions are therefore standardised 'easy wins' that can be applied across the Council's building stock. More information and the assumptions for the projects are contained below:

1. Energy management with aM&T

- The Council should look to develop an overall policy and procedure towards energy management across its sites. Energy management is a continuous process that develops over time. A blend of both technological and management interventions is required in order to develop robust energy management procedures. The Council will need to ensure that any strategy is integrated, proactive, and incorporates energy procurement, energy efficiency and renewable energy to be fully effective.
- Estimated savings have been calculated based on industry-accepted estimates, and information obtained from physical site visits (e.g. proportion of electric heating). % reduction in total electricity consumption, and % reduction in gas consumption for space heating were assumed to be as follows: **St Peter's Hill**, 2.0% & 1.0%; **Guildhall Arts Centre**, 3.0% & 2.0%; **Stamford Arts Centre**, 5.0% & 1.0%

2. Solar PV installation

- Simulations were run using 250 W panels each occupying an area of $\sim 1.6 \text{ m}^2 \text{ panel}^{-1}$. The building was assumed to consume 100% of the electricity produced by the array, and a CAPEX of £1,000 per kW was applied.
- Useable roof areas of 400 m^2 and 65 m^2 were estimated for St Peter's Hill and the Guildhall Arts Centre, respectively.
- The occupancy of building's visited were consistent with the generation profile of a solar PV system, and an energy storage system (e.g. a battery) has not been included in the business case. Further consideration of a site's *actual* demand profile should be made to access the suitability of an energy storage system to increase the utilisation of electricity generated.

Appendix 3: Further information and assumptions - SKDC buildings



3. Lighting upgrades

- LED lighting offers significant energy savings over typical fluorescent tube lighting. The quality of light produced and types of fittings available can also make for a more attractive, exciting and comfortable working environment. 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.
- The proportion of electricity used for lighting was estimated for each building, derived from industry benchmarks and information obtained from physical site visits. This varied from between 13.8% - 15.9% for the three sites.
- Expected kWh saving of 40% from the LED & control system rollout was used to estimate savings. Costs were approximated using 2500 £/kW of LED.

4. Heating system upgrades

- For all the sites visited, space and water heating make up a considerable proportion of the site's emissions. Where heating upgrades have been recommended, two options have been put forward (a. electrify heating through an air source heat pump, or b. upgrade existing gas boilers).
- The business case for installing a heat pump is often weaker than upgrading with traditional gas boilers. However, the enhanced efficiency of a heat pump and grid decarbonisation make for greater carbon savings relative to a gas boiler. The business case for heat pumps is expected to significantly improve with sector maturity and Government policy (e.g. increase in gas levies).
- By choosing the cheaper straight swap option for upgrading existing gas boilers, the council will very likely lock themselves into a more carbon intensive heating source for buildings over the coming years. As such, it is strongly advised that electrified heating should be thoroughly investigated for all sites in the future.
 - a. **Air source heat pumps.** Electrical demand of heat pump derived assuming current gas boiler efficiency of 70% and heat pump COP of 4 – 4.1. Cost assume £425/kW of estimated heat demand required (350kW for St Peters Hill and 200kW for the Guildhall)
 - b. **Upgraded gas boilers.** Gas consumption of upgraded boilers derived assuming current gas boiler efficiency of 70% and a new boiler efficiency of 95%. Costs assume £100kW of estimated heat demand required (350kW for St Peters Hill and 200kW for the Guildhall).



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