West Lindsey District Council

Carbon Action Plan

February 2021

Key contacts

Prepared by:

Rob Franklin, Senior Analyst
Rob.Franklin@carbontrust.com

Approved by:
Graham Hunter, Manager
Graham.Hunter@carbontrust.com
Floriane Ortega, Manager
Floriane.Ortega@carbontrust.com

Prepared for:

Steve Leary
Commercial Waste Manager
steve.leary@west-lindsey.gov.uk

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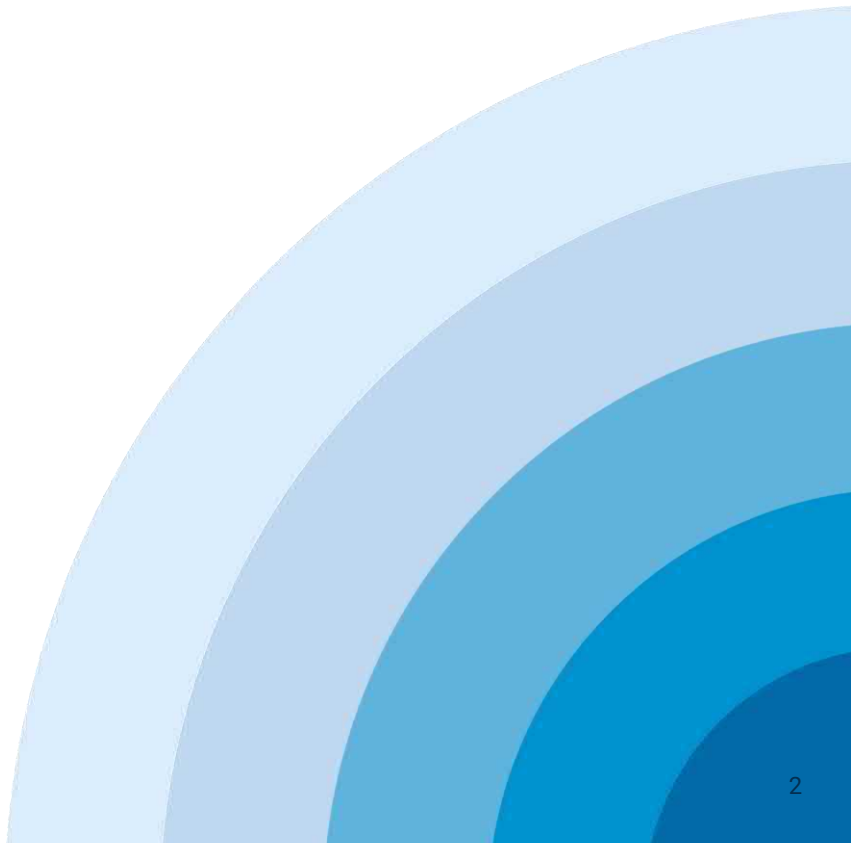


1. Executive summary

Background and Context

Growing acknowledgement of the latest science and recommendations from the Committee on Climate Change have 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^{o}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 became the first major economy in the world to pass laws to end its contribution to global warming by 2050 by setting a target of achieving net zero emissions by 2050. Local authorities have a crucial role to play in developing effective pathways towards reducing their emissions, which, if successfully achieved, will help to reduce climate impacts at both the local and national scale as well as delivering public health co-benefits resulting from cleaner air and leading a more active lifestyle.

In November 2019, West Lindsey District Council (WLDC) resolved to make the council's activities net zero carbon by 2050. To support this target, the council are developing a new Sustainability, Climate Change and Environment Strategy, due to be launched in May 2021. This report has been commissioned by the Council to help achieve their carbon reduction targets.

Action Plan summary

- This Carbon Action Plan will form a key part of WLDCs response to the climate crisis and emerging Sustainability, Climate Change and Environment Strategy. This Plan sets out a number of recommendations that WLDC should initially work towards in order to accelerate carbon reduction across the Council, actions that will seek to support their carbon reduction target.
- The Council has recently produced an updated Carbon Management Plan, which has enhanced overall understanding of the key emissions hotspots across the organisation, allowing for the targeted analysis identified throughout this Action Plan.
- WLDC has set a carbon reduction target of achieving net zero emissions across their own operations by 2050. The Council recognises the importance of decisive action on this issue, and will work closely with members and the wider district to ensure that this target is continually reviewed and updated to reflect emerging carbon reduction ambitions.

Carbon reduction opportunities

A summary of the recommendations identified are listed below:

Emissions hotspot	Project	CAPEX [GBP]	Annual savings [GBP]	Simple payback [yrs]	Annual savings [tCO_2e]	CAPEX/ tCO_2e
Transport	Review all travel related policies and ensure alignment with decarbonisation ambitions	Internal costs only	0	Instant	21.09	0
Transport	Incorporate fuel efficient driving into driver training and refresher courses	8,000	10,800	0.8	26.43	303
Transport	Replacement of manager vans with electric vehicles	12,000	3,900	3.1	15.17	791
Transport	Waste and Street Cleansing fleet electrification	6,264,000	17,300	362.5	865.93	7,234
Leisure Centres	Require third-party operators to implement a formal energy management system, e.g. ISO 50001	Internal costs only	0	Instant	26.54	0
Leisure Centres	Implement requirement for third-party operators to report energy/carbon performance of buildings, at least annually	Internal costs only	0	Instant	10.61	0
Leisure Centres	Compile plant and equipment inventory and work with site operators to implement a replacement schedule based on life cycle analysis	Internal costs only	0	Instant	39.46	0
Leisure Centres	Solar PV at Market Rasen Leisure Centre	18,000	1,912	9.4	5.03	3,576
Council Buildings	Implement a formal energy management system to cover all major energy consuming sites	Internal costs only	1,900	Instant	6.87	0
Council Buildings	Compile HVAC plant inventory and implement a replacement schedule based on life cycle analysis	Internal costs only	2,200	Instant	11.08	0
Council Buildings	Electrification of space heating	TBC	TBC	TBC	83.64	TBC
Public Facilities	LED streetlighting	155,900	20,800	7.5	54.82	2,843

2. Carbon footprint

Carbon Footprint Methodology

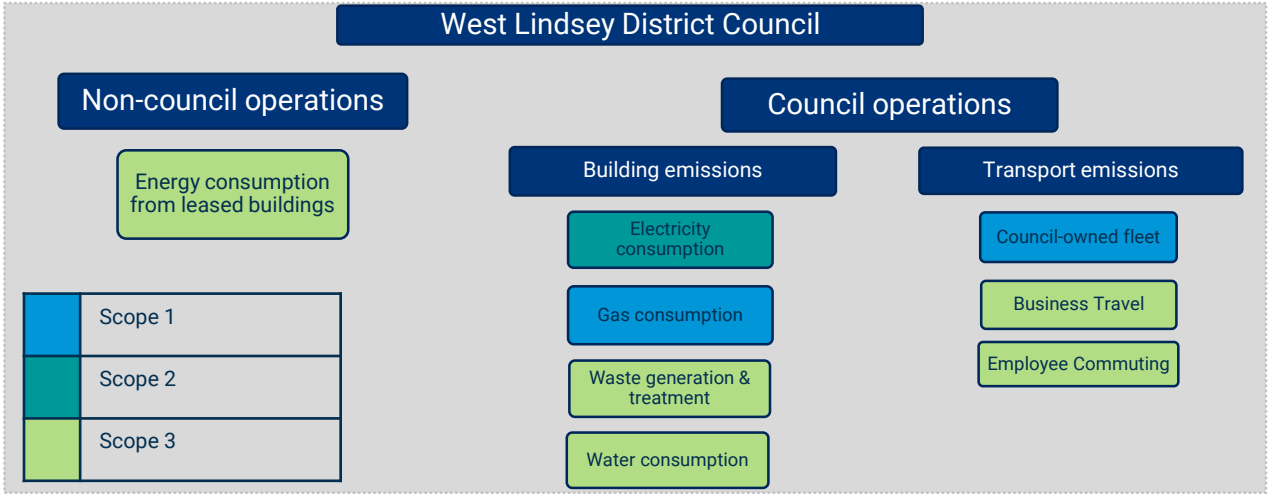
This chapter provides an inventory of greenhouse gas emissions for WLDC for the financial year 2019/20. This inventory, or footprint, provides the council with a 'baseline' of emissions for this period.

Council Target

It is important to note that the emissions included in the council's footprint measurement are different to those emissions included in the council's carbon reduction target (**see slide 17**). It is these emissions included under the council's target that will be used to measure and evaluate the council's carbon reduction progress going forward.

Methodology

This footprint has been calculated according to the Greenhouse Gas (GHG) Protocol, the most widely used and accepted methodology for greenhouse gas accounting. The GHG Protocol classifies emissions as either scope 1, 2, or 3 (Figure 1). This chapter presents the scope 1,2 and selected scope 3 footprint for WLDC. In the case of the council, a scope 1 and 2 footprint measures those emissions associated with direct council-led operations, whilst scope 3 elements of the footprint account for the emissions associated with indirect activities.



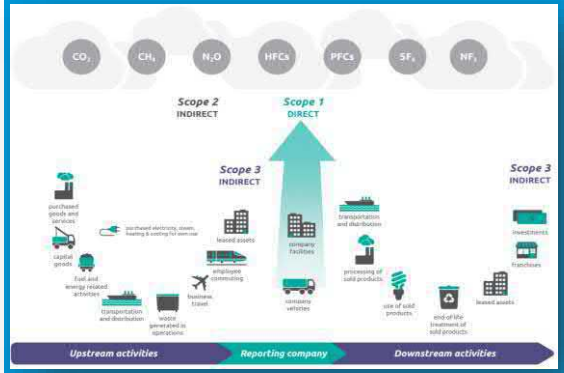


Figure 1: The GHG Protocol emissions classification

- **Scope 1:** Direct emissions from combustion of gas and other fuels.
- **Scope 2:** Emissions resulting from purchased electricity, heat, or steam.
- **Scope 3**: Emissions made by third parties in connection with operational activities.

How carbon footprints are calculated

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.**

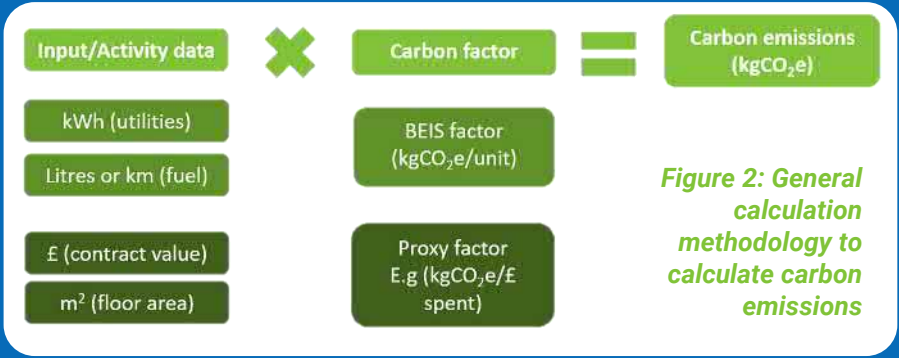


Figure 2: General calculation methodology to calculate carbon emissions

What does CO_2e mean?

Carbon dioxide (CO_2) is the most well known of all of the greenhouse gases. There are six other commonly reported GHGs, which can be seen in Figure 1 on the previous page. In footprinting carbon dioxide equivalent (CO_2e) is used in order to express the impact of the other gases in terms of the amount of CO_2 that would create the same amount of warming.

Data availability and the use of benchmarks

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:

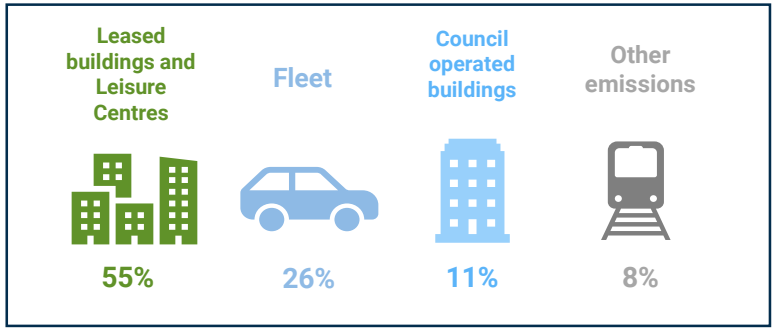
- Benchmarks can be used to approximate activity data. For example, typical electricity consumption per m^2 of a building.
- When input data is scarce, proxy factors can be used in place of the BEIS factors to approximate emissions from the available input data (e.g. contract value).

West Lindsey District Council has worked closely with the Carbon Trust to ensure that their carbon footprint is as comprehensive and accurate as practically possible at this time. Real activity data for gas and electricity consumption has been used for all council-operated sites. Additional assumptions have been made in order to obtain a full data-set for LPG emissions at the council's Lea Fields Crematorium, alongside data for employee commuting (see Footprint Report for full breakdown of assumptions).

West Lindsey District Council FY 19/20 Footprint

West Lindsey District Council's total measured carbon footprint for the 2019/20 financial year is 3,428 tonnes of CO2 equivalent (tCO_2e).

- **Scope of emissions:** 69% of the footprint is associated with scope 3 emissions from leased buildings, leisure centres, business travel and commuting, water and waste. Scope 1 emissions account for 25% of the overall footprint, whilst scope 2 emissions account for the remaining 6%.
- **Emissions by activity:** Approximately 55% of the measured footprint emissions are associated with electricity and gas use across the council's leased buildings. This includes emissions across the Gainsborough and Market Rasen Leisure Centre facilities, which account for 16% of the overall footprint. Fleet fuel consumption is responsible for 26%, whilst electricity and gas use across council operated buildings accounts for 11% of the total footprint. Approximately 8% of emissions are associated with the treatment and disposal of water and waste across council operated sites, alongside emissions from business travel and commuting.



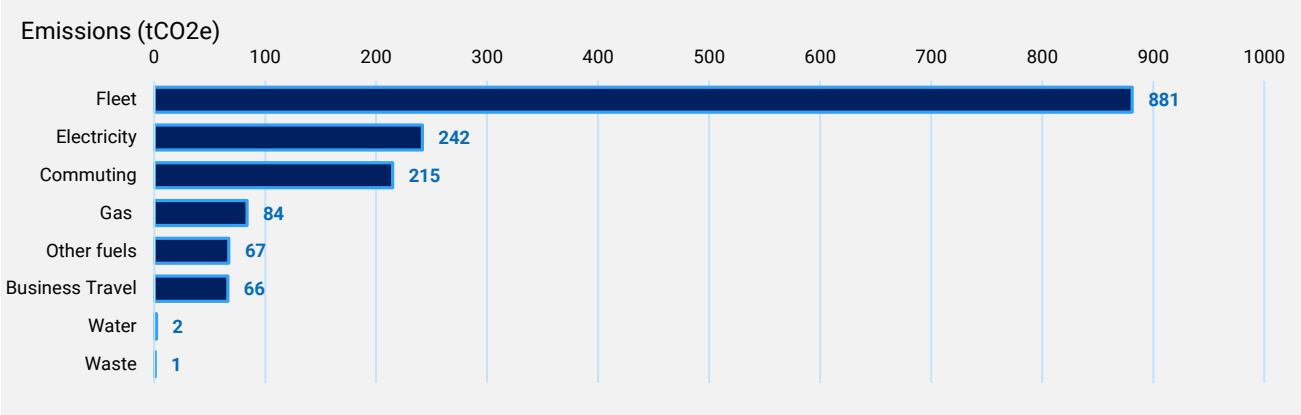
Scope	Emission source	tCO_2e
1	Natural gas	83.6
1	Other fuels	67.4
1	Fleet	881.1
2	Electricity	241.7
3	Leased Buildings	1339
3	Leisure Centres	530.7
3	Employee Commuting	214.8
3	Business Travel	66.4
3	Water	2.1
3	Waste	1.0
	Total Emissions	3,428

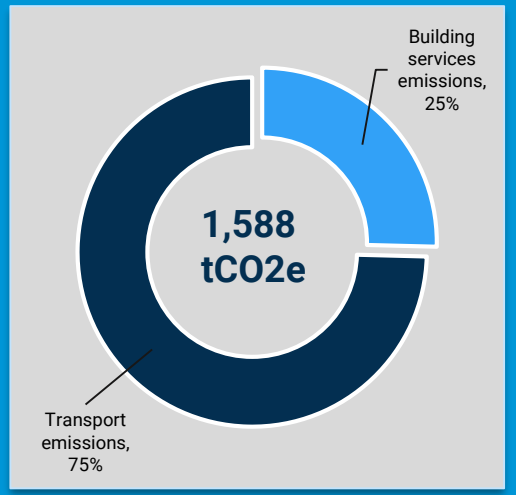
Footprint in Detail: Operational emissions

The next pages in this chapter explore the **operational carbon emissions of WLDC**. These include a mix of direct and indirect emissions associated with the council's direct operations and use of their own buildings and assets, i.e:

- **Scope 1:** Gas (primarily for heating buildings and water), other fuels (LPG), and vehicle fuel consumption across the Council's own fleet;
- **Scope 2:** Electricity consumption within WLDC buildings and across council owned car parks (streetlighting);
- **Scope 3:** Waste, water supply & treatment (arising from WLDC operated buildings), business travel and commuting.

Operational emissions across WLDC total 1,588 tCO_2e (45% of the total footprint). Fleet and electricity consumption are the two largest sources of emissions. Operational emissions across the council can be categorised into two main sources: **Building Services and Transport emissions.** 75% of emissions are associated with activities relating to transport, including the operation and use of the council's fleet vehicles, employee commuting and business travel.



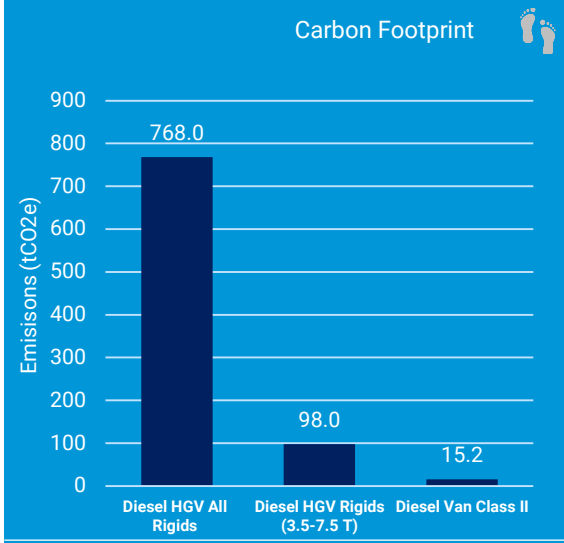


Breakdown of WLDC operational emissions by source

Footprint in detail: Transport emissions

The council own and operate a large fleet of vehicles, all of which are diesel powered. **Emissions from council-owned fleet vehicles account for 26% of the overall carbon footprint, the largest operational source of emissions.**

- The majority of emissions from fleet vehicles are associated with the use of Heavy Goods Vehicles (HGVs) across the council. HGVs of all sizes account for 98% of total emissions from fleet vehicles.
- The common decarbonisation pathway for fleet vehicles is the adoption of low carbon alternatives. The share of low carbon vehicles across the Council's fleet will therefore have to grow in order to achieve decarbonisation targets.



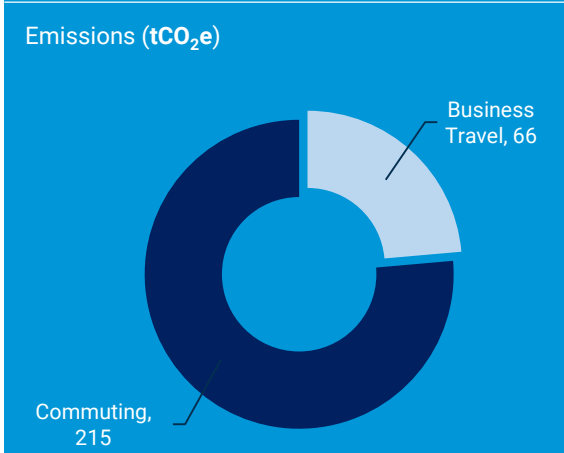
Emissions associated with business travel and employee commuting total 281 tCO_2e, accounting for 8% of the council's overall footprint.

Business Travel

- Includes the emissions associated with vehicles not directly operated by the council, but used to perform council business (i.e. use of employee vehicles during business hours)
- An overall mileage of 179,464.9 was provided and used to calculate emissions for business travel.

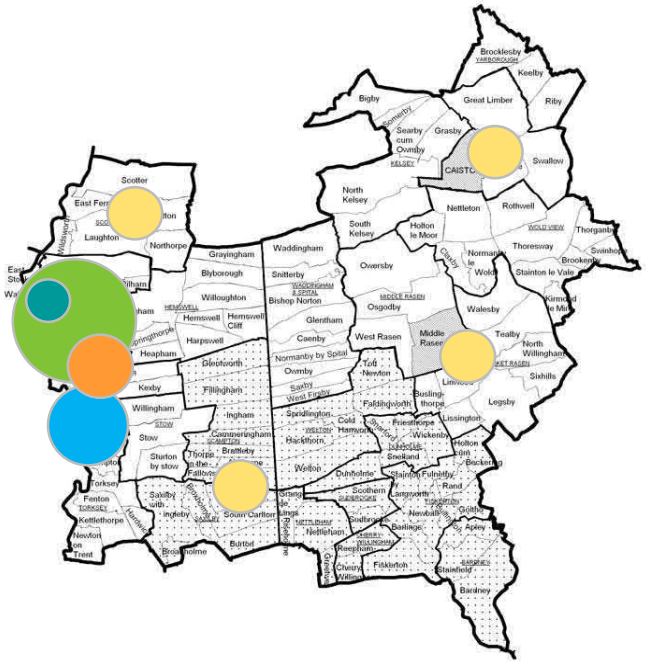
Employee Commuting

- Emissions associated with vehicles not directly operated by the council, but used by employee to travel to and from a place of work (i.e. use of employee vehicles outside of business hours).
- A number of assumptions have been used to calculate commuting mileage in the absence of first-hand data. A representative sample of 139 employees was used and average commuting distance calculated to obtain commuting mileages (See Footprint Report).



Footprint in detail: Building Services emissions

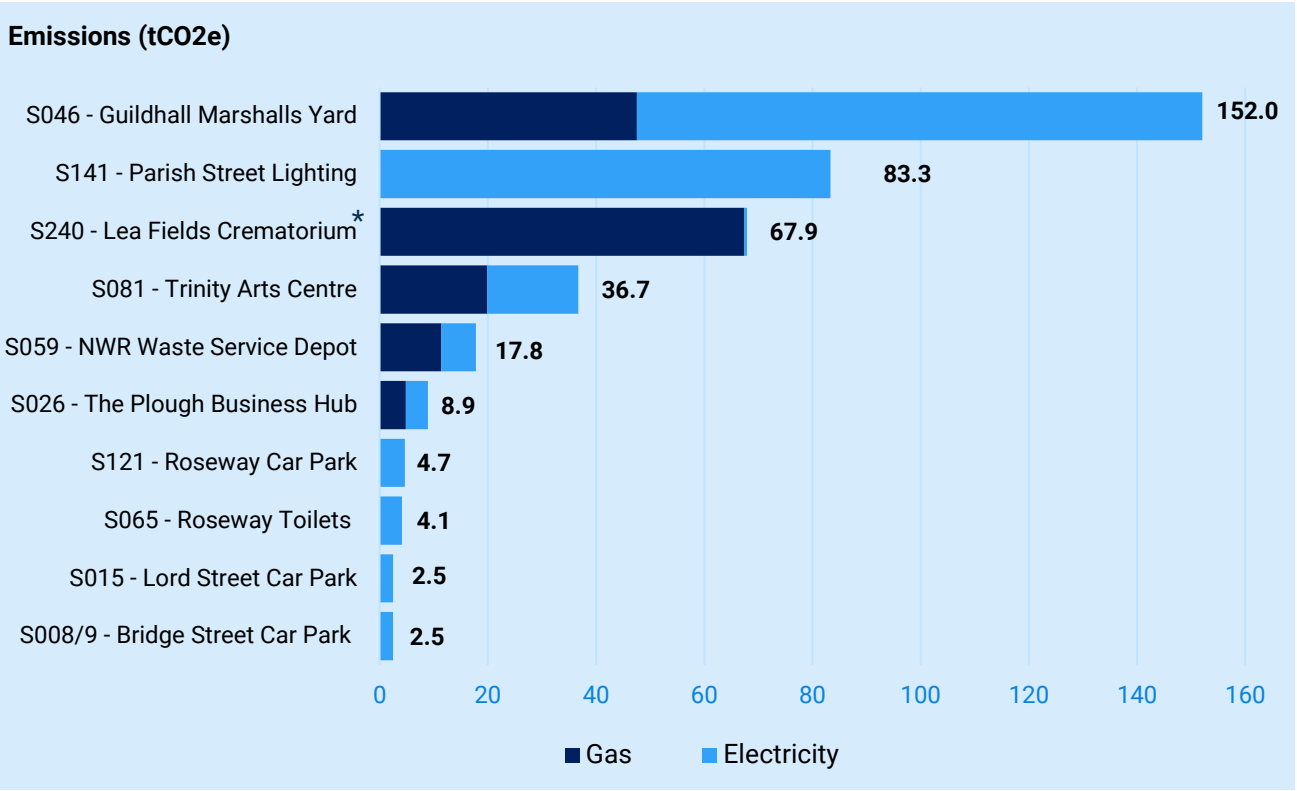
The majority of carbon emissions from WLDC operated buildings and sites are associated with the Council's main office building, **Guildhall Marshalls Yard**, which accounts for **39% of total gas and electricity emissions across council operated sites.** Emissions from streetlighting across council operated car parks are also included in the council's carbon footprint measurement, accounting for 24% of total emissions across council operated sites.



Building/Site*	Total tCO_2e
Guildhall Marshalls Yard	152
Parish Street Lighting	83.3
Lea Fields Crematorium	67.9
Trinity Arts Centre	36.7
NWR Waste Service Depot	17.8

** Only the top 5 buildings/sites are shown, ordered by total emissions*

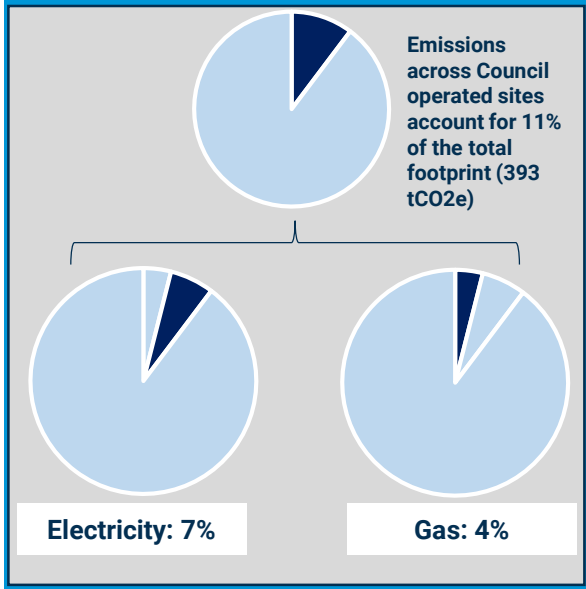
Footprint in detail: Building services emissions



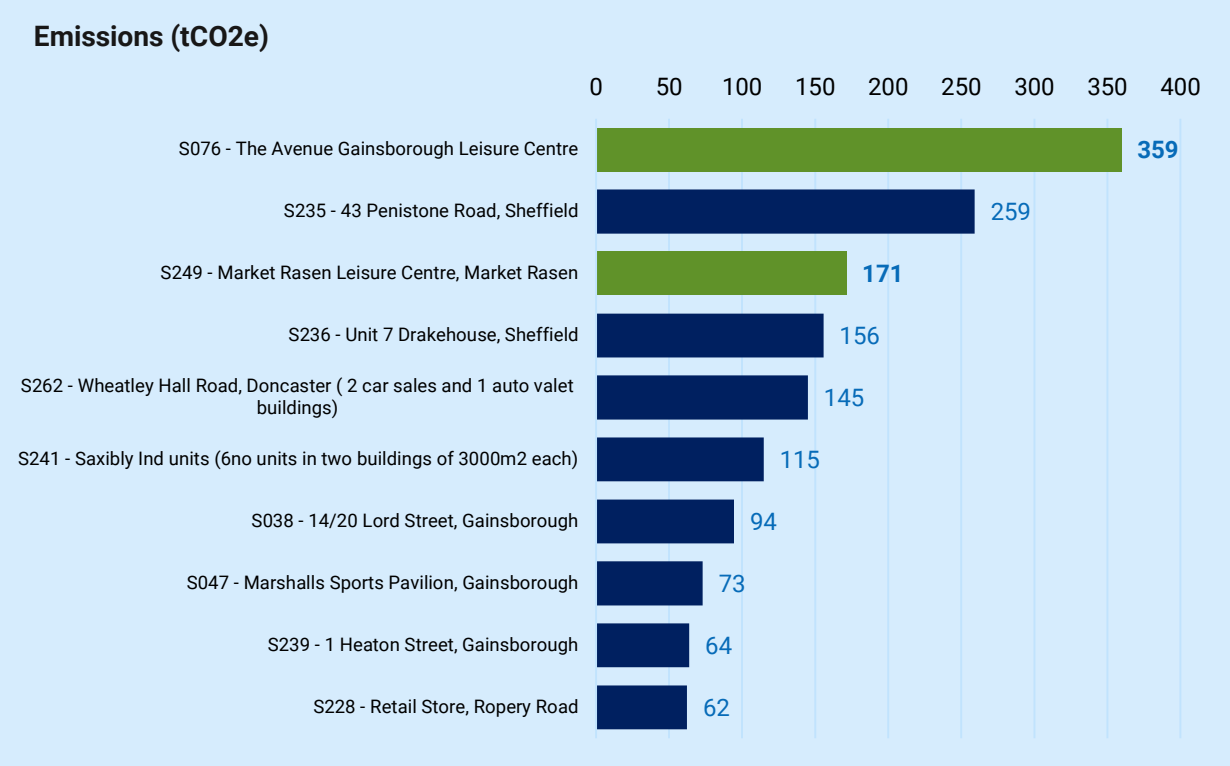
** Emissions from the Lea Fields Crematorium site are as a result of Liquid Petroleum Gas (LPG) consumption*

Analysis of emissions

- Only the top 10 buildings/sites are shown
- Total emissions from electricity and gas consumption across all council operated sites are **393 tCO_2e**, accounting for approximately 11% of the council's overall carbon footprint.



Footprint in Detail: Leased Buildings and Leisure Centres



Leased Buildings

- For this iteration of the Council's footprint, the majority of emissions from leased buildings have been calculated using CIBSE benchmarks, taking into account overall floor area. Where available, actual consumption data has been used to calculate a buildings emissions e.g. Gainsborough Leisure Centre.
- Energy consumption (gas & electricity) in buildings owned by the Council and leased to a 3rd party operator accounts for approximately **55% of the Council's total carbon footprint (1339 tCO_2e).**
- The council has 32 buildings that they own and lease out to a third party operator. Only the top 10 highest emitting sites are shown.
- WLDC owns the Gainsborough and Market Rasen leisure centres but leases both these sites to a third-party operator who is in charge of operations across the centres. **Both these sites account for 16% of the overall carbon footprint.**
- The Council acknowledges the fundamental role that both leisure centre facilities have on council operations. The decision has been made to include both facilities in the Council's Net Zero target for carbon reduction moving forward (see Slide 17).

3. Net Zero target

A note on the net zero target boundary

West Lindsey District Council's total measured carbon footprint for the 2019/20 financial year is **3,428 tonnes of CO2 equivalent (tCO2e)**. Full details of this can be found in the WLDC Footprint Report.

WLDC has set a carbon reduction target of achieving net zero emissions across their own operations by 2050.

This target covers those emissions sources that are under the operational control of the Council, as well as emissions associated with the provision of services to the community, Leisure Centres (which are currently operated by third parties on behalf of the Council). A full list of the emissions sources covered by the Council's net zero target is shown in the table opposite.

A decision has been made to exclude all other leased buildings from the Council's net zero target. The Council acknowledges the importance of reducing emissions across these sites, and will work closely with building operators in order to improve overall understanding of emissions across these buildings, however, in the short term WLDC's Action Plan will focus on reducing emissions from the sources opposite.

Below: WLDC Net Zero Target Boundary

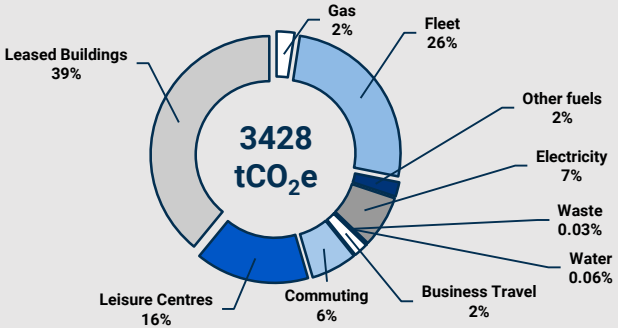
WLDC Net Zero Target Boundary	
Scope 1	• Natural gas • Other fuels (LPG) • Fleet vehicles
Scope 2	• Purchased electricity
Scope 3	• Water • Waste • Business travel • Employee commuting • Emissions from the council's leisure centres (Gainsborough and Market Rasen)

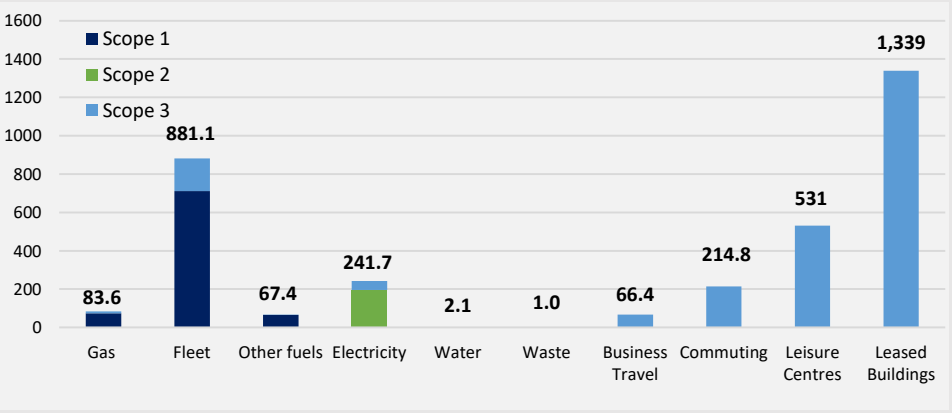
Excluded scope 3 emissions (to be considered for future inclusion in the net zero target boundary):

- Leased buildings (excluding leisure centres)
- Capital goods
- Procured goods and services
- Investments

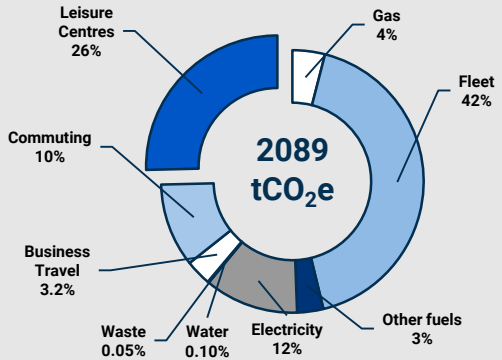
Measured Footprint vs Targeted Footprint

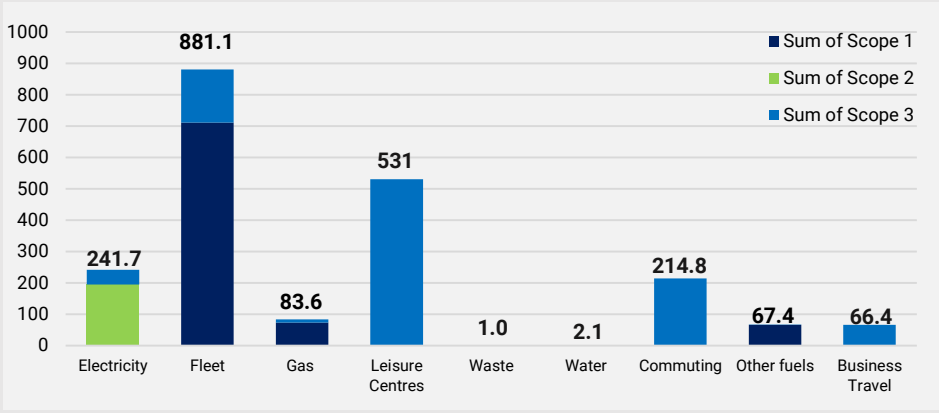
Total measured footprint





Targeted footprint

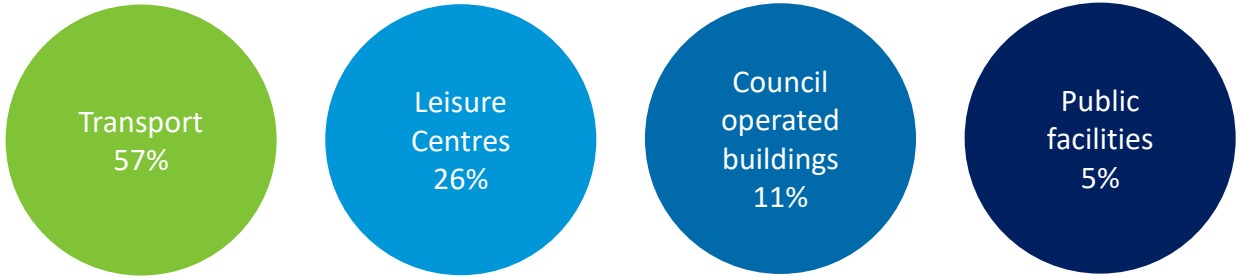




4. Carbon reduction opportunities

Introduction to project identification

The Carbon Trust has performed desk-based analysis to identify decarbonisation initiatives across the targeted footprint. This analysis focused on 4 emissions 'hotspots' which when combined are responsible for approximately 99% of the targeted footprint:



A data collection phase was initiated for each emissions hotspot. The project identification was based on the data received, primarily a fleet inventory, site audit data collection forms, streetlighting inventories, footprint data, and interviews with key stakeholders. The expected carbon savings and costs of the initiatives (where these could be reasonably estimated) are presented in the following pages. Recommendations in the report cover:

- Transport policy
- Driver training
- Fleet electrification
- Monitoring & reporting
- Carbon accounting
- General energy management
- HVAC plant
- Solar PV
- LED streetlighting

Between now and 2030, the carbon intensity of the UK's national grid is expected to reduce by 64%.

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). Many of the recommendations made in this report focus on the 'electrification' of conventional fuel sources so that this greener electricity can be utilised by the Council.

Recommendations summary

The anticipated financial requirement for each of the recommendations was estimated, including capital costs (CAPEX), annual savings, and cost of carbon abated, wherever data was available to calculate this. **IMPORTANT NOTE:** The costs, technologies and emissions provided in this report are estimates and the order (CAPEX / tCO2e) may be subject to change when actual quotes are received from contractors as individual technologies mature and projects progress. All suggestions are subject to further feasibility/design studies and procurement processes.

The results show that the environmental and business case for many of the technologies are conflicting. This demonstrates the need for WLDC to:

- Actively include environmental considerations and weighting in procurement decisions
- Avoid siloing individual projects and take an estate-wide view to optimise the distribution of technologies across the estate
- Retain an active view of the market (e.g. cost reductions, government support) and be prepared to engage with specialised market instruments to improve the financial viability of marginal business cases (e.g. specialised tariffs)

Some recommendations will require significant capital investment and will be subject to suitable technologies becoming available on the market, e.g. waste fleet electrification, space heating electrification. These recommendations are likely to be viewed by WLDC as longer term opportunities/investments, some of which may not be practically implementable immediately, i.e. not within the next 1-3 years, however, at the same time will contribute significantly to decarbonisation of the Council's operations. Electrification of vehicle fleet and space heating systems recommendations assume that electricity is procured on renewable electricity tariffs until the UK electricity grid mix fully decarbonises.




Recommendations summary

Emissions hotspot	Project	CAPEX [GBP]	Annual savings [GBP]	Simple payback [yrs]	Annual savings [tCO_2e]	CAPEX/ tCO_2e
Transport	Review all travel related policies and ensure alignment with decarbonisation ambitions	Internal costs only	0	Instant	21.09	0
Transport	Incorporate fuel efficient driving into driver training and refresher courses	8,000	10,800	0.8	26.43	303
Transport	Replacement of manager vans with electric vehicles	12,000	3,900	3.1	15.17	791
Transport	Waste and Street Cleansing fleet electrification	6,264,000	17,300	362.5	865.93	7,234
Leisure Centres	Require third-party operators to implement a formal energy management system, e.g. ISO 50001	Internal costs only	0	Instant	26.54	0
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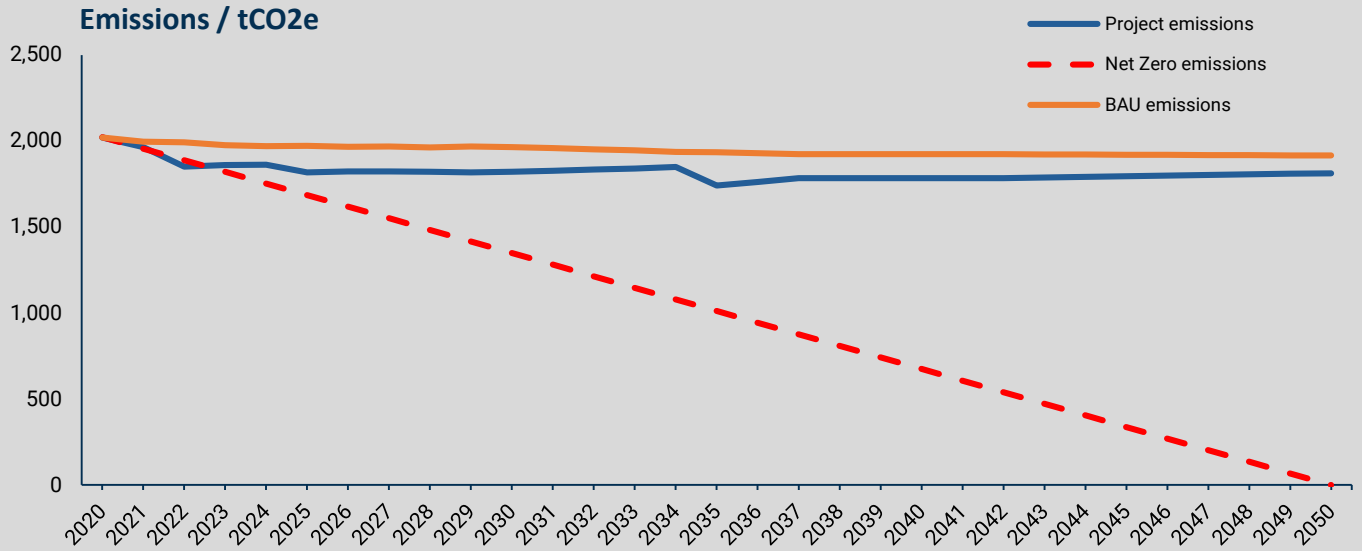
Leisure Centres	Compile plant and equipment inventory and work with site operators to implement a replacement schedule based on life cycle analysis	Internal costs only	0	Instant	39.46	0
Leisure Centres	Solar PV at Market Rasen Leisure Centre	18,000	1,912	9.4	5.03	3,576
Council Buildings	Implement a formal energy management system to cover all major energy consuming sites	Internal costs only	1,900	Instant	6.87	0
Council Buildings	Compile HVAC plant inventory and implement a replacement schedule based on life cycle analysis	Internal costs only	2,200	Instant	11.08	0
Council Buildings	Electrification of space heating	TBC	TBC	TBC	83.64	TBC
Public Facilities	LED streetlighting	155,900	20,800	7.5	54.82	2,843

Carbon Reduction Pathway

- In a do-nothing scenario, WLDC's footprint is expected to decrease as a result of the decarbonisation of the national grid. Taking into account those emissions sources included under the council's net zero target, projected Business as Usual (BAU) emissions fall to **1915 tCO2e** by 2050.
- In addition to a BAU scenario, a project emissions scenario* has also been modelled, taking into account the projected levels of carbon reduction associated with the recommendations provided across the WLDC estate** (see previous slide). Based on potential recommendations and decarbonisation of the national grid, the council's footprint in 2050 could be reduced to **1811 tCO2e**, from a baseline of **2089 tCO2e**.
- Under the project emissions scenario, WLDC will still have a gap to target of **1811 tCO2e**. Under this scenario, greenhouse gas removals (e.g. forestation) would therefore be required to reduce residual emissions in order for the council to achieve net zero emissions by 2050.

* See appendices for further explanation of the modelled scenarios shown.

** The project emissions scenario shown does not include the modelled carbon reduction associated with the electrification of the council's fleet of waste vehicles (866 tCO2e). Additional technical information on alternative fleets (i.e. electric waste vehicles) is required in order to develop a robust pathway projection. Due to the fact that electric waste vehicles are still considered an emerging technology, there is currently a shortage of data which covers the technical specifications of selected vehicles.



Travel related policies

Summary Recommendation. It is recommended that a review of all travel related policies be carried out to ensure alignment with current carbon reduction targets.

Introduction. The emissions associated with transport (including operation of the Council's vehicle fleet, staff commuting and business travel) currently total 1,162 tCO2e, or 34% of the Council's footprint. During the transport audit is was noted that some transport related policies may no longer be aligned to WLDC's increasingly ambitious carbon reduction targets, e.g. vehicle procurement, staff travel, remote working.

Project identification. The following are examples of areas of policy guidance that could be updated to encourage a reduction in transport associated emissions:

- Ensure that the Council's procurement policies and processes reflect its ambition to decarbonise it's vehicle fleet, e.g. by setting requirements for new vehicles to have electric motors, or be the most fuel-efficient model available, ensuring EV charging infrastructure is installed as standard at new-build sites.
- Providing all staff with the option of working remotely on an ongoing basis, where appropriate, to reduce commuting mileage.
- The use of video-conferencing tools could be promoted to cut down on travel to face to face meetings.
- Car sharing and encouragement of the use of active and public transport where possible should also be investigated.

Fuel efficient driver training

Summary Recommendations. Driving style has a big impact on all 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 5-10%. Sustaining these savings over the longer term is challenging, so we have assumed that all drivers of fleet vehicles attend the training twice between 2021 and 2030. We have estimated that WLDC could achieve a 3% reduction in fleet emissions by ensuring that all drivers attend driver training.

Introduction. Fuel consumption of the Council's vehicle fleet accounts for 42% of the targeted footprint. While in the longer term it is anticipated that most (if not all) vehicles will be replaced by electric vehicles, ensuring that all drivers receive fuel efficient driver training will help to reduce this footprint the short term by encouraging drivers to improve fuel performance.

State of play. WLDC currently operate a fleet of over 30 diesel engine vehicles, which are a mix of refuse collection vehicles (rigid HGVs) and medium sized vans. A range of fuel efficiency technologies are fitted to the waste fleet, including: vehicle telemetry systems, soft pedals and electric bin lifts. Annual 'round reviews' are carried out to identify any potential to reduce waste fleet mileages, however, as the district grows it is anticipated that mileages will increase overall. All drivers are required to attend initial and refresher driver training courses at least annually, however, fuel efficient driving is not currently covered. This could be integrated into the training sessions to promote best practice amongst drivers. Driver league tables could also be used to promote healthy competition and actively engage drivers in WLDC's efforts to decarbonise its operations.

Fuel efficient driver training

All drivers of fleet vehicles attend the training twice between 2021 and 2030

- 26.43 tCO_2e/year saving
- 8,231 litres/year diesel saving
- £10,372/year fuel cost saving

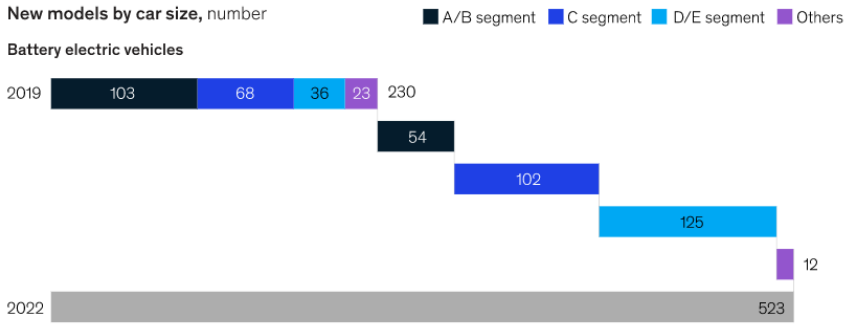
Fleet electrification

Summary Recommendations. Significant fuel-switching of the fleet is required for the Council to achieve their decarbonisation ambitions. The Council should commit to a phased fuel-switching of the fleet, accounting for vehicle type and use. The supporting infrastructure requirement is the largest constraint to electric vehicle (EV) deployment and the Council should, as a priority a) ratify internal support for infrastructure roll-out, b) understand the financial and technical requirements accounting for local constraints, c) explore potential funding avenues, and d) seek collaborative partnerships.

Introduction. Fuel consumption of the Council's fleet accounts for 42% of the baseline footprint. As with gas, the emission factors associated with liquid fossil fuels will not decrease significantly between now and 2030 and fuel-switching will be required to achieve meaningful reductions in emissions. However, the provision of a reliable, efficient and available waste and street cleansing fleet is central to the Council's function and cannot be compromised in any decarbonisation strategy.

State of play. WLDC currently operate a fleet of over 30 vehicles, which are a mix of refuse collection vehicles (rigid HGVs) and medium sized vans. All vehicles have diesel engines. Uptake and use of EVs within the Council has been low, predominately due to their limited range and lack of understanding amongst users. However, EV technology has improved drastically in recent years and the market is becoming far more saturated and competitive as mainstream manufacturers begin to offer electric ranges. This is expected to continue, and McKinsey estimate that 523 new electric vehicle models will be launched between 2019 – 2022 across a variety of vehicle sizes.

Despite the growing market, the current capital costs of specialised electric waste fleet vehicles are prohibitively expensive. It is therefore recommended that the Council focus initially on the electrification of manager vans where there is a far more established market for low-to-zero emission vehicles. Government grants are available for the procurement of electric vans.



Above: the global EV market is underdoing a period of rapid growth

Source: McKinsey, Electric Vehicle Index 2020

Fleet electrification

Project identification. The Council operate a small fleet of 6 manager vans which are appropriate to be considered for immediate electrification. For each vehicle a suitable electric vehicle (EV) model was identified and life cycle costs were compared with a similar internal combustion engine (ICE) model. Similarly, replacement of the 27 waste fleet HGVs with new-to-market electric refuse collection vehicles was modelled. Key findings include:

- At the point-of-use the **business case for replacing manager vans with EVs is favourable** over their lifetime compared to ICE equivalents.
- Due to capital cost there is currently no business case for replacing the waste fleet with EVs. However, these vehicles account for ~270,000 L of annual fuel consumption (98% of the Council's total), therefore, **in order to materially reduce the Council's footprint the waste fleet will need to decarbonise.**
- Full fleet electrification could result in annual emission reductions of **881 tCO_2e, 43% of the targeted footprint.**

Manager van electrification

Replacement of 6 diesel engine fleet vehicles with equivalent EVs

- 15.17 tCO_2e/year saving
- £12k estimated marginal capital cost vs ICE procurement (BAU)
- £3,850/year cost saving (difference between EV and current vehicle running costs)
- £791/tCO_2e saved

Waste fleet electrification

Replacement of 27 diesel-fuelled HGVs with e-HGVs

- 865.93 tCO_2e/year saving
- £6.2m estimated marginal capital cost vs ICE procurement (BAU)
- £17,280/year cost saving (difference between EV and current vehicle running costs)
- £7,234/tCO_2e saved

N.B.

- These calculations assume that EV's are operated according to manufacturer's specifications.
- It is currently unclear whether electric or hydrogen fuel cell waste collection vehicles (or both) will become established as the market standard, with neither solution being widely available yet. WLDC are encouraged to conduct further feasibility studies when alternatives for waste fleet vehicles are further developed.

Electric vehicle infrastructure

The business and environmental case for electric vans at the point-of-use is convincing. The Council should prioritise securing access to a robust and available charging network to facilitate the roll-out of electric vehicles. Detailed technical and economic analysis of infrastructure requirements is outside of the scope of this assessment, however it is recommended that the Council:

Understand the financial and technical requirements accounting for local constraints

Charging infrastructure costs vary significantly based on the number, wattage and specification of chargers required. Higher wattage charge-points are more expensive but required if vehicles need to charge rapidly over shorter periods of time, whereas more lower-wattage charge-points could be installed if it's feasible for EVs to charge over longer periods. The specification for any given-wattage varies too; the cost of a basic 7.4 kW charger (common for van charging) could be as low as £300 but rise to over £1,200 if smart-charging is incorporated. Civil and engineering costs have to be taken into account, which are heavily influenced by site conditions (e.g. length of any trenchwork, ground conditions); assessments in some areas of the UK estimate the installation cost of a 7kW charger at £5,000 with the caveat that these can vary significantly. Once the charging requirement is estimated, a site survey should be conducted to determine the available grid capacity at the site. Depending on local network capacity, grid upgrades may be required that will carry significant additional cost.

Explore potential funding avenues

Recognising the potential costs of EV infrastructure, grant schemes and innovative financing mechanisms exist that can support infrastructure deployment. The UK Government operates a workplace charging scheme, offering a grant contribution of £500 per socket for charge points installed at the workplace. Depending on ownership model preferences, various levels of private-sector involvement can also be sought to minimise the upfront financial requirement.

Seek collaborative partnerships and engage with support schemes

Local and national-level initiatives exist that can help the Council develop a network of usable infrastructure. ESPO Vehicle Charging Infrastructure and CCS Vehicle Charging Infrastructure Solutions are two national frameworks that can support Central Purchasing Bodies in the procurement and installation of infrastructure. The Energy Savings Trust offer free fleet strategic assessment the UK that can assist with initial strategic and technology advice. Currently, Flexible Power Systems ltd. is also offering free fleet strategy assessments for vans that are monitored with telematics or a job management system as part of an Innovate UK funded project.

Leisure Centres: energy management

Summary Recommendations. Significant reductions in Leisure Centre energy consumption will be required for the Council to achieve their decarbonisation ambitions. Adoption of an energy management system, such as the ISO 50001 standard, at these sites will help energy performance improvement via the development and use of an energy management system (EnMS) based on a model of continual improvement.

Introduction. Energy consumption of the Gainsborough and Market Rasen Leisure Centres accounts for **approximately 15% of the targeted footprint**. As the Council do not have operational control over these assets and their associated emissions they will need to work closely with third party operators to implement energy management systems and reduce the carbon footprint of the buildings.

State of play. Audits of leased buildings highlighted that no formal energy or environmental management systems have been put in place by building operators. This is of particular concern at the high energy consuming leisure and fitness centres, which account for 28% of the leased building footprint. It is recommended as a first step that WLDC work with the operators of Gainsborough and Market Rasen Leisure Centres (the two sites included in the targeted footprint) to implement formal energy management systems at each site. It is expected that, given their significant energy consumption, improving the management systems at these sites will result in significant carbon footprint reductions. By managing energy as a controllable resource it is conservatively estimated that a 5% reduction in gas and electricity consumption could be achieved at both Gainsborough and Market Rasen Leisure Centres, this is equivalent to a **26.54 tCO2e/year saving.**

Above: the ISO 50001 'plan, do, check, act' model

Implement energy management systems

Require third-party leisure centre operators at Gainsborough and Market Rasen to implement a formal energy management system

- 26.54 tCO_2e/year saving
- 119,507 kWh/year energy saving
- £5,795/year cost saving (to building operators)

Leisure Centres: performance monitoring

Summary Recommendations. Significant reductions in Leisure Centre energy consumption will be required for the Council to achieve their decarbonisation ambitions. Implementing basic energy performance monitoring at these sites will enable the Council to understand the energy consumption and review performance against its carbon reduction targets, without the need for estimation. Through improved awareness of the energy performance of these sites the Council will be able to better understand the potential to improve it.

Introduction. Energy consumption of the Gainsborough and Market Rasen Leisure Centres accounts for approximately **26% of the targeted footprint.** As the Council do not have operational control over these assets and their associated emissions they will need to work closely with third party operators to monitor the energy consumption of these sites and reduce the carbon footprint of the buildings.

State of play. There is currently no requirement for third party operators to share energy consumption/carbon performance data with the Council. As stated in the footprint report, this means that the majority of WLDC's scope 3 footprint has been estimated using building energy consumption benchmarks. This lack of data visibility means the Council cannot monitor the energy consumption of these buildings, which account for the majority of its carbon footprint. By requiring building operators to annually report energy and carbon performance WLDC will be able to monitor and review the footprint of leased buildings against its carbon reduction targets. As a first step it is recommended that the Council ask the operators of the Gainsborough and Market Rasen Leisure Centres to report annually on site energy consumption. This data can then be fed into the Council's annual footprint calculation compared against previous years. It is conservatively estimated that monitoring of the Council's Gainsborough and Market Rasen Leisure Centre footprints will result in a 2% reduction in gas and electricity consumption, equivalent to a **10.61 tCO_2e/year saving.**

Annual reporting of building energy performance

Require third-party leisure centre operators at Gainsborough and Market Rasen to report energy consumption annually

- 10.61 tCO_2e/year saving
- 47,803 kWh/year energy saving
- £2,318/year cost saving (to building operators)

Leisure Centres: energy efficiency improvements

Summary Recommendations. Heating, ventilation and air conditioning (HVAC) systems typically account for the majority of energy consumption and associated emissions at Leisure Centres, therefore, there are often significant savings to be achieved from refurbishing or upgrading these systems. It is recommended that the Council, along with third party operators, compile an inventory of HVAC plant at the Gainsborough and Market Rasen Leisure Centres and develop a replacement schedule based on a life cycle analysis' of each replacement option.

State of play. It is understood that a mix of gas-fired and electrical HVAC systems are in place at both Leisure Centres, however, details of these were not readily available during the remote audits. By compiling an inventory of this plant the Council will be able to assess the replacement options for each item of plant and when it would be economically feasible to replace. A life cycle analysis of all options should be carried out to assess the lifetime cost and carbon impact of each.

As a general rule, the installation of heat pumps should be considered for every heating system requiring replacement and installed as standard in new builds. Heat pumps are not a like-for-like replacement with gas boilers or conventional electric heating and improved energy efficiency in buildings is a pre-requisite for heat pump retrofit. Whilst not practically suitable for all applications, the electrification of heat will be required for the Council to achieve their decarbonisation targets.

It is conservatively estimated that moderate upgrades to HVAC plant at Gainsborough and Market Rasen Leisure Centre will result in a 10% reduction in gas and electricity consumption, equivalent to a **39.46 tCO_2e/year saving.**

HVAC plant upgrades

Compile plant inventory for Gainsborough and Market Rasen Leisure Centres and develop replacement schedule based on life cycle analysis

- 39.46 tCO_2e/year saving
- 189,918 kWh/year energy saving
- £5,698/year cost saving (to building operators)

Leisure Centres: solar photovoltaic (PV)

Summary Recommendations. Solar PV is the most affordable method of producing on-site renewable electricity. In the absence of feed-in-tariffs, solar PV should be prioritised where on-site usage can be maximised. Emission reductions relative to the National Grid will decrease out to 2030 and solar will increasingly be viewed from a financial standpoint, rather than one that achieves significant emissions reductions across the estate.

Introduction. Solar PV is a modular, scalable technology that allows for renewable electricity to be produced at source. Cost reductions over the past decade have made it an increasingly-attractive technology and resulted in it's accelerated roll-out at both utility and small-scale.

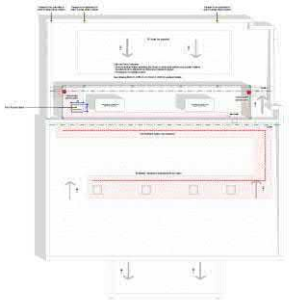
State of play. 49kWp of solar PV was installed on the roof of Gainsborough Leisure Centre in 2012, for which the Council receives Feed in Tariff payments. It is understood no solar PV was installed on the recently built Market Rasen Leisure Centre – although this is referenced in the plans. The market in the UK is now well established and there are plentiful providers of solar PV and related services. However, UK government support for small-scale projects has been significantly curtailed and any new project will be subject to market prices.

Project identification. MCS calculations were used to model retrofitting a rooftop solar PV array at Market Rasen. Key findings include:

- Around **20 kWp** of solar PV could be feasibly installed, generating 15,930 kWh per annum
- This represents a **5.03 tCO_2e** emission saving using 2019 emission factors
- The financial case for solar PV is significantly improved when more solar PV is consumed or site (displacing grid electricity at 12 p/kWh) as opposed to exporting to the grid (5 p/kWh)

Emission reduction

The avoided emissions of solar installations will decrease out to 2030 as the national grid decarbonises and the variance between local, zero-carbon generation and national generation decreases.



Above: Modelled generation profile of a 20kWp solar PV array at Market Rasen Leisure Centre. Left: Roof Plan of Market Rasen Leisure Centre.

Council Buildings: energy management

Summary Recommendations. Reductions in energy consumption across the Council's buildings estate will be required for WLDC to achieve their decarbonisation ambitions. Adoption of an energy management system, such as the ISO 50001 standard, across these sites will help energy performance improvement via the development and use of an energy management system (EnMS) based on a model of continual improvement.

Introduction. Energy consumption of Council-operated buildings accounts for **approximately 11% of the targeted footprint**. While this footprint is less material than that of the Council's vehicle fleet or leisure centres it is likely that this will still need to be reduced in order for the Council to achieve its decarbonisation targets.

State of play. While a number of energy efficiency improvements have been implemented across the Council's built estate, remote audits of these buildings highlighted that no formal energy or environmental management systems are in place. The lack of a coordinated plan to reduce the footprint of Council buildings means that some carbon reduction opportunities may have been missed, particularly behavioural and operational measures. Therefore, it is recommended that the Council implement formal energy management systems to cover all Council-operated sites. By managing energy as a controllable resource it is conservatively estimated that a 3% reduction in gas and electricity consumption could be achieved across Council buildings, this is equivalent to a **6.87 tCO2e/year saving.**

Implement energy management systems

Implement a formal energy management system to cover all Council-operated sites

- 6.87 tCO_2e/year saving
- 24,888 kWh/year energy saving
- £1,910/year cost saving

Council Buildings: energy efficiency improvements

Summary Recommendations. Similar to the Leisure Centres, Heating, ventilation and air conditioning (HVAC) systems are expected to account for the majority of energy consumption and associated emissions at Council-operated buildings, therefore, again, there are often significant savings to be achieved from refurbishing or upgrading these systems. It is therefore recommended that the Council also compile an inventory of HVAC plant across Council-operated buildings and develop a replacement schedule based on a life cycle analysis' of each replacement option.

Introduction. Energy consumption of Council-operated buildings accounts for **approximately 11% of the targeted footprint**. While this footprint is less material than that of the Council's vehicle fleet or leisure centres it is likely that this will still need to be reduced in order for the Council to achieve its decarbonisation targets.

State of play. A mix of gas-fired and electrical HVAC systems are in place across the Council-operated buildings, however, a detailed list of these assets does not currently exist. By compiling an inventory of this plant the Council will be able to assess the replacement options for each item of plant and when it would be economically feasible to replace. A life cycle analysis of all options should be carried out to assess the lifetime cost and carbon impact of each.

As a general rule, the installation of heat pumps should be considered for every heating system requiring replacement and installed as standard in new builds. Heat pumps are not a like-for-like replacement with gas boilers or conventional electric heating and improved energy efficiency in buildings is a pre-requisite for heat pump retrofit. Whilst not practically suitable for all applications, the electrification of heat will be required for the Council to achieve their decarbonisation targets.

It is conservatively estimated that moderate upgrades to HVAC plant across Council buildings will result in a 10% reduction in gas and electricity consumption, equivalent to a **11.08 tCO_2e/year saving.**

HVAC plant upgrades

Compile plant inventory for Council-operated buildings and develop replacement schedule based on life cycle analysis

- 11.08 tCO_2e/year saving
- 82,962 kWh/year energy saving
- £2,233/year cost saving

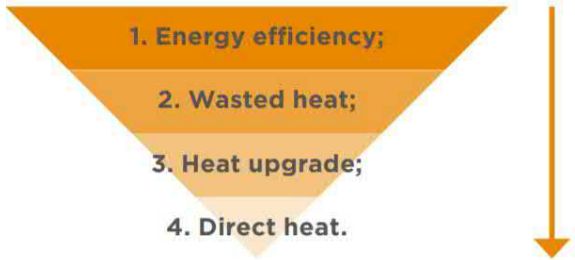
Heat hierarchy

Gas consumption for space and water heating in buildings (including leisure centres) accounts for approximately 24% of WLDC's targeted footprint. Compared to electricity, the emission factor for gas usage is less sensitive to policy and technology changes and is expected to remain relatively constant between now and 2030. In order to achieve their decarbonisation targets, the Council will therefore have to proactively target a significant reduction in gas use across the estate.

The challenge of heat decarbonisation is multifaceted and there is no one-size-fits-all solution that can be implemented across the estate. However, we recommend that any approach to heat decarbonisation should consider the heat hierarchy outlined below. The hierarchy has four key stages, which should be addressed in chronological order:

- **Energy efficiency.** Reduce the heating demand of the building by improving its thermal performance through fabric upgrades (e.g. insulation, draught proofing). As the initial step, this is referred to as a fabric-first approach and should be maximised for each building within the bounds of reasonable viability (i.e. respecting technical and financial constraints) regardless of the heat source.
- **Wasted heat.** Utilise any heat that is already being produced in other processes but wasted.
- **Heat upgrade (i.e. heat pumps).** 'Upgrading' heat refers to the process of raising a low-temperature heat source to a higher temperature that can be utilised in heating system. This process requires an energy input (e.g. electricity) and is the function of heat pumps.
- **Direct heat.** This is where energy is directly inputted for the *creation* of heat (e.g. fuel into a boiler). This should be restricted to when wasted heat is not available, or the use of a heat pump is not technically or financially feasible.

A decarbonised WLDC will likely involve a combination of the above measures in varying proportions. The appropriateness of each option needs to be assessed in the context of the fabric and efficiency of each building to ensure that the space is adequately heated. Due to the remote nature of the assessment, the Council should look to consolidate this work with further site specific investigations, using the heat hierarchy as a foundation.



Above: the heat hierarchy

Source: ADE, A framework for net-zero for new and existing buildings.

Applying the heat hierarchy and moving to low carbon heat

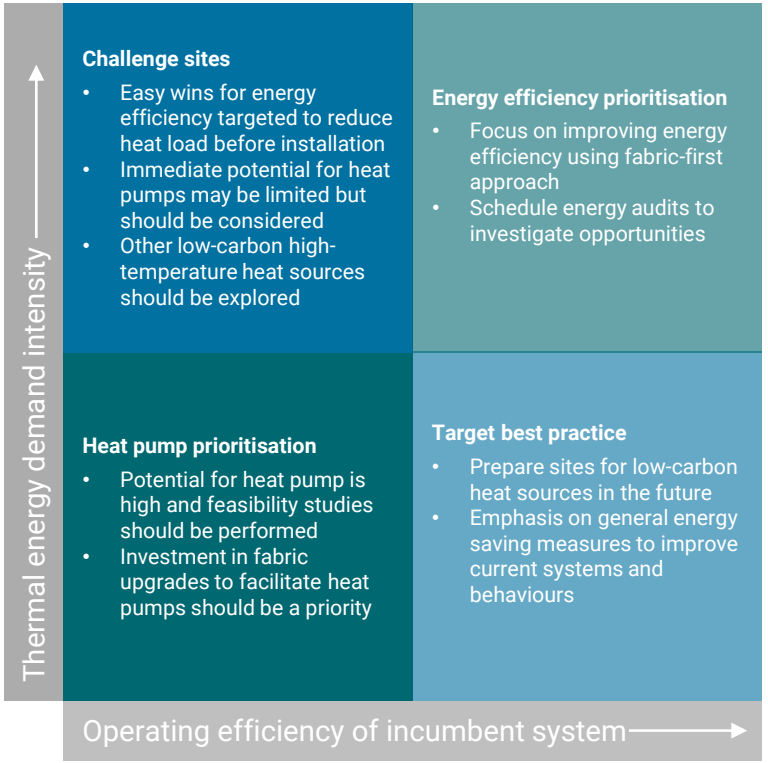
A broad approach to applying the heat hierarchy should be understood and established. However, it should be recognised that site specific conditions will ultimately determine which technologies and interventions are both appropriate and financially viable.

Technology Replacement Mapping. As a good first step, mapping the expected heating technology replacement timeline and the operation efficiency of current systems will help prioritise sites for energy audits and heat pump assessment. This mapping should be updated regularly; any heating system that comes up for renewal should have an assessment performed that considers alternative heating technologies including heat pumps – as set out in previous recommendations.

The approach will vary site-by-site. The matrix to the right explores likely actions depending on the thermal energy demand intensity of the site and the immediacy of heating technology replacement. This matrix is only a start, each site is unique in practice, and the approach will be different site-by-site. Low carbon heating will be technically feasible for every site, but some sites will be financial prohibitive due to the amount of retrofit required to achieve the required levels of thermal performance.

Top tips for low carbon heating:

- Understanding flow temperature is important. Lower flow temperatures are more compatible with the efficient operation of heat pumps, and heat pump business cases become favourable when temperatures are <45°C.
- Flow temperatures are a function of the building's thermal retention and area of heat emitters (e.g. radiators). A building with high heat retention and large heat emitters is a prime candidate for installation of a heat pump.



Boiler upgrades

In accordance with the heat hierarchy, alternative heat sources are preferred solution over boiler upgrades. However, it is recognised that technical and/or financial constraints may limit the feasibility of these alternative sources (e.g. heat pumps). When this is the case, boiler upgrades can contribute to decarbonisation through efficiency gains while also making sure that the building is heated properly.

Introduction. Though gas-fired boilers are carbon intensive, they provide flexibility in heating several building archetypes and often present attractive business case relative to low-carbon alternatives. This has resulted in gas boilers being the preferred heating mechanism in the UK, with 1.67 million gas boilers sold in 2019. Technology advances and stricter government legislation has led to advances in boiler design that has increased the efficiency of new boilers to over 90% when properly applied.

State of play. It is understood that most sites (Council-operated and leisure centres) have gas-fired boilers connected to central heating with radiators. At Gainsborough Leisure Centre gas-fired boilers also provide pool heating. Replacement gas boilers will present a strong financing case as current boilers approach end of life. However, the emission savings associated with their widespread replacement is not compatible with the Council's decarbonisation ambitions, particularly for leisure centres. Emission savings can be realised through increased efficiencies and the reduction in gas consumption for a given heat load. However, their relative carbon intensity means that the Council should only pursue like-for-like replacement when the financial or technical constraints for low-carbon technologies are overwhelming.

Heat pumps

The installation of heat pumps should be considered for every heating system requiring replacement and installed as standard in new builds. Heat pumps are not a like-for-like replacement with gas boilers or conventional electric heating and improved energy efficiency in buildings is a pre-requisite for heat pump retrofit. Whilst not practically suitable for all applications, the electrification of heat at some sites will be required for the Council to achieve their decarbonisation targets.

Introduction. Heat pumps are a highly efficient form of electric heating; as such they save ~60-70% of emissions compared to conventional electric heating and have lower running costs. Compared to an A-rated gas boiler, heat pumps save ~55-65% of CO_2. Heat pumps perform optimally at lower temperatures than conventional heating systems and require a thermally efficient site to operate effectively.

State of play. Currently, it is understood there are no heat pumps installed in the WLDC estate. The business case for installing a heat pump is expected to be poor for the majority of sites and **environmental weighting** will have to be included to promote their procurement. Current government support to incentivise heat pump use in the form of the non-domestic renewable heat incentive (RHI) is due to finish in March 2021. WLDC should keep an eye out for a new mechanism that is expected to be announced that may improve the business case. It should be noted that the emission savings associated with electrifying heat increase as the national grid decarbonises. This will be further improved if the heat pump is powered by on-site renewable power. The emissions saving stated opposite is based on the projected scenario of the UK electricity grid fully decarbonising as electricity generation becomes 100% renewable.

Electrification of space heating

Replace gas-fired space heating systems in all Council buildings with air source heat pump systems

- 83.64 tCO_2e/year saving

Public Facilities: LED streetlighting

Summary Recommendations. Good quality LED luminaires offer superior illumination, control and energy performance over many of the Council's incumbent lamp types. They should be installed by default wherever streetlighting and car park lighting is replaced. Once LEDs are installed, additional savings will also be possible through implementing control savings such as dimming and/or trimming. Beyond energy and carbon savings, WLDC would also benefit from reduced maintenance and lamp replacement lifecycle costs thanks to the significant additional burn hours that LED alternatives bring over traditional lighting.

Introduction. LEDs have the highest efficiency and lamp life of all widely used lighting types. Cost reductions and a step-change in the technological performance of LED lighting over the past 10-15 years has made them the mainstream solution for the vast majority of lighting applications in the UK.

State of play. WLDC has responsibility for over 300 MWh per annum of street and car park lighting across the District, equivalent to **106 tCO_2e, 5.2% of the targeted footprint.** Some streetlighting has already been upgraded to LED however the majority of lamps are efficient low pressure sodium and fluorescent lamps. No information has been received regarding their state of repair (or column upgrade needs). Based on the Council's lighting inventory, streetlighting is responsible for ~264 MWh of electricity consumption per annum while car park lighting results in ~46 MWh of electricity consumption.

Project identification. A Council-provided streetlighting inventory was used to determine the current luminaire/lamp types and annual burn hours. The costs and emission savings from replacing each luminaire (excluding column) with a like-for-like LED luminaire were estimated and these are shown opposite.

LED streetlighting

Replace low pressure sodium and fluorescent street and car park lighting with LED lighting

- 54.82 tCO_2e/year saving
- 173,502 kWh/year energy saving
- £20,820/year cost saving

5. Governance and engagement

Programme management

To manage the implementation of a carbon reduction programme, it is important that organisational procedures and resources 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 robust yet dynamic organisational structures to ensure that they remain flexible in the approaches being taken to tackle climate change through time.

Key functions of the dedicated project team across the Council will include:

- Gaining senior endorsement and publication of the Council's Carbon Reduction Plan
- Providing regular and ongoing oversight and monitoring of progress towards achieving WLDC's Net Zero target across key delivery teams
- Ensuring that carbon reduction stays on the strategic agenda across WLDC, including at senior management level and among the elected members
- Managing the expectations of key stakeholders and recognising achievements on carbon reduction across the organisation

Stakeholder engagement

Robust engagement with stakeholders from across the Council and beyond will be crucial for successful implementation of climate action.

- Achieving the greatest possible input and buy-in will allow WLDC to work closely with all stakeholders to identify the areas of the Council to prioritise and implement action 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 key stakeholders from across the Council with whom to engage on an ongoing basis
- 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

6. Monitoring and reporting

Monitoring and reporting

Once a carbon footprint has been measured and a target set, monitoring 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.
- Not only does the footprint need to be monitored at least annually 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 in a quantitative as well as a qualitative way. This can help to drive momentum and support the securing of budget for 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 its carbon reduction targets. This will help the team to identify other potential carbon reduction opportunities and ensure that any carbon reduction co-benefits of specific policies and actions can be delivered.

7. Appendices

Detailed calculations

Transport

Site	Current fuel consumption [litres]	Current spend [GBP]	Footprint [tCO_2e]	Annual saving [litres]	Annual saving [GBP]	Annual saving [tCO_2e]	CAPEX [GBP]	Simple payback [years]
Review all travel related policies and ensure alignment with decarbonisation ambitions	unknown	unknown	281.26	unknown	unknown	21.09	£0	instant
Incorporate fuel efficient driving into driver training and refresher courses	274,381	£345,720	881.09	8,231	£10,372	26.43	£8,000	0.8
Replacement of manager vans with electric vehicles	4,723	£5,951	15.17	4,723	£3,850	15.17	£12,000	3.1
Waste and Street Cleansing fleet electrification	269,658	£339,769	865.93	269,658	£17,280	865.93	£6,264,000	362.5

- Policy review savings assume a 7.5% reduction in business travel and commuting mileage can be achieved as a result.
- Driver training savings assume that fleet fuel consumption can be reduced by 3%. This does not include potential associated maintenance cost savings.
- A capital cost of £200 per driver has been applied to the Driver Training recommendation, based on 40 drivers attending.
- CAPEX figures applied to EV procurement are marginal costs against a business as usual scenario of procuring internal combustion engine vehicles.
- A cost of £1.26/litre of diesel has been used to calculate current spend.

Key assumptions for transport calculations have been sourced from the BEIS statistical data set on weekly road fuel prices: https://www.gov.uk/government/statistical-data-sets/oil-and-petroleum-products-weekly-statistics

Detailed calculations

Leisure Centres

Site	Current energy consumption [kWh]	Current spend [GBP]	Footprint [tCO_2e]	Annual saving [kWh]	Annual saving [GBP]	Annual saving [tCO_2e]	CAPEX [GBP]	Simple payback [years]
Require third-party operators to implement a formal energy management system, e.g. ISO 50001	2,390,139	£115,890	530.72	119,507	£5,795	21.09	£0	instant
Implement requirement for third-party operators to report energy/carbon performance of buildings, at least annually	2,390,139	£115,890	530.72	47,803	£2,318	26.43	£0	instant
Compile plant and equipment inventory and work with site operators to implement a replacement schedule based on life cycle analysis	1,899,184	£56,976	394.57	189,918	£5,698	39.46	£0	instant
Solar PV at Gainsborough Leisure Centre	311,824	£37,419	86.47	39,825	£4,779	12.58	£45,000	9.4

- A gas cost of 3p/kWh and an electricity cost of 12p/kWh have been applied to energy consumption at both sites.
- The energy management system recommendation assumes a 5% reduction in annual gas and electricity consumption can be achieved.
- The energy reporting recommendation assumes a further 2% reduction in annual gas and electricity consumption can be achieved.
- The plant and equipment inventory and replacement schedule recommendation assumes a 10% reduction in annual HVAC energy consumption can be achieved.
- The solar PV figures are based on installing a 50kWp array on the flat roof of Gainsborough Leisure Centre.

Detailed calculations

Council Buildings

Site	Current energy consumption [kWh]	Current spend [GBP]	Footprint [tCO_2e]	Annual saving [kWh]	Annual saving [GBP]	Annual saving [tCO_2e]	CAPEX [GBP]	Simple payback [years]
Implement a formal energy management system to cover all major energy consuming sites	829,616	£63,662	229.02	24,888	£1,910	6.87	£0	instant
Compile HVAC plant inventory and implement a replacement schedule based on life cycle analysis	487,978	£22,326	110.85	48,798	£2,233	11.08	£0	instant
Electrification of space heating	402,569	£12,077	83.64	TBC	TBC	83.64	TBC	TBC

Public Facilities

Site	Current energy consumption [kWh]	Current spend [GBP]	Footprint [tCO_2e]	Annual saving [kWh]	Annual saving [GBP]	Annual saving [tCO_2e]	CAPEX [GBP]	Simple payback [years]
LED streetlighting	334,402	£40,128	105.66	173,502	£20,820	54.82	£155,850	7.5

- A gas cost of 3p/kWh and an electricity cost of 12p/kWh have been applied to energy consumption at all sites.
- The energy management system recommendation assumes a 3% reduction in annual gas and electricity consumption can be achieved.
- The plant and equipment inventory and replacement schedule recommendation assumes a 10% reduction in annual HVAC energy consumption can be achieved.

Resources to help deliver decarbonisation

Resource Name	Resource type	Notes	Link
Salix Finance	• Interest-free finance • Recycling Fund		https://www.salixfinance.co.uk/
Non-domestic Renewable Heat Incentive (RHI)	Financial incentive; payments received based on heat generation	Due to finish March 2021; expected to be replaced by another mechanism	https://www.ofgem.gov.uk/environmental-programmes/non-domestic-rhi
Energy Technology List	List of the top performing equipment to help make sure new purchases are efficient. Includes heat pumps, boiler equipment, automatic monitoring and targeting equipment, and more.		https://etl.beis.gov.uk/purchasers
Local authorities and sixth carbon budget	A guide for local authorities on their local contributions to the sixth carbon budget		https://www.theccc.org.uk/wp-content/uploads/2020/12/Local-Authorities-and-the-Sixth-Carbon-Budget.pdf

Carbon Reduction Pathways

Key assumptions

- The project emissions scenario shown demonstrates the potential to reduce emissions from the installation of low carbon technologies across the key sites evaluated as well as fleet electrification of management vans.
- The scenario shown does not include the modelled carbon reduction associated with the transition of Waste and Street Cleansing to low-carbon vehicles. More information on alternative fleets (i.e. electric waste vehicles) is required in order to develop a robust pathway projection.
- The project emissions scenario has been quantified based on the reductions associated with the indicative recommendations provided on slide 23. For the purposes of this scenario modelling and to allow for a realistic phased approach, the LED street lighting recommendation has been separated into two separate project phases.
- Phasing for individual projects has been based on assumptions surrounding the ease of implementation associated with individual measures e.g. scale of the recommendation and development of individual technologies. In reality, these projects would be appropriately phased out over a prolonged project timeline and would be dependent on a number of factors not assessed within e.g. available funding, operational impacts.
- Further information on the phasing of individual projects is provided on the next slide.

Carbon Reduction Pathways

Project phasing

Hotspot	Recommendation	Year of implementation
Transport	Review all travel related policies and ensure alignment with decarbonisation ambitions	2021
Council buildings	Compile HVAC plant inventory and implement a replacement schedule based on life cycle analysis	2021
Transport	Incorporate fuel efficient driving into driver training and refresher courses	2022
Leisure Centres	Support/require third party operators to implement formal energy/environmental management systems, e.g. ISO 14001/50001	2022
Leisure Centres	Set requirements for third party operators to report energy/carbon performance of buildings to the Council, at least annually	2022
Leisure Centres	Compile plant and equipment inventory and work with site operators to implement a replacement schedule based on life cycle analysis	2022
Council buildings	Implement formal energy management systems across all sites, e.g. ISO 50001	2022
Transport	Replacement of manager vans with electric vehicles	2025
Public facilities	LED streetlighting phase 1	2025
Council buildings	Solar PV at Market Rasen Leisure Centre	2028
Council buildings	Electrification of space heating	2035
Public facilities	LED streetlighting phase 2	2035