**27th April 2021**

**Part II Report for Georgina Chapman**

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**of North Herts District Council**

**From CLS Energy Ltd**

**version 4.0**

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## NHDC Greenhouse Gas Reduction Report (Part II)

### Introduction:

Following our work to assess the Councils eight significant energy consuming buildings in August/September 2020, this part II report has been commissioned to address the Council's fleet, waste, and water and to take control over its greenhouse gas emissions with a view to addressing and targeting these and well as potentially leading by, and demonstrating a positive example to local businesses, residents, and other Councils.

The totals for these aspects of the operation have been combined in our calculations to provide an accurate representation of the operation. It must be noted that Part I and Part II exclude the remaining buildings and F gases which we have quoted to produce separately, and which should, in time, form a total carbon footprint for the Council if taken forward.

### NHDC

Covered in this report:

- Operational Fleet
- Grey Fleet
- Commuter fleet
- Water
- Waste and Recycling

We have also assessed the telematics data for John O'Connor's Grounds Maintenance vehicles for this contract but have not assessed or profiled the vehicles.

Not covered in this report:

- Remaining buildings (beyond the 8 assessed in Part I)
- F Gases

### Council Carbon Emissions:

**Part I: 1,801 tonnes**

**Part II: 1,901 tonnes**

**Total: 3,702 tonnes***

*This figure currently excludes the Councils remaining (all bar 8) buildings and F Gases.


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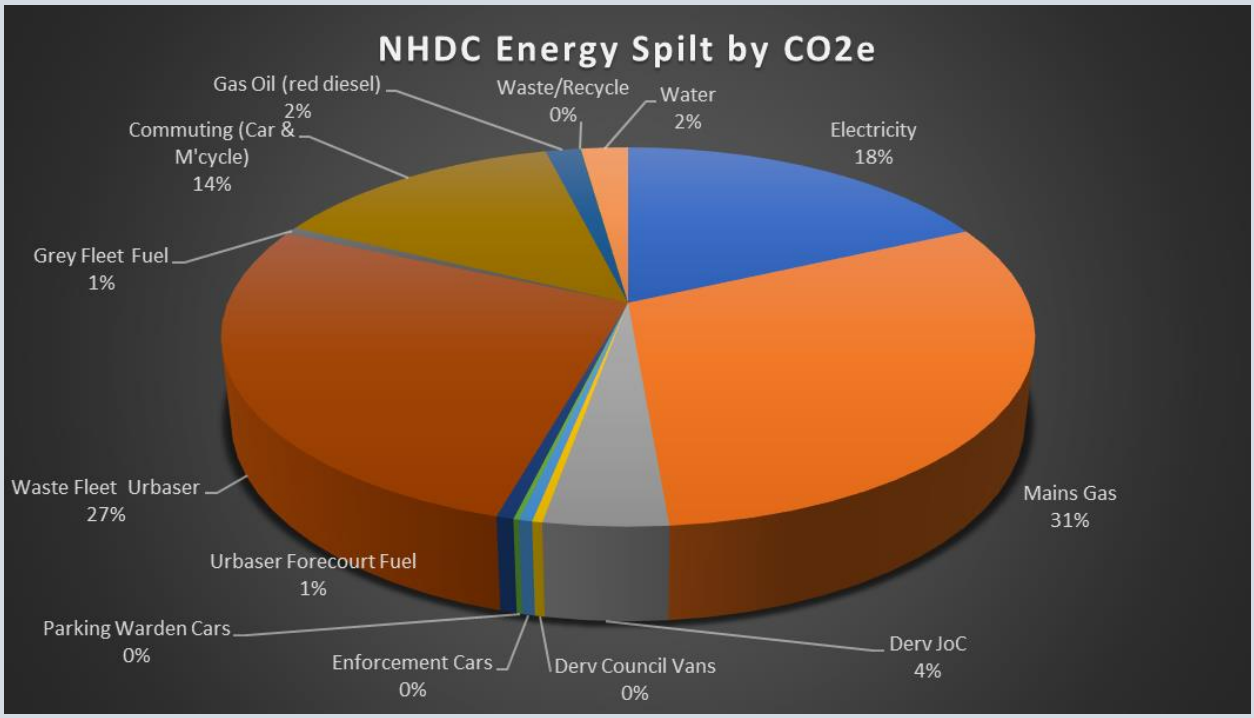
## Background:

In terms of tonnes of CO2e emitted, the significant energy user for NHDC (based on the aspects calculated in Part I and Part II) at 31% is mains gas. This is followed closed by the waste fleet at 28%. Electricity follows in third place at 18% with commuting at 4th with 14%.




Organisations are typically required to report on their scopes 1 and 2 emissions with an option to report on some of their scope 3 emissions.

**Scope 1:** Direct emissions. These are emissions from activities owned or controlled directly by the organisation. In the case of NHDC this includes gas used at its corporate buildings and fuel used by its own vehicles. Emissions from gas usage are calculated using gas meter reads. Emissions from fleet fuel usage are calculated using annual fuel usage reports and telematic data.

**Scope 2:** Indirect emissions. These are emissions which are caused by the organisations energy use but are released at source not at the location owned or controlled by the organisation. In the case of NHDC this covers the electricity used at its corporate buildings. Emissions from electricity usage are calculated using electricity meter reads, billing, and half hourly data.

**Scope 3:** Other indirect. Emissions other than scope 2 emissions, that are caused by an organisations actions but do not occur at locations owned or controlled by the organisation. How this is factored when the Council owns but does not operate a facility may have impacts on where this is counted.

At the request of the Council, this report focusses on scopes 1 and 2 and includes aspects of Scope 3 emissions, specifically:

- Commuting
- Grey Fleet
- Water
- Waste

It could be argued that refuse, grounds maintenance and street cleansing fall out of scope of the Council's remit. However, since these services can and often are taken in-house by Councils and the perception is that these are Council activities, it is wise to maintain them in these assessments. It may also be beneficial in considering depots in this, whether they are currently Council owned or otherwise.

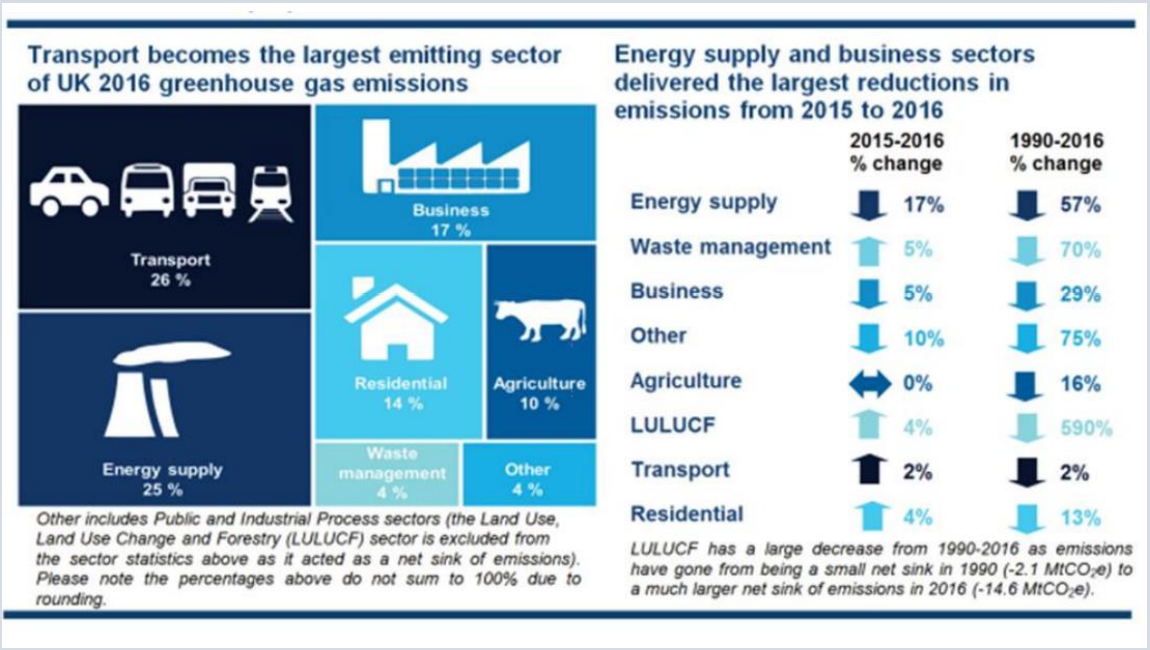
In this instance, scope 1 is natural gas and transport fuel, and scope 2 is electricity. We have factored scope 1 and 2 data for all buildings that are owned and operated by the Council or operated on their behalf. However, we have yet to assess all the Council's estate and only eight such buildings remain in the baseline. The Council's depot site is owned by Urbaser. Its Leisure Centres are owned by the Council and managed by Stevenage Leisure. Grounds Maintenance is a John O'Conner operation. Whilst the leisure sites have their energy bills paid by these private companies, at any time the Council may elect to take these properties and operations back in-house. Public perception is that a Council cannot wash its hands of a swimming pool or its waste, recycling, or grounds maintenance services.

We have not included the sites that the Council owns and leases to tenants as the Council has no direct ability to influence energy use at these sites. There may be a local perception-based case for certain sites, as there is for the leisure centre and waste depot. In any event, these properties should all be considered priority in advancing any Council ambitions to make the district zero carbon over time. By acting to engage and work with local companies at this early stage, the Council puts itself in a strong position to meet such targets going forward.

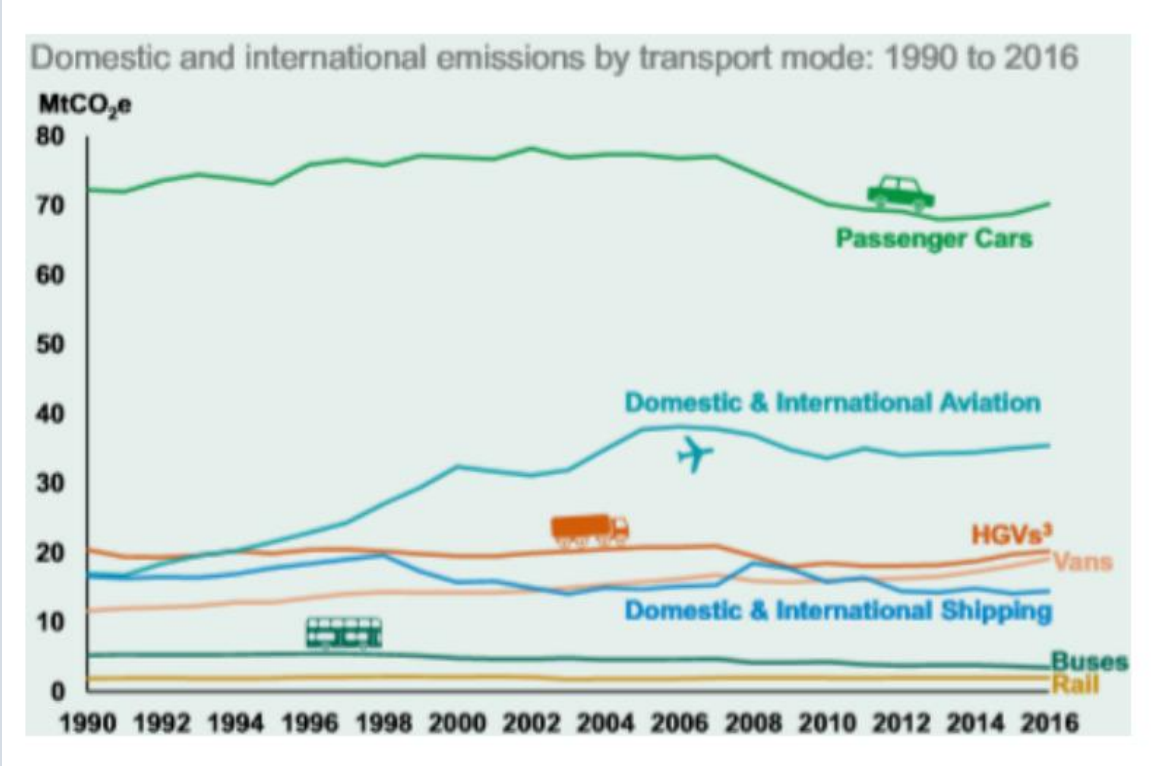
| Index: | Page: |
|---|---|
| National Situation | 6 |
| Introduction | 8 |
| Baseline | 9 |
| Summary findings | 11 |
| Recommendations Table | 12 |
| Grey Fleet | 13 |
| Commuting | 16 |
| Green House Gases | 18 |
| Air Quality | 22 |
| Next Steps | 26 |
| Recommendations (Fleet) | 29 |
| Recommendations (Water) | 53 |
| Recommendations (Waste) | 55 |
| Recommendations (Renewable Energy) | 57 |
| Next steps | 61 |
| Observations | 63 |
| Biog | 68 |
| Glossary of Terms | 70 |
| End | 72 |

## National Situation

Transport now represents the largest greenhouse gas (GHG) emitting sector in the UK at over 26% in 2016.




Specifically, cars are far and away the highest single transport contributor to GHG emissions:



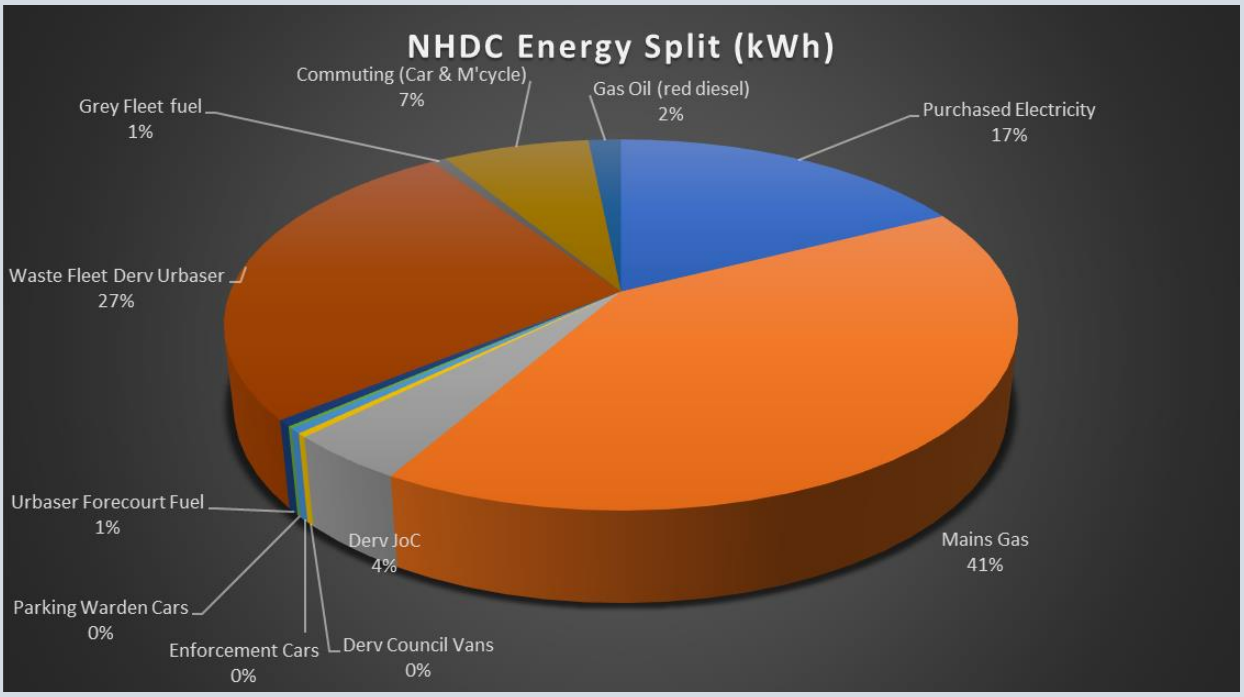

*(UK Government data):*

## Introduction

The Councils emissions from its 8 main buildings which includes its leisure facilities, fleet operations and associated fleet (refuse and grounds maintenance), water* as well as the Councils van fleet, grey fleet, and commuting amounts to:

- 3,956 tonnes of CO2e
- 14,913,516kWh

The graph below shows energy split by kWh for part I and Part II (and excludes remaining buildings and F gases).




**Pool water treatment has been assumed as the same volume as that consumed. This has yet to be confirmed.*

The Part I report demonstrates:

1,801 tonnes of CO2 emissions from eight (8) sites so far assessed:

This report (Part II) focusses on:

- Fleet
- Water
- Waste

And this amounts to 1,901 tonnes and is broken down as follows:

| Total Organisational Grid Energy Consumption (TEC): | kWh | Rate (£) | MWh | Cost | Tn CO2e |
|---|---|---|---|---|---|
| Fleet Urbaser | 3,988,946 | 0.100 | 3,989 | £398,895 | 1,008 |
| Fleet Urbaser Forecourt | 85,467 | 0.100 | 85 | £8,547 | 22 |
| Fleet John O'Connor | 631,890 | 0.100 | 632 | £63,189 | 155 |
| Council Vans | 51,142 | 0.100 | 51 | £5,114 | 13 |
| Enforcement | 68,614 | 0.100 | 69 | £6,861 | 17 |
| Parking | 28,657 | 0.100 | 29 | £2,866 | 7 |
| Grey Fleet | 104,441 | 0.450 | 104 | £46,998 | 25 |
| Commuting | 1,053,827 | 0.000 | 1,054 | £0 | 511 |
| Gas Oil | 236,324 | 0.050 | 236 | £11,816 | 61 |
| **Total Transport** | **6,249,308** | | **6,249** | **£544,286** | **1,817** |
| Waste | | | | £5,889 | 2 |
| Water Consumption | | | | £49,298 | 30 |
| Water Treatment | | | | £49,298 | 52 |
| Renewables | 0 | | 0 | £0 | 0 |
| **Total Energy Consumption** | **6,249,308** | | **6,249** | **£648,772** | **1,901** |

We have also factored separately for two car park sites (beside Council offices and Lairage) that may well lend themselves to renewable technologies linked to EVF charge points. The energy data for these two sites is not considered as they fall outside of the 8 sites assessed and as such, we have not yet been provided the data for them.

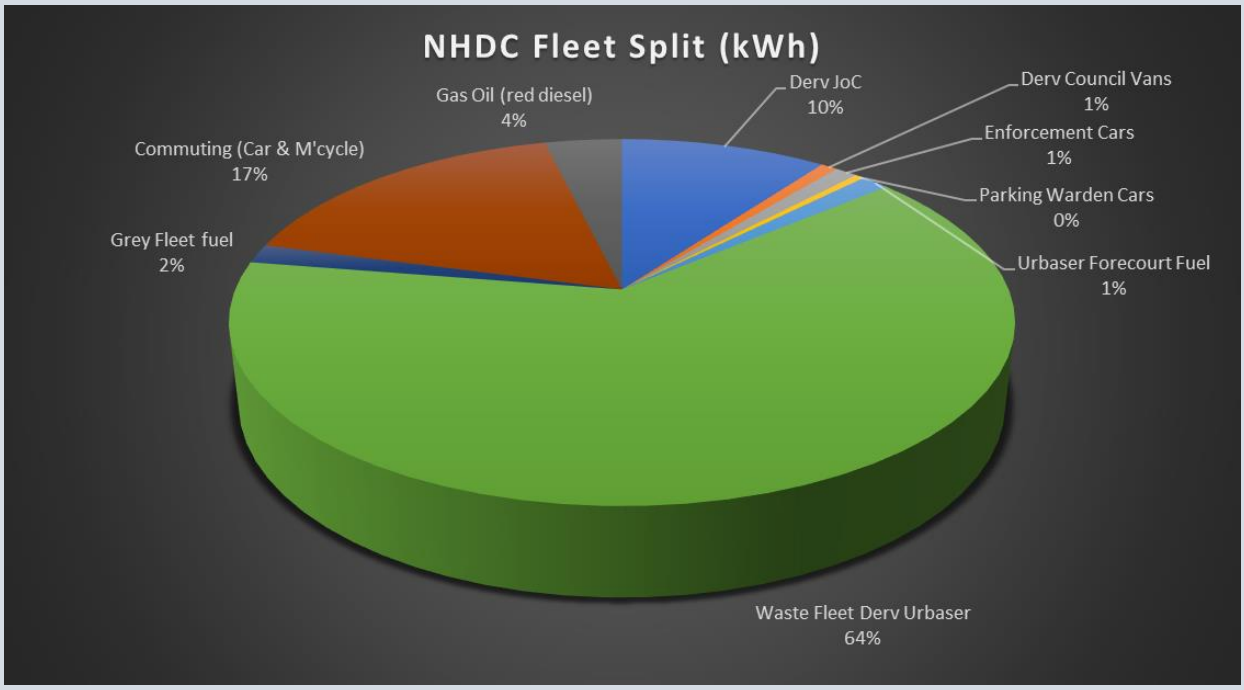
## Baseline

The Councils carbon baseline is established using the carbon dioxide equivalents (CO2e) which is the mix of the basket of greenhouse gases as agreed under the Kyoto Protocol, ratified in 2005. Council data has been scoped for the year 2019/20 and includes the following parameters:

- Electricity
- Gas
- Fleet Diesel
- Electricity generation
- Water Supply and Treatment

## The fleet physically assessed for emissions are as follows:

1. Commercial waste van
2. IT services van
3. Urbaser Waste RCV
4. Museum Services van
5. Parking services cars (3)




The above also includes (non-physically assessed):

- John O'Connor Grounds Maintenance
- Grey Fleet
- Commuting
- Site transport (red Diesel)
- Enforcement fleet

We have also assessed the John O'Connor Grounds Maintenance fleet but only from their telematics. We did not gain access to this fleet. The table below sets out the total energy consumption and factors CO2e emissions by percentage of the total:

The Council's van fleet is set out below:

| FLEET | REG | VEHICLE | CO2 | EU | Status |
|---|---|---|---|---|---|
| ENFORCEMENT 1 | LL66KSF | KIA SPORTAGE 2.0 CRDi KX-1 5DR ESTATE | 139 | EU6 | Extended |
| ENFORCEMENT 2 | LL66KSJ | KIA SPORTAGE 2.0 CRDi KX-1 5DR ESTATE | 139 | EU6 | Extended |
| PARKING SERVICES 1 | EY67AUN | VOLKSWAGEN POLO 1.4 Tdi 75 MATCH EDITION 5DR | 95 | EU6 | Extended |
| PARKING SERVICES 2 | EY67AUK | VOLKSWAGEN POLO 1.4 Tdi 75 MATCH EDITION 5DR | 95 | EU6 | Extended |
| PARKING SERVICES 3 | EY67AUH | VOLKSWAGEN POLO 1.4 Tdi 75 MATCH EDITION 5DR | 95 | EU6 | Extended |
| WASTE MANAGEMENT 5 | KE19PUF | CITROEN BERLINGO ESTATE 1.5 BLUE Hdi 100 FEEL M 5DR | 113 | EU6 | Leased |
| WASTE MANAGEMENT 6 | KE19PUJ | CITROEN BERLINGO ESTATE 1.5 BLUE Hdi 100 FEEL M 5DR | 113 | EU6 | Leased |
| WASTE MANAGEMENT 4 | LT69VVR | CITROEN BERLINGO ESTATE 1.5 BLUE Hdi 100 FEEL M 5DR | 113 | EU6 | Leased |
| WASTE MANAGEMENT 1 | LT69VVS | CITROEN BERLINGO ESTATE 1.5 BLUE Hdi 100 FEEL M 5DR | 113 | EU6 | Leased |
| WASTE MANAGEMENT 2 | LT69VVP | CITROEN BERLINGO ESTATE 1.5 BLUE Hdi 100 FEEL M 5DR | 113 | EU6 | Leased |
| I.T. SERVICES 1 | LS69KSY | CITROEN BERLINGO XL 1.5 BLUE Hdi 950KG DRIVER 130PS (VAN) LCV | 117 | EU6 | Leased |
| ENFORCEMENT 1 | | MITSUBISH OUTLANDER ESTATE 2.4 PHEV DYNAMIC 5DR | 46 | EU6 | On Order |
| ENFORCEMENT 2 | | MITSUBISH OUTLANDER ESTATE 2.4 PHEV DYNAMIC 5DR | 46 | EU6 | On Order |
| MUSEUMS | LL08KNH | VAUXHALL ASTRA COMBO CREW 1.7 Tdi (VAN) LCV | 140 | EU4 | Owned |
| WASTE MANAGEMENT 7 | GK63ZZL | IVECO REFUSE DISPOSAL 4.0 DIESEL 2 AXLE RIGID BODY HGV | N/A | | Owned |

## Summary Findings

The table below summarised the savings opportunities located from this assessment of fleet, water, and waste. We have also factored in the potential for renewable energy (RE) at the two car park sites and excluded and included these respectively in the final two columns:

| Total Energy Consumption | 6,249,308 | | 6,249 | £648,772 | 1,901 |
|---|---|---|---|---|---|
| Savings Located: | Fleet | Water/Waste | Renewables | Total Exc RE | Total Inc RE |
| Energy Saving potential identified kWh | 1,490,712 | | 493,000 | 1,490,712 | 1,983,712 |
| Carbon reduction kg CO2e | 550 | 9 | 126 | 558 | 684 |
| %age saving from total kWh consumption | 23.85 | | 7.89 | 23.85 | 31.74 |
| %age saving from total CO2e emissions (tonnes) | 28.90 | 0.46 | 6.63 | 29.36 | 35.99 |
| Financial Saving Potential £ | £67,723 | £21,053 | £64,090 | £88,776 | £173,920 |

## Recommendations Summary:

Set out in the table below are the recommendations by fleet type in green:

- Urbaser waste fleet
- John O'Connor grounds maintenance
- Council Vans
- Grey Fleet
- Officer Commuting

Waste and recycling in purple

Renewable Energy in brown.

Water consumption and treatment in blue.

The table sets out:

- Item number
- Description of recommendation
- How assessed
- To what it applies
- Energy savings converted to kWh (where possible) in year one.
- Cost savings at year one
- Tones of CO2e reduced at year one.

- Capital cost to instigate measure.
- Payback Ranked by speed of return.
- Percentage carbon reduced against total for part II (1,880 tonnes).

This last column is also colour coded to show which are high (green = less than one year) medium (amber = less than 2 years) and low (red = 3 or more years) returns.

## Recommendations Table:

| Assessment Findings: | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Detail of Measure Identified | Assessed Via | Applicability | Identified Energy Savings Yr 1 (kWh) | Averaged annual savings (£) | Tn CO2e Reduced | Capital cost to instigate (£) | Ranked Payback Period | Rank HML (RAG) & %age CO2 |
| **Urbaser Fleet** | | | | | | | | | |
| **Measure MU1** | Idling Reduction | Site/Desk Assessment | All Fleet | 67,812 | 6,755 | 17 | 2,600 | 0.38 | 0.90 |
| **Measure MU2** | Install Telematics and Eco Training | Site/Desk Assessment | All Fleet | 199,447 | 19,869 | 50 | 7,500 | 0.38 | 2.65 |
| **Measure MU3** | Fuel card data extrapolation | Site/Desk Assessment | All Fleet | 51,280 | 5,080 | 13 | 2,500 | 0.49 | 0.68 |
| **Measure MU4** | Speed Restriction | Site/Desk Assessment | All Fleet | 79,779 | 7,947 | 20 | 6,300 | 0.79 | 1.06 |
| **Measure MU5** | Maintenance and Tyres | Site/Desk Assessment | All Fleet | 19,945 | 1,987 | 5 | 4,200 | 2.11 | 0.27 |
| **Measure MU6** | CNG Trial | Site/Desk Assessment | One RCV vehicle | 0 | 7,977 | 0 | 26,000 | 3.26 | 0.00 |
| **Total** | | | | **418,263** | **49,615** | **106** | **49,100** | **0.99** | **5.56** |
| **John O'Connor** | | | | | | | | | |
| **Measure MJ7** | Idling Reduction | Site/Desk Assessment | All Fleet | 34,111 | 3,379 | 8 | 1,000 | 0.30 | 0.44 |
| **Measure MJ8** | Fleet Averaging | Site/Desk Assessment | All Fleet | 3,302 | 327 | 1 | 500 | 1.53 | 0.04 |
| **Total** | | | | **37,413** | **3,706** | **9** | **1,500** | **0.30** | **0.48** |
| **Council Vans** | | | | | | | | | |
| **Measure MC9** | Electrify | Site/Desk Assessment | 8 Vans | 64,858 | 1,472 | 16 | 1,876 | 1.27 | 0.83 |
| **Measure MC10** | Tyre Rolling Resistance | Site/Desk Assessment | All Fleet | 1,356 | 135 | 0 | 320 | 2.37 | 0.02 |
| **Measure MC11** | Eco Driver Training | Site/Desk Assessment | All Fleet | 3,990 | 397 | 1 | 1,200 | 3.02 | 0.05 |
| **Measure MC12** | Speed Restriction | Site/Desk Assessment | All Fleet | 3,192 | 318 | 1 | 1,200 | 3.77 | 0.04 |
| **Total** | | | | **73,395** | **2,323** | **18** | **4,596** | **1.98** | **0.94** |
| **Grey Fleet Cars** | | | | | | | | | |
| **Measure MG13** | Managed Pool Fleet | Site/Desk Assessment | All Grey Fleet | 31,323 | 12,080 | 8 | 18,000 | 1.49 | 0.41 |
| **Total** | | | | **31,323** | **12,080** | **8** | **18,000** | **1.49** | **0.41** |
| **Commuting** | | | | | | | | | 0.00 |
| **MCo14** | Build Back Better (80%) | Site/Desk Assessment | All Car Commuting | 930,318 | 0 | 409 | 0 | 0.00 | 21.51 |
| **Total Fleet** | | | | **930,318** | **0** | **409** | **0** | **0.00** | **21.51** |
| **Waste** | | | | | | | | | |
| **MWs4** | Move Recycling to 50% | Desk Assessment | All Council Sites | | 1,334 | 1 | 1,000 | 0.00 | 0.03 |
| **Total Waste** | | | | | **1,334** | **1** | **1,000** | | **0.03** |
| **Water** | | | | | | | | | |
| **MWt1** | Reduce Consumption by 10% | Site/Desk Assessment | All sites | | 9,860 | 3 | 1,000 | 0.00 | 0.16 |
| **MWt2** | Reduce Treatment by 10% | Site/Desk Assessment | All sites | | 9,860 | 5 | 1,000 | 0.00 | 0.27 |
| **Total Water** | | | | | **19,719** | **8** | **2,000** | 0.10 | **0.43** |
| **Renewable Measures** | | | | | | | | | |
| **Measure MR1** | Solar Car Port Array | Desktop Assessment | Lairage Car Park | 259,000 | 33,670 | 66 | 406,000 | 12.06 | 3.48 |
| **Measure MR2** | Solar Car Port Array | Desktop Assessment | Council Offices Car Park | 234,000 | 30,420 | 60 | 365,000 | 12.00 | 3.15 |
| **Total Renewable Measures** | | | | 493,000 | 64,090 | 126 | 771,000 | 12.03 | **6.63** |
| **Total All Energy** | | | | 1,490,712 | 67,723 | 558 | 76,196 | 1.13 | **29.36** |
| Total Inc Renewables | | | | 1,983,712 | 131,813 | 684 | 847,196 | 6.43 | **35.99** |

## Key

MWh = Mega watt hour (1,000 x kwh)

kWh = Kilo watt hour (1,000 x watt)

Tn CO2e = Tonnes of carbon dioxide equivalents (1,000 x kg)

kg CO2e = Kilogrammes of carbon dioxide equivalents

## Grey Fleet (Mileage Reimbursement)

A grey fleet vehicle is a car or van owned and driven by an employee for business purposes. The employee is reimbursed on a pence per mile basis for using their private vehicle to make business journeys. Vehicles used by employees under cash allowance schemes are also considered to be grey fleet vehicles.

The Council's fleet that drew down expenses on miles travelled in their personal cars for the 12-month period in question amounted to 121 vehicles. From the provided registrations and miles driven over the year, we have been able to establish the following:

Total miles driven: 87,035 at an annual cost of £39,166.

There are:

- 73 Unleaded Petrol
- 29 diesels
- 3 Hybrid Electric Vehicles
- 16 Unknown (o/w only 1 with a registration)

The average fleet age is 7.8 years which is broadly in line with the UK average grey fleet. Average engine capacity across this fleet is 1,616CC.

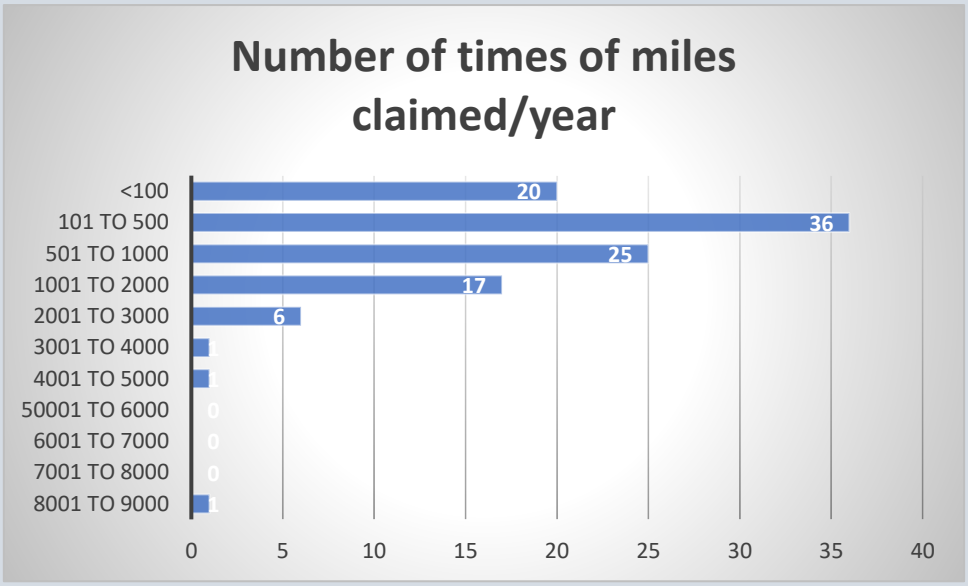
As an average 7.8-year-old (2011/12) fleet, its exhaust emissions are likely to be significantly higher (more than twice as high) than if they were new petrol of diesel vehicles. See table below:

| Standard | Year introduced | Diesel NOx mg/km | Petrol NOx mg/km |
|---|---|---|---|
| Euro 1 | 1993 | 780 | 490 |
| Euro 2 | 1997 | 730 | |
| Euro 3 | 2001 | 500 | |
| Euro 4 | 2006 | 250 | |
| Euro 5 | 2011 | 180 | |
| Euro 6 | 2015 | 80 | 60 |

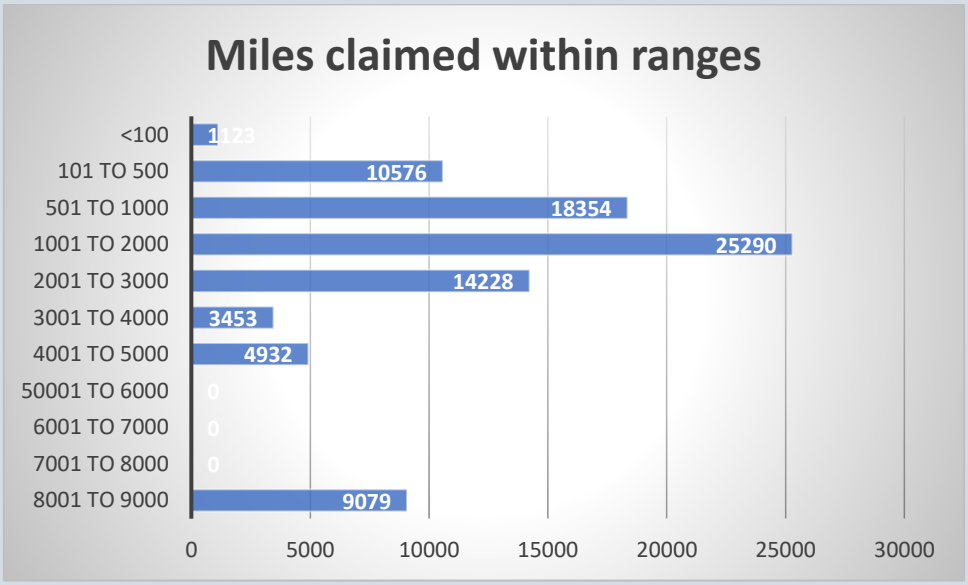
Naturally, a fleet of battery electric vehicles (BEVs) will have no exhaust emissions and could be in part powered by on site solar PV generation (as discussed in part I).

The fleet emits 25,189 kg or 25 tonnes of CO2e per year operating on an average 135g/km CO2 emitted per car where the highest is 231g/km CO2 and the lowest is 44g/km CO2.

Ranking these vehicles by frequency of annual miles over set distances, we can see that most drivers (36/107) are claiming between 101 and 500 miles per year. Only one driver has driven and claimed over 5,000 miles and they represent more than 10% of the Councils total annual mileage claims.




The miles claimed within these ranges shows a dominance between 101 and 3000 miles per year, where 78.6% of all miles claimed and 84/107 vehicle are within this sphere.




From these data, we would argue that all these journeys could comfortably be conducted by battery electric vehicles in a controlled and managed centralised pool fleet.

From initial assessment, we would expect that the annual cost of £39,166 could be reduced by around £12,080 per annum by moving to a managed fleet.

The benefits of this would include:

- Low/No Emission Council fleet
- Reduced risk:
    - Insurance checks
    - Regular servicing
    - MOT checks
    - Tyre treads
    - Control over ability/competence to drive.
    - Fluid levels
- Reduced congestion.
- Better air quality
- Reduced emissions (NOx, CO2, PM2.5 etc)
- Leadership by example
- Reduced cost.
- More professional and branded fleet

It would be important to gain more fleet granularity to better understand days and times when fleet is likely to be in most demand but with a relatively small amount of work, we would be able to establish with a good degree of certainty, the size of managed fleet required and the savings available for applying this.

### Commuting

NHDC have committed to counting their scope 3 commuter data within their carbon footprint.

The Council have done so because they recognise that, whilst they have little control over the cars their officers drive, they recognise the impact on the district that commuting delivers from such aspects as:

- Additional cars on the roads
- Peak hours congestion
- Worsened air quality through NOx and particulate emissions
- Increased CO2 emissions
- Potential for more accidents
- Effects on climate change
- Need for available car parking.
- Marginal cost for not being able to rent these parking spaces to the public.

Councils should do all that they can to reduce commuting. From the grey fleet (the cars that officers use to commute that are also used for business use for which they gain a mileage reimbursement) data provided to CLS Energy, the average car is 7.8 years old. This is broadly in keeping with the average age of the UK fleet. However, it is old and means that very few of the cars on the grey fleet list achieve Euro 6 efficiency levels or anywhere close to this.

Euro 6 (normally discussed in relation to trucks) standards were introduced in September 2015. Euro standards follow a long line of EU environmental emission reductions standards that began in 1993 with Euro 1. All cars sold in the EU post 2016 must meet Euro 6 standards.

| Standard | Year introduced | Diesel NOx mg/km | Petrol NOx mg/km |
|---|---|---|---|
| Euro 1 | 1993 | 780 | 490 |
| Euro 2 | 1997 | 730 | |
| Euro 3 | 2001 | 500 | |
| Euro 4 | 2006 | 250 | |
| Euro 5 | 2011 | 180 | |
| Euro 6 | 2015 | 80 | 60 |

https://www.autoexpress.co.uk/tips-advice/90816/euro-6-emissions-standards-what-do-they-mean-you

Euro 6 has seen emissions testing improved in September 2018 following the 'Diesel-gate scandal' that demonstrated how car manufacturers were incorporating software in their vehicles to cheat the emissions tests. World harmonised Light vehicle testing (WLTP) has now replaced these old NEDC tests to demonstrate real world emissions.

As can be seen in the table above, taking diesels as an example, and accepting that the average of this fleet is Euro 5 (with many below this), the commuter (and grey) fleet at NHDC are emitting more than twice the oxides of nitrogen levels than would be expected of a new fleet of any petrol or diesel cars. As discuss earlier in the grey fleet section. Moreover, particulate matter (PM2.5 to PM10) were not measured in petrol engines until the start of Euro 5 in September 2011. It should be remembered that particulate matter is not only emitted from vehicle exhausts.

The Covid-19 pandemic of 2020 has allowed the Council the opportunity to consider their options here and as part of this piece of work, they have requested that we calculate the emissions from commuting of their officer fleet of private vehicles. Organisations both

public and private have not historically collected this data. It has always been considered that the organisation does not take responsibility for the employee until they have arrived on the premises. Changes to working patterns during the pandemic mean that most officers have been working from home and, following the successes of this, and to 'build back better', the council want to consider different ways of working that will improve the air quality of the district as well as all other aspects listed above.

## Staff Commuting Data Assessment: Scope of Work

Following discussions, regarding this piece of work, we have set out our report as understood. Commuting carbon baseline using NHDC staff postcodes supplied in the format (SG1 or SG15) to avoid providing details of private addresses.

We have used national average data for commuting modes, and GHG Protocol "average data" method, using staff commute distances based on elements of postcode provided to destinations below.

Data has been factored into carbon for travel to the Council's core site.

The data provides an estimate of a pre-Covid/pre-home working baseline carbon footprint for staff within the organisation. In assessing these data, it must be accepted that assessing transport fleet using average details is the least accurate method of assessment. However, due to the paucity of data and the inability to share personal data including vehicle identifiers and full post codes, the data used is the only data currently available to us. In analysing these data, we have utilised the methodology as set out in the GHG Protocol for average fleet assessment.

## Greenhouse Gases (GHGs)

All data has been factored for Greenhouse Gas (GHG) emissions, also known as carbon dioxide equivalents (CO2e), from Government (DEFRA) conversion factors for the year 2019/20.

Whilst terms such as carbon accounting and carbon foot-printing are ubiquitous, and broad terminology talks about carbon dioxide (CO2) emissions, whilst we can broadly conduct assessments against CO2 emissions, it should be appreciated that the release of carbon in gaseous form is just one of the major contributors to global warming and climate change. In terms of addressing the basket of the most climate harmful gases, the Kyoto Protocol (1997) ratified by 192 countries from 2005, has named the following six and later seventh gases as:

1. Carbon dioxide (CO2),
2. Methane (CH4),
3. Nitrous oxide (N2O),

4. Hydrofluorocarbons (HFC) aka F Gas
5. Perfluorocarbons (PFC) aka F Gas
6. Sulphur hexafluoride (SF6).
7. Nitrogen trifluoride (NF3)

Each gas is weighted by its global warming potential (GWP) – the higher this number, the more damaging are its effects in terms of global warming. The numbers below are indicative and are adjusted over time as more data becomes available.

| Greenhouse Gas | GWP (100-year GWP) |
|---|---|
| Carbon dioxide (CO2) | 1 |
| Methane (CH4) | 28 |
| Nitrous oxide (N2O) | 265 |
| Hydrofluorocarbons (HFC) aka F Gas | 2,200 |
| Perfluorocarbons (PFC) aka F Gas | 8,600 |
| Sulphur hexafluoride (SF6) | 16,100 |
| Nitrogen trifluoride (NF3) | 23,500 |

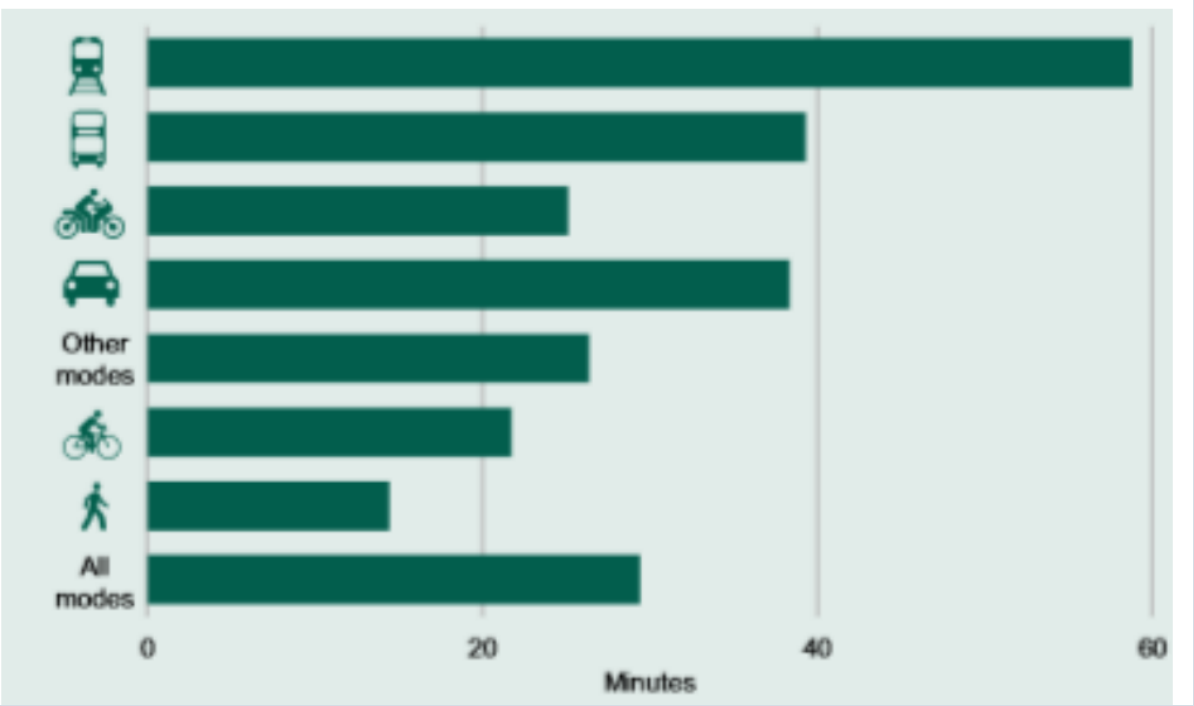
*Herriot, S (2015) Metrics for Sustainable Business: Measures and Standards for the assessment of Organisations. Routledge.*

As is indicated above, one Methane (CH4) molecule is considered anywhere between 21x and 28x more damaging than a molecule of CO2. Carbon Dioxide (CO2) is equal to the arbitrary figure 1. However, it is because it is in such abundance, accounting for 81% of total UK GHG emissions, that it is of major significance). Figures are aggregated to give total greenhouse gas emissions in CO2 equivalents (CO2e also known as greenhouse gases or GHGs). For this carbon assessment, we have used CO2e, or greenhouse gases combined. These data have been extrapolated from DEFRA Conversion tables for 2019/20 and broadly coincide with the reference period 1 April 2019 to 31 March 2020.

## Context

According to the latest published Government data, 83% of all passenger miles travelled in 2017 were by car, van, or taxi. This amounted to 8.3 billion journeys. By contrast, passenger journeys on local buses have fallen by 62% since 1950 and now stands at 4.9 billion journeys. Around 27% of all UK trips were for commuting or business purposes. Some 51%

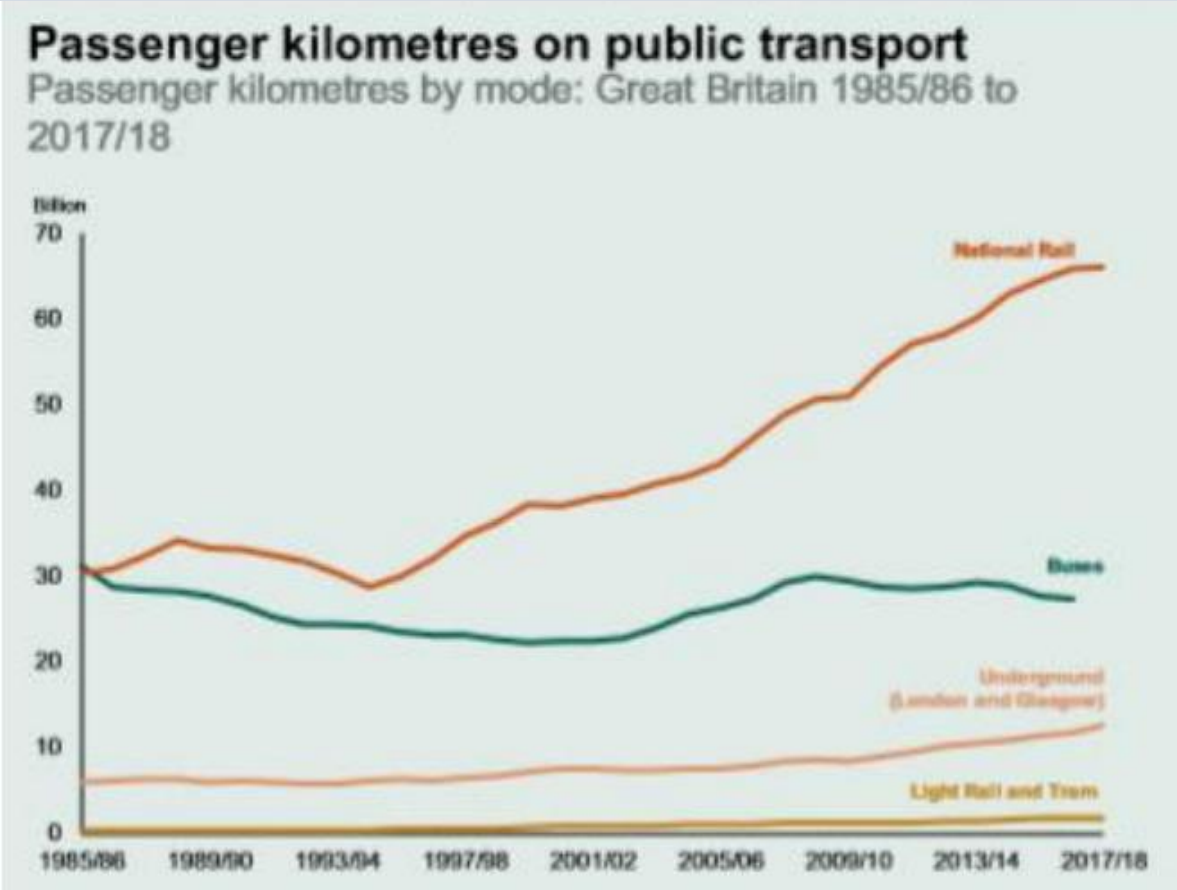
of all rail trips were for commuting or business purposes. Typical travel commute times by transport mode in the UK in late 2017 are shown below:



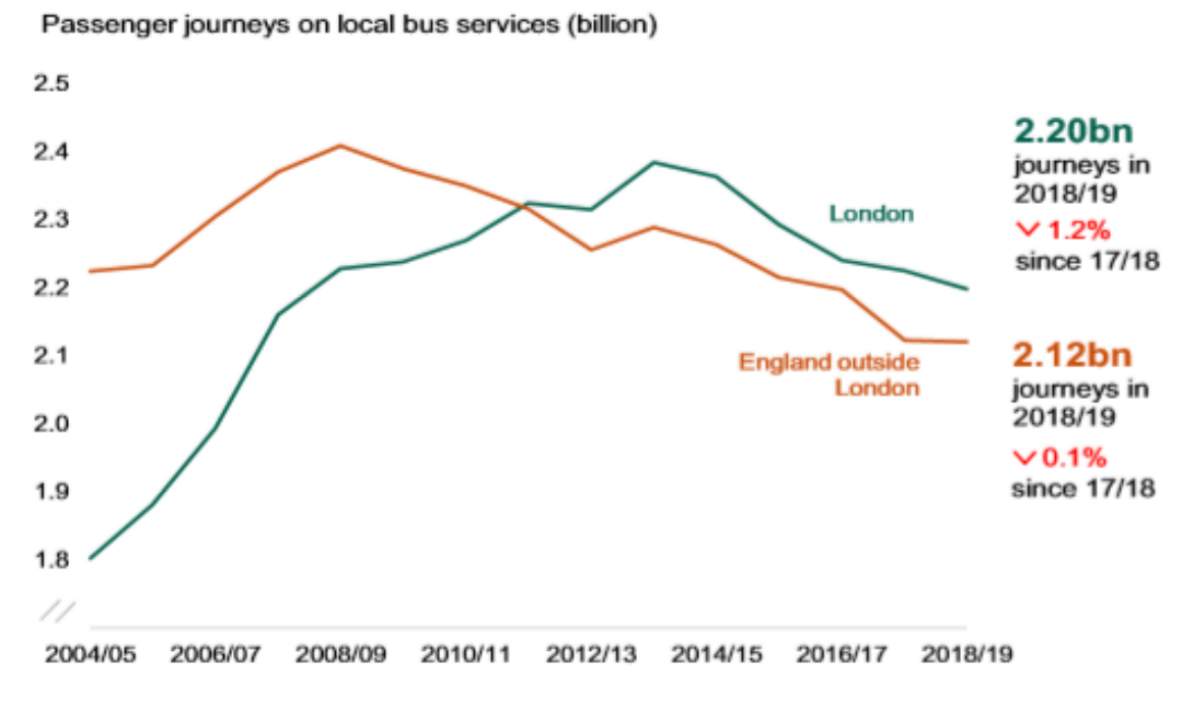

The average UK rail commute time is 59 minutes with average walking commute at 14 minutes.

### Public Transport:

For the UK, as can be seen below, national rail travel has increased since the mid-1990s and indeed has increased by 149% since 1985. By contrast, bus travel has remained somewhat stalled and has been declining in recent years to 2019. This is not least because of bus service reductions across the UK.



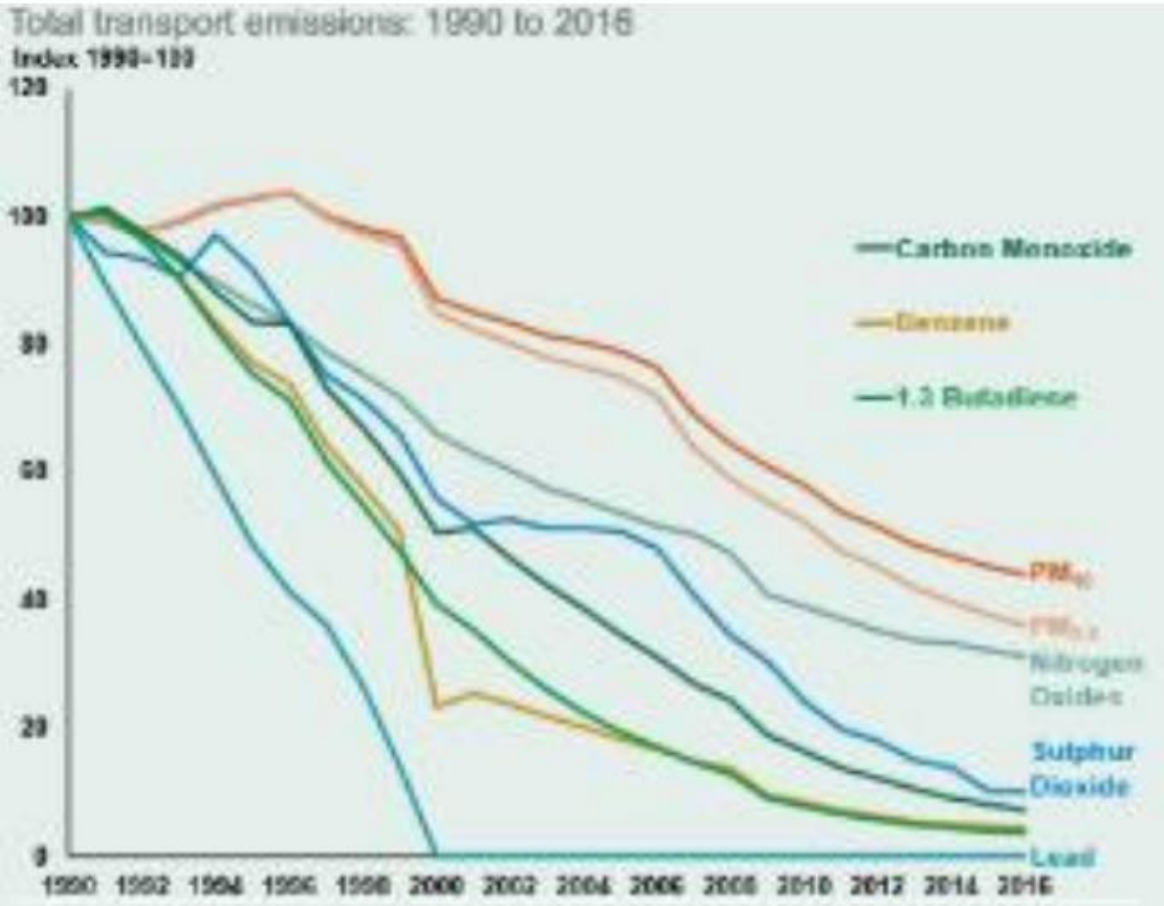

Bus journeys in decline between 2008 and 2019:



As of 30th April 2020, of the 39,890,500 registered motorised vehicles on UK roads, some 32,884,300 were cars. A rise of nearly 500,000 cars from the previous year. https://www.gov.uk/government/statistical-data-sets/veh02-licensed-cars

**Air Quality:**

Whilst it is notable in the graph below is that whilst air pollutants have decreased by more than half since 1990, they remain at illegal levels across Europe and in many UK cities:

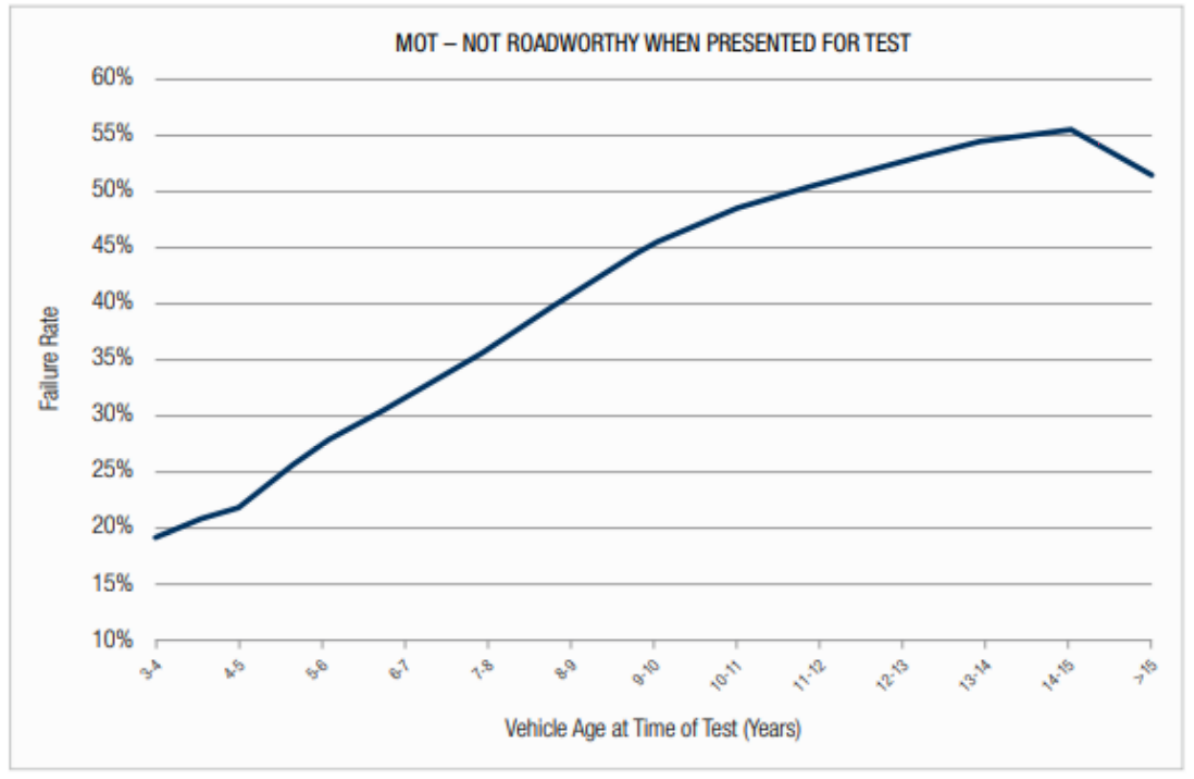



It is notable what effects legislation has historically had on these emissions. Since 1990, lead emissions from domestic transport declined by almost 100% due to the ban of leaded petrol in 1999. Similarly, sulphur dioxide (SO2) emissions from transport have decreased by 90% since 1990. This was largely due to the removal of sulphur from road fuel. BVRLA data for 2016 shows 1.5 billion miles per annum are driven by grey fleet vehicles (personal cars driven on business and reimbursed at typical HMRC mileage rates) in the public sector at a cost of £786 million.

Whilst commuting does not fall under these data because it is not claimed for, it utilises the same private vehicles. Grey fleet vehicles in the UK have an average age of 8.2 years.

Significant numbers of these cars predate the implementation of Euro 6 (Sep 2015) and as such, their emissions levels are high.

The graph below shows the correlation between car age and first time MOT failure rate. As is clear, the %age fail rate at 8 years sits at over 35% meaning that cars are not only polluting and inefficient, but they are also potentially unsafe to be driven on the road:




*Source: DfT 2013*

UK Public sector grey fleet mileage generates around 447,000 tonnes of CO2, 1,118 tonnes of NOx and 40,000 kg of particulates each year.

https://www.bvrla.co.uk/resource/insight-getting-to-grips-with-grey-fleet.html

All the above leads to the clear justification for a move away from the status quo post Covid-19 return to work. The reduction of passenger cars linked to car share solutions, greater use of active travel (walking and cycling), public transport and the continued adaptation to working from home and video conferencing will deliver significant benefits to aspects including:

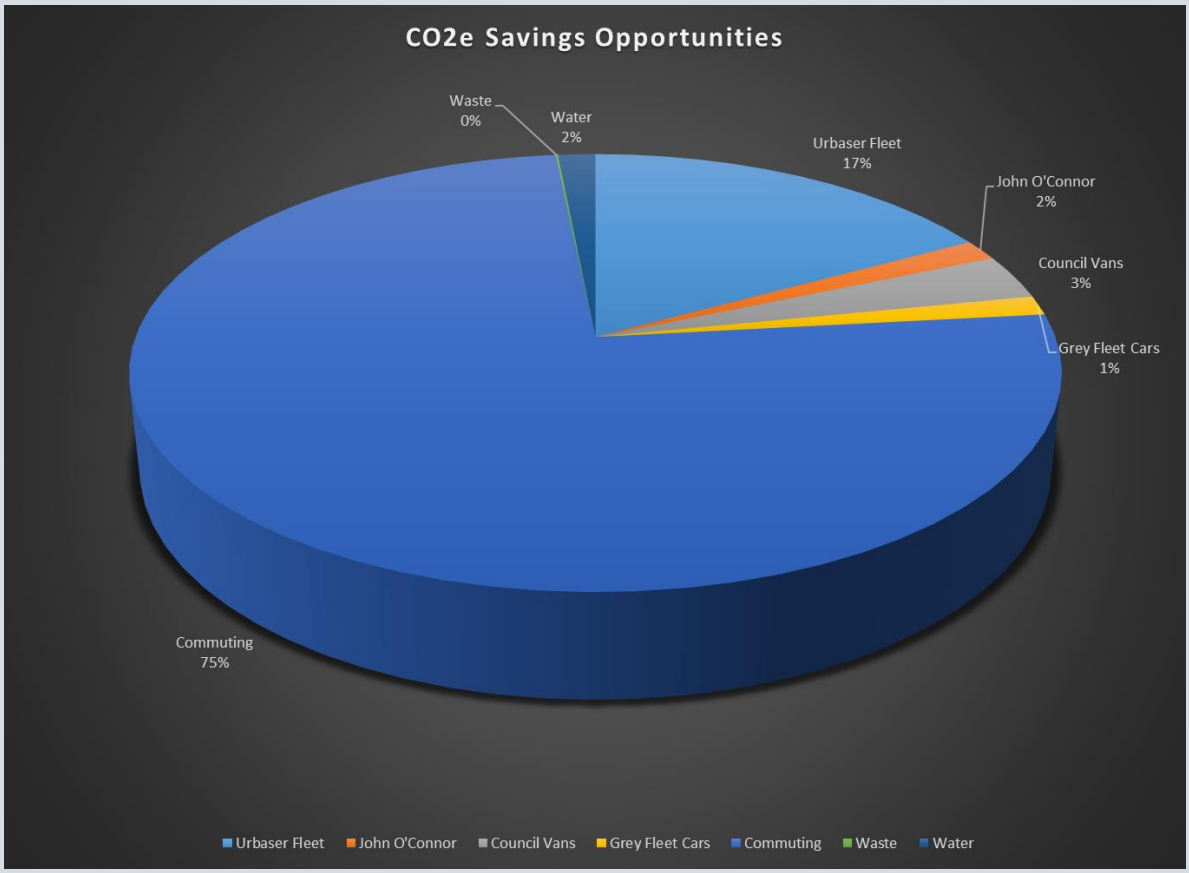
- Congestion
- Air quality and associated lung diseases
- Carbon reduction and associated greenhouse gases
- Acid rain and damage to building facades.

- Road traffic accidents and quality of life

This is the context behind this study.

With more accurately stored data going forward, opportunities to assess actual vehicle mode as well as make, model, fuel type and engine capacity will allow for more accurate assessment. Registrations will provide expected mpg and from this, we can establish likely real-world mpg. Regular production of staff surveys will help to sense check data going forward and provide a representative sample from which to work calculations back from. If non averaged anonymised data can be made available in future, it would be worthwhile re-running this 12-month period of numbers to establish a more accurate baseline.

Ranking the carbon reduction potential available through fleet, water, and waste savings opportunities for this part II report, it appears that commuting has the greatest potential as can be seen below:




It should be noted that whilst the waste and recycling fleet looks comparatively small in this chart, this is partially because, for this report, Urbaser would only permit us access to a single vehicle. The company use telematic data for their fleets across the UK but not for the NHDC contract fleet. The fuel pumped data which would normally provide good insights into driver behaviours is only available through a single diesel tank in the yard at Letchworth and

most drivers do not log their vehicle mileage at time of fill up. Most do not correctly record their vehicle registration which means that the data is extremely weak. Given that the carbon emissions from the Urbaser fleet amount to 65% of the Councils total fleet emissions (including commuting), we would strongly recommend that Urbaser are required to correctly record all fuel and mileage data from this point on. As a large company, Urbaser will be mandated to UK and EU legislation requiring this and as such, it will be in their interests to address this now. Urbaser savings opportunities have been underplayed here as the data is insufficient to make reliable assertions.

The John O'Connor fleet has 'Quartix' telematics, and the fleet looks to be professionally managed. We have not had the opportunity to physically view and profile this fleet and again, the only recommendations we can make are from the telematics which, without a physical profile of the vehicles, we have had to be very conservative with.

There are opportunities in the near future for all fleet and in particular, the fleets named above. However, at time of writing, these options are not commercially viable. It will be worthwhile keeping a watching brief intense area as a significant move away from carbon is likely.

There are savings opportunities with the Councils van fleet but as with all fleet activity, savings delivering fast returns require reasonable vehicle milage. The majority of the Council's fleet travels locally (for example, the IT van, typically travels less than 1,000 miles per year). As such, the savings potential here is limited.

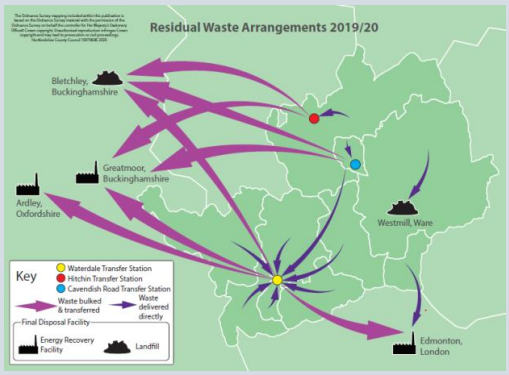
The grey fleet operated by the Council pays officers to use their own cars for business purposes. We have not factored in aspects such as essential user allowances but even without this, a managed car scheme would look to be worthwhile of further investigation.

Commuting clearly has no direct cost benefit to the Council (officers pay for their own travel). However, by encouraging home working, video conferencing, public and active travel, the benefits to the district will include:

- Less road congestion
- Better air quality
- Leadership by example
- Reduced CO2, oxides of Nitrogen (NOx) and particulate emissions.
- A healthier workforce

The council currently recycles around 27% of its waste produced at its premises. It should easily be able to move more of its waste to recycling and take this to 50%. As Urbaser were unable to quantify the volumes of waste that end up in landfill compared to Energy from

waste (EfW), we have arbitrarily split these waste figures in half (50% top EfW and 50% to landfill).




It should be noted that the carbon conversion factors for closed loop recycling are currently the same as incineration (EfW) whilst for landfill, they are almost five times greater. It would be easy to draw from this statement that recycling, and incineration (EfW) are equally good. However, it should be remembered that at present, the UK government does not include for the carbon emitted from the burning of any material and as such, the figure is unrealistic; The recycling of materials remains significantly more carbon efficient than EfW.

We have factored water consumption on a 10% reduction which is relatively easy to achieve with basic alterations to taps, controls and behaviours. which immediately leads to a 10% reduction in water treatment.

Renewable solar car ports at the two car parks visited will lend themselves well to electric vehicle charging which in turn links with recommendations made for some of the council's future fleet.

### Post Pandemic - Potential Next Steps:

With an expectation that post Covid-19, the Council may elect to encourage more home working, it would be worthwhile analysing the effects of increased home energy use against reduced Council building office energy use and the consequent changes to overall CO2e emissions as they factor changes in travel behaviour. In assessing changes to the way in which people commute, there will invariably be claims that the car must be used for the commute and parked nearby 'just in case' it is needed from business travel.

This is a myth and can be reasonably easily addressed. Following the likely implementation of more low emission zone across UK towns and cities, the nature of staff vehicles entering the towns in the district will likely become an issue. Early adoption of the maximisation of home working, encouraging active travel and public transport use, implementation of a controlled fleet (see grey fleet recommendations), home working, video conferencing and electric charging infrastructure would be a wise approach at this juncture.

Naturally, in order to achieve buy-in, this should be independently communicated through consultation with staff, staff-side, unions, members an all tiers of management.

F Gas use/loses ought to be included in the Councils calculations for GHG emissions.

In relation to active travel (cycling and walking etc), Government made an announcement on Saturday 9th May 2020 https://www.gov.uk/government/news/2-billion-package-to-create-new-era-for-cycling-andwalking for £2bn to support active travel.

Assessing building, transport, and operational carbon ($CO_2e$) footprint needs to be scoped to ensure that all scope 1 and 2 emissions are factored and scope 3 is included where possible. The Council should consider areas such as procurement, building control and planning where it has influence. Whilst it is always attractive to consider large ticket items such as renewable energy, these should be the focus after the optimisation of energy and fuel efficiency measures following comprehensive assessment of significant energy consumers and data-led analysis of site and fuel consumption.

We would be pleased to continue to assist the Council with third party independent assessment and fleet profiling and all the above. Providing independent recommendations and advice to large companies and councils is something we specialise and take great pride in.

Whilst every effort has been made by CLS Energy to draw out and highlight savings opportunities, we cannot be held responsible for omissions of data or analysis where this was not made available to us.

As with all such works, any liability upon CLS Energy is limited in its entirety to the quoted fee agreed for this piece of work.

### Refuse and Recycling Fleet opportunities

The significant energy user for NHDC (based on the aspects calculated in Part I and Part II) at 34.1% by kWh (rising to 41.8% when commuting is included is their vehicle fleet). NHDCs control of this fleet is good. However, some 26.6% (more than a quarter) of the total fleet energy use is in the hands of the waste and recycling provider, Urbaser.

Unlike John O'Connor, neither the Council nor more importantly, Urbaser operate any form of telematic system. Whilst it is encouraging to note that John O'Connor use Quartix telematics which is a good system and looks to be well-managed. The lack of Telematics with Urbaser is unusual for a waste contractor and is compounded by the fact that the fuelling of the refuse and street cleansing fleet is conducted from a tank at the depot at which staff are not required to input vehicle registrations. More specifically, this practice is not enforced. As such there are very few accurately recorded vehicle' registrations

provided. This means that the fleet cannot be accurately assessed for savings opportunities. Going forward, we would strongly advise that Urbaser implement a system for recording, and at the very least, capture at every fill up:

- Vehicle registration (perhaps using an RFID key fob)
- Fuel pumped by time and date.
- Odometer reading at time of fuel pump.

Even with these basis parameters and some fleet profiling, we would expect to be able to demonstrate significant fuel savings opportunities.

An assessment of the small number of vehicle registrations that are recorded shows that indicatively, there is a relatively wide range between best and worst drivers for fuel efficiency. Whilst more granular data is required, this would indicate that there is potential for the following:

47,252 litres of fuel savings opportunity.

We would expect this figure to be a good deal larger.

This amounts to 418,263 kWh of energy with an approximate value per annum of £49,615. This is a fuel saving of around 13% with an overall payback of just under one year.

Given that Urbaser look likely to be mandated to both ESOS Phase 3 and SECR, it would be wise for them to begin collating this data now.

Data can demonstrate the savings available through avoiding historic routing of vehicles from sites where these would be better undertaken by more proximate sites. Control of vehicle data will also allow the ranking and assessment of drivers and provide rewards to those that have the most room for improvement. Telematic data can also be utilised to justify reduced insurance premiums.

By instigating telematic data, the Council should expect to make significant savings. In addition, optimal routing and vehicle utilisation are critical to NHDCs success as a business, providing a competitive edge in service and cost control.

Control of vehicle data will also allow the ranking and assessment of drivers and allow for reward of those that have the most room for improvement.

We have not factored for the inclusion of routing software to improve costs and reduce emissions because we understand that this project is already in hand. However, this is likely to be significant. We would recommend that data on this is assessed using your in-house telematics. We would be happy to work with you to independently quantify savings from this to provide you with peace of mind.

# Recommendations

### Savings opportunities:

### Urbaser Waste and Recycling Fleet

The Urbaser fleet constitutes the refuse, recycling, and street cleansing operation for NHDC. It operates into landfill sites in the area. Urbaser own the fleet and the current refuse depot in Letchworth.

RCVs: VK18 ONW, VO61 ZBE, VU11 HUO. And sweeper DK18 HNJ:

Euro 6 - LL18 PFE and LL18 PFF. The Iveco GK63 ZZL (below centre and right) was assessed but there were no telematics on board, nor was the trip computer operational. As such, the assessment was perfunctory. No access was provided to any other Urbaser site fleet vehicle.

Panelled rigid vehicle: LN18 BZP, Van OU18 DHD:

## M1 Idling reduction

Idling is an index that demonstrates driver behaviour. Reducing the instances of idling will affect a range of driving attitudes and bring down fuel use and emissions. It is not possible to establish this without telematic data and good fuel data and as such, where we have used telematics to assess this for the John O'Connor fleet, we have had to use rule of thumb and experiential assessments for the Urbaser fleet.

| | Detail of Measure Identified | Identified Energy Savings Yr 1 (kWh) | Averaged annual savings (£) | Tn CO2e Reduced | Capital cost to instigate (£) | Ranked Payback Period | Rank HML (RAG) |
|---|---|---|---|---|---|---|---|
| MU1 | Idling Reduction | 67,812 | 6,755 | 17 | 2,600 | 0.38 | |

## M2 Telematics and Eco Training (Refuse)

There are invariably opportunities to improve on driver behaviour and the installation and proper control of telematics will facilitate this. There is significant evidence of improved MPG through Driver Development Managers. We would recommend the inclusion of weekly incentives for most improved driver mpg and use of train the trainer following initial specialist training. We would be happy to recommend trainers.

By installing a suitable telematic system and managing the ensuing telematic data, beyond simply reporting on idling and over revving, the company should expect to make significant savings. Training the trainer (using your best drivers as the new trainers) in this way avoids ongoing external trainer costs.

Using train, the trainer techniques and then following up by utilising Urbaser's consistently better drivers to train poorer drivers (acceleration, harsh braking, and cornering, etc) as well as bringing drivers towards the fleet specific average, will also keep costs down and skills in house and deliver savings alongside safer and better skilled drivers.

| | Detail of Measure Identified | Identified Energy Savings Yr 1 (kWh) | Averaged annual savings (£) | Tn CO2e Reduced | Capital cost to instigate (£) | Ranked Payback Period | Rank HML (RAG) |
|---|---|---|---|---|---|---|---|
| MU2 | Install telematics and Eco Training | 199,447 | 19,869 | 51 | 7,500 | 0.38 | |

## M3 Fuel Card extrapolation

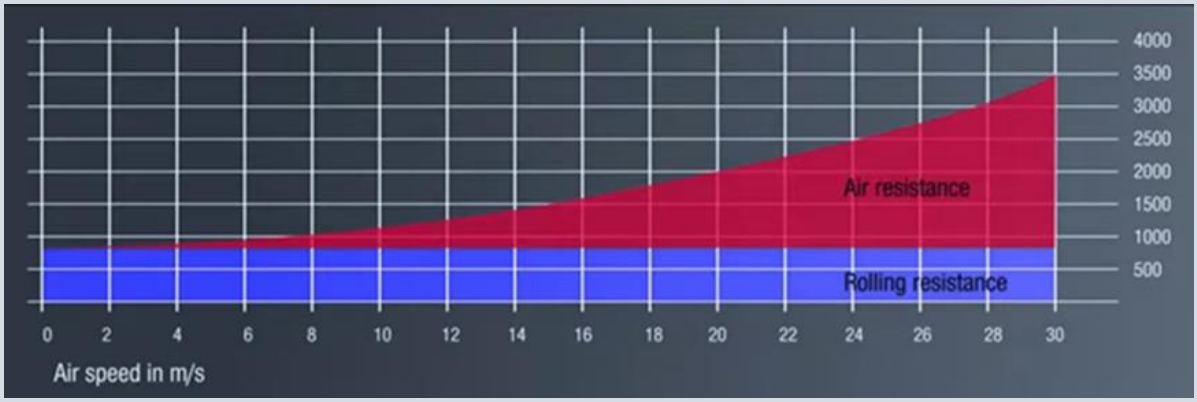
The fuel card data for Urbaser was only implemented form March 2020 and so the data in this report comprises site tank data and one month of forecourt data. This month ended with England's first Pandemic lockdown. This data only consists of some registrations and litres pumped. As such, it is not interrogatable data. We have considered this against similar council fleets and factored a saving potential based on these and substantively reduced to ensure that it will over deliver.

| | Detail of Measure Identified | Identified Energy Savings Yr 1 (kWh) | Averaged annual savings (£) | Tn CO2e Reduced | Capital cost to instigate (£) | Ranked Payback Period | Rank HML (RAG) |
|---|---|---|---|---|---|---|---|
| MU3 | Fuel card data extrapolation | 51,280 | 5,080 | 13 | 2,500 | 0.49 | |

## M4 Speed Restriction

Vehicles that are not speed restricted use significantly more fuel than those that are. We understand that NHDC, A roads and dual carriageways and the presence of speed restrictions will remind staff of the importance of keeping within limits. The vehicle inspected (GK63 ZZL) was unsurprisingly speed limited to 90kmh. this could be further reduced.

At average speeds above 60kph (37mph), wind resistance consumes more fuel than all other aspects of the vehicle put together. Once all vehicles are speed limited (around 53mph) the opportunities lie in reducing parasitic drag or wind resistance.




As can be seen in the graph above, a doubling of speed leads to 4-fold increase in air resistance (red). The highest point here - 30m/s equates to 67.1mph.

| | Detail of Measure Identified | Identified Energy Savings Yr 1 (kWh) | Averaged annual savings (£) | Tn CO2e Reduced | Capital cost to instigate (£) | Ranked Payback Period | Rank HML (RAG) |
|---|---|---|---|---|---|---|---|
| MU4 | Speed Restriction | 79,779 | 7,947 | 20 | 6,300 | 0.79 | |

## M5 Maintenance

If tyre pressures are not regularly checked and maintained, then there is significant space for improvement. For example, a five PSI underinflation has the drag effect equivalent to an additional cab-mounted extremity with consequent increase in fuel consumed of 0.5%. We would expect extremely fast payback on such measures. We understand that vehicles are maintained by local dealerships, frequency and level of checking should be investigated along with assessments by drivers. As with HGVs, it is common amongst fleets that tyre

pressures and tracking are not checked and adjusted as often as necessary. We would recommend at least monthly, before driving at high speed and more ideally, weekly.

| | Detail of Measure Identified | Identified Energy Savings Yr 1 (kWh) | Averaged annual savings (£) | Tn CO2e Reduced | Capital cost to instigate (£) | Ranked Payback Period | Rank HML (RAG) |
|---|---|---|---|---|---|---|---|
| MU5 | Maintenance and Tyres | 19,945 | 1,987 | 5 | 4,200 | 2.11 | |

## M6 Compressed Natural Gas (CNG)

Whilst Hydrogen as a fuel is available today, it is not yet commercially viable. Nor are there adequate numbers of filing stations to make this viable for NHDC. A short to mid-term solution for the Council would be CNG.

As the world of heavy goods looks to alternative fuels following net zero emissions targets by 2050 climate emergencies and 'diesel-gate', considerations for viable low emission alternatives to diesel are required.

CNG offers an attractive 40% discount in fuel cost per kWh (1 litre of diesel contains approximately 10kWh of energy) at a roughly 20% reduction in combustion efficiency, net gain in real world conditions is approximately 20% reduction in fuel cost for the same work/distance.

This can and is being produced from sustainable biofuels and has significantly lower emission than diesel and less cost per litre. We are currently conducting trials on these vehicles and would be pleased to discuss our independent findings following these tests and perhaps more specific assessment for NHDC at a later date.

Importantly, as the world moves to more and more low emissions zones (LEZ), dramatic reductions in harmful emissions (NOx, SOx, PMs, CO etc.) are available using CNG. This will enable entry to low emission zones and avoidance or reduction in congestion charges. CNG in use is Renewable, Sustainable Biomethane, 100% sourced from waste, independently verified, and approved by the Department for Transport's Renewable Transport Fuel Obligation (RTFO). The CNG option here has only be assessed against one truck. Naturally, the cost is based on additionality, but a trial would have limited to no cost.

| | Detail of Measure Identified | Identified Energy Savings Yr 1 (kWh) | Averaged annual savings (£) | Tn CO2e Reduced | Capital cost to instigate (£) | Ranked Payback Period | Rank HML (RAG) |
|---|---|---|---|---|---|---|---|
| MU6 | CNG Trial | 0 | 7,977 | 0 | 26,000 | 3.26 | |

## John O'Conner Grounds Maintenance Fleet

John O'Connor operates a well-managed fleet operation. They have set a very encouraging target for all company cars to be sub 100g/km CO2 by the end of 2020.

In May 2017, they set themselves a target to replace existing 3.5 tonne vehicles with Euro 6 compliant Fiat Ducato Vans over a five-year period.

All vehicles are speed restricted to 60mph (to aid safety, save fuel, ware, and tear) and are all fitted with Quartix telematics to monitor usage. The company monitor driver style and reward good drivers.

This has resulted in reduced idling, wear and tear from hard braking and accelerating. In terms of vehicle payloads, the company have taken the time to ensure that as far as possible, they deploy teams with effective equipment in an efficient and practical vehicle whilst remaining within legal payloads. John O'Connor drivers are issued with a list of weights for machinery and accessories so they can calculate their load and check it is safe and compliant.

The company's workshop manager has worked extensively with vehicle suppliers and their body workers to produce bespoke bodies that enable a ride on mower to be carried by a 3.5 tonne Fiat Ducato Vehicle along with crew and accessories and remain within the legal payload. This avoids the need for trailers which can be awkward to park and manoeuvre, particularly on some of the company's local authority contracts.

Equipment weights are set to increase with a new requirement for diesel particulate filters and again, the in-house team have been working in partnership with key manufacturers to develop new lighter weight models that can be carried by a 3.5 tonne vehicle whilst still complying with this new requirement.

We have been provided with access to the Quartix system to assess the 28 vehicles on the NHDC contract. Of these vehicles, 27 are road vehicles that can be described as LCV commercial vehicles. The road fleet are predominantly Vauxhall Movano (12) and Fiat Ducato (4) and Fiat Doblo (4) vehicles.

The John O'Conner fleet looks to be well-managed and has Quartix telematics on board which has useful attributes for this fleet.

A summary assessment of the 27 strong road fleet operating the NHDC contract established two fundamental points worth considering:

- That there is no Powerfeed on these vehicles that connects to the telematics.
- Similarly, neither is there fuel pumped data connected with this.

As a result, the data that is available, whilst incredibly useful, could be made more useful to the company in monitoring and addressing fleet fuel use and emissions.

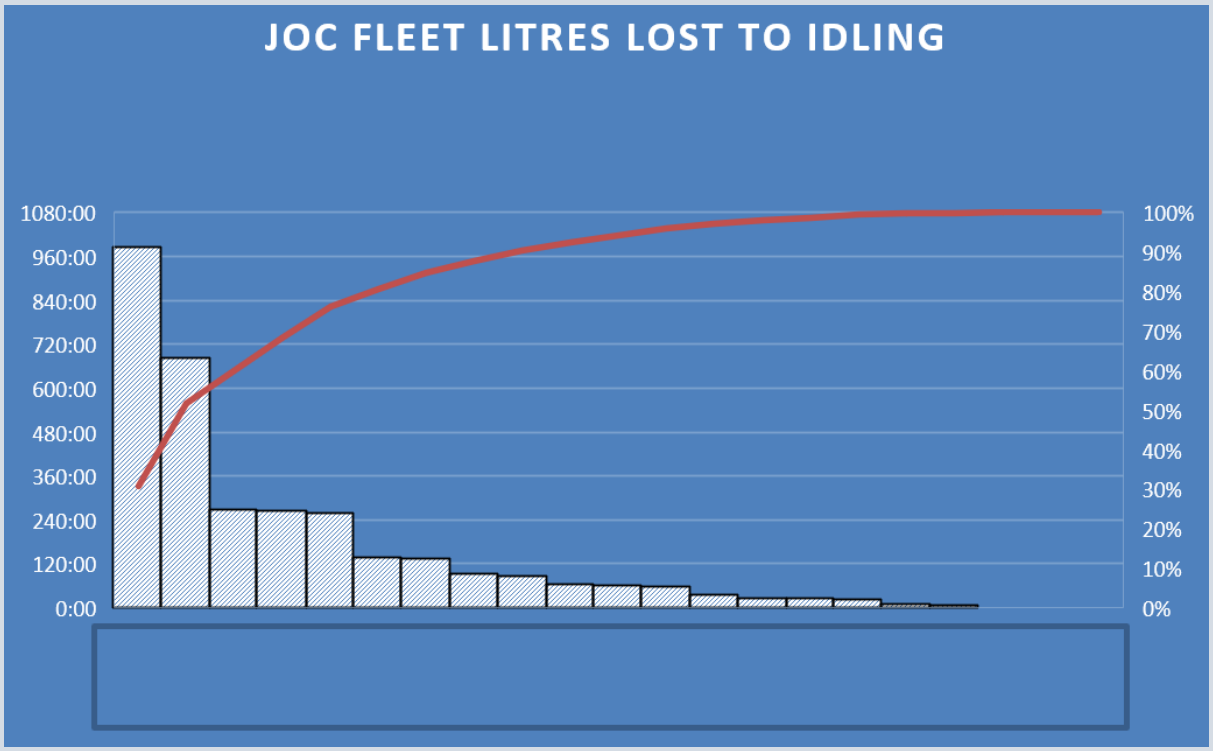
We would recommend that conversations take place with Quartix to establish whether the above can be actioned as part of the package that they offer.

As an interim measure, we have taken a years-worth of Fuel Genie fuel pumped data for the NHDC fleet and linked it to the Quartix data for the same period and vehicles. By doing this, have a more versatile and accurate (from a fuel perspective) dataset for the reference period.

What we have observed is that the driving styles for these vehicles range from MPGs of 7.4 down to as low as 1.9. Interestingly (and tellingly) the highest and lowest MPGs achieved over this year are found in vehicles that are the same make, models, and year of manufacture (2017). From a careful analysis of these drivers and a wider spread of data, there would be savings available from bringing the laggards into line with the better drivers.

Having factored out one of the vehicles that is exhibiting extremely high idling, an analysis of the idling taking place on this fleet shows potential for up to 3,218 litres of diesel savings worth just over £3,378 at today's rates, equating to a potential saving of 9.56% against total litres pumped for this fleet. This can only at this stage be indicative as we would normally expect to assess for anomalies in the fleet and this is always better conducted over the full fleet and over longer periods of time. We have built in what we would consider to be a reasonable assumed idling rate for the John O'Connor fleet, but the operation needs to be viewed to better understand the level of engine usage for the various grounds maintenance and shredding processes.

The graph below shows the higher idling vehicles with lost litres on the y axis.

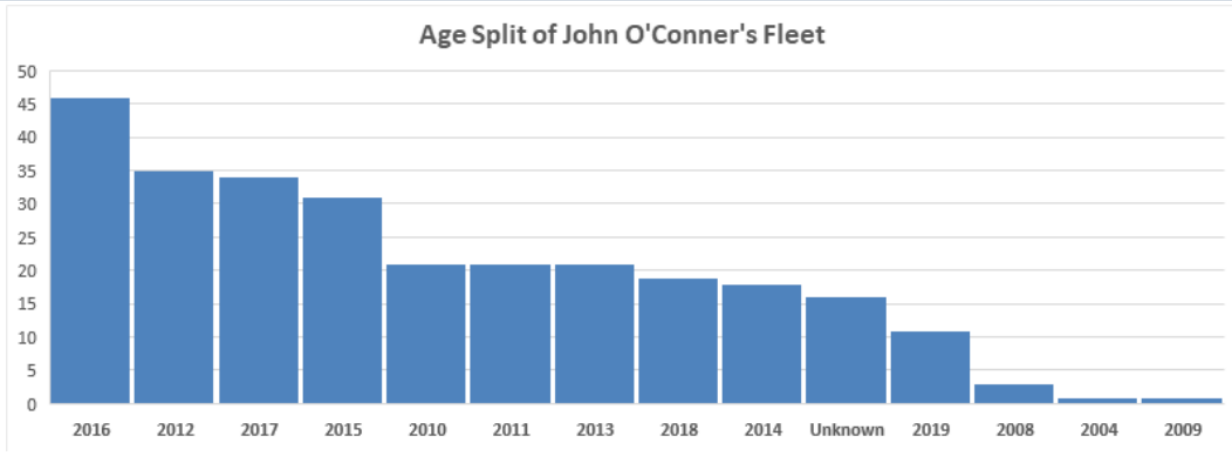


*Graph produced from our analysis of Quartix telematics.*

Clearly this only represents savings for 26 of the 27 road vehicles on the NHDC contract and not for the much larger John O'Connor operation which will likely make these figures much more attractive.

We understand from the Equas ESOS Phase 2 report that the total John O'Connor energy consumption (TEC) is 97% transport (which as a fleet specialist company, is no surprise to us).

We further understand that the total fleet across the UK amounts to 278 vehicles of which 260 are owned and around 145 of these are between 6 and 9 years old.




*Graph extracted from the Equas ESOS Ph 2 report.*

We would never make assumption on fleet data against a fleet we have not seen. Indeed, this assessment without a physical sample of fleet being profiled and assessed must be caveated. However, since the NHDC fleet amounts to 27 vehicles, it might well be seen as a microcosm of the total fleet which is ten times larger and worthy of a fuller inspection.

If at some point we can get in and around the vehicles and ask questions of the fleet managers and drivers, we would be able to recommend the sort of adjustments, technologies, controls, measures, and behaviour changes that we would typically recommend for a fleet of this type. We would expect to find significant savings from a full profile and physical assessment of such a fleet as this and this could be provided as a standalone exercise or as part of ESOS Phase 3 from 1st January 2022 if you would like us to provide a proposal for either going forward.

We understand that whilst affected by the Energy Efficiency Directive Article 8 the Energy Savings Opportunities Scheme (ESOS Phase 2), as a company, John O'Connor do not appear to be captured by Streamlined Energy and Carbon Reporting (SECR) legislation that became law in the UK in April 2019.

SECR requires large companies to collate and publicly report on their CO2e emissions if they meet two of the following criteria:

- 250 staff
- £36 turnover
- £18m balance sheet

In terms of the report, we are producing for NHDC, it will be extremely important to understand if John O'Connor are (or have plans to) commence public reporting on their CO2e emissions. This is because it is necessary that we avoid double counting on the NHDC aspect of their business (or indeed other Councils on the John O'Connor contract list that have similar ambitions to NHDC). We can of course assist with this if desired.

A summary assessment of the 26 strong road fleet operating the NHDC contract. There is no Powerfeed on these vehicles that connects to the telematics, and neither is fuel pumped connected with this data. As such, the data that is available, whilst useful, is not in depth.

We have taken a years-worth of Fuel Genie fuel pumped data and linked it to the Quartix data for the same period and vehicles and as such, have a more versatile dataset.

What we have observed is that the driving styles for these vehicles ranges from MPGs of 7.4 down to as low as 1.9. From a ranking of drivers, there would be savings available from bring the laggards into line with the better drivers. Moreover, an analysis of the idling taking place on this fleet shows potential for around 4,837 litres of diesel of just over £5,000 at today's rates or 14.6% of total litres pumped.

Naturally, we have not seen these vehicles so are not able to recommend the sort of adjustments and measures that we would typically recommend for a fleet of this type.

| | Detail of Measure Identified | Identified Energy Savings Yr 1 (kWh) | Averaged annual savings (£) | Tn CO2e Reduced | Capital cost to instigate (£) | Ranked Payback Period | Rank HML (RAG) |
|---|---|---|---|---|---|---|---|
| MJ7 | Idling reduction | 34,111 | 3,379 | 9 | 1,000 | 0.30 | |

We understand that whilst affected by the Energy Efficiency Directive (ESOS Phase 2), they are not captured by SECR legislation that became law in the UK in April 2019. SECR requires large companies to collate and publicly report on their CO2e emissions.

Because we were unable to profile their physical fleet, it is difficult to put figures against savings opportunities. We have ranked the driver behaviour over a short period and come up with a very conservative saving opportunity here that could be addressed very easily through training:

| | Detail of Measure Identified | Identified Energy Savings Yr 1 (kWh) | Averaged annual savings (£) | Tn CO2e Reduced | Capital cost to instigate (£) | Ranked Payback Period | Rank HML (RAG) |
|---|---|---|---|---|---|---|---|
| MJ8 | Fleet Averaging | 3,302 | 327 | 1 | 500 | 1.53 | |

## Commercial Van Fleet opportunities

The Council's commercials vans do not drive significant distances that would justify the expense of various technologies. However, there remain opportunities.

## MC9 EVs

From an assessment of fleet movements and costs, we have established that there look to be a number of vehicles that would readily lend themselves to replacement with battery electric vehicles (BEVs). For the purposes of this exercise, we have elected to replace:

Parking services VW Polos with Nissan Leaf Mk2s or eNV200 – other alternatives are available.

A more exact assessment using actual miles driven per day will ensure that these vehicles will cope with the range delivered by these EV models. Savings from EVs are most especially made in terms of fuel costs. Further to this, the changes to benefit in kind (BIK) recently announced, make EVs an attractive company car option. With around half of all new cars obtained by companies, and because benefit in kind (BIK) makes a significant difference to an individual's monthly wages, BIK represents a very potent lever available to government to encourage adoption of the lowest emitting vehicles.

In July 2019, following consultation, HM Treasury announced their intent to strongly incentivise full (BEVs) using these rates, and offer a more modest incentive on plug-in hybrid electric vehicles (PHEV).

The changes incentivise companies and employees to purchase BEVs, effective from 6th April 2020. At this point, these new lower rates became effective (all BEVs now pay no company car tax in 2020-21, just 1% in 2021-22 and 2% in 2022-23). Previously, BIK rates for zero emission vehicles were up to 16%.

Inevitably, some of the messaging around the running costs of EVs tends to be quite general in order to reduce complication.

Positive messages tend to focus on the fact that EVs could cost as low as £0.02 per mile whereas the more pragmatic messages use a default £0.04 per mile (the HMRC Advisory Electric Rate for business mileage).

However, it is important to remember that, just like petrol and diesel cars, not all EVs are the same in terms of their cost per mile and so it is important to understand and be able to calculate the differences before making your choice.

Like any car, the larger / heavier it is the less efficient it is likely to be. There will also be differences between the technologies incorporated by different manufacturers.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The types of journeys, season, driving style, load weight, passengers, temperature, and weather will all affect these indicative figures together with the use of public charge points.

A constant and incorrect perception around EVs which is repeated by the media and suppliers within the automotive sector is around annual mileage.

A recurring message is that EVs are best suited to short journeys, and this then translates into a message that EVs are only suitable for people who do low annual mileage or as a second urban car.

This perceived annual mileage threshold at which an EV becomes unsuitable varies but it is usually 10,000 or 15,000 miles per year.

However, if you drive 110 miles a day for work, 5 days a week for 46 weeks of the year this equates to 25,000 miles. When you factor in extra weekend private mileage this could easily be 30,000 miles a year.

The real-life average range of EVs on the market today is approximately 190 miles. Most are more than capable of achieving 110 miles a day. We have factored on the safe side using an average 100 miles per day as we do not have granular data for driving at NHDC.

Of course, this also ignores the fact that on longer journeys you can always charge up for extra range and rapid chargers at all UK motorway service stations can charge a car from dead to 80% within 40 minutes (broadly the time it takes to drink a cup of coffee).

In short, EV range is no longer an issue. It is important to question anyone who claims otherwise.

There is an electric van on the fleet, and this is encouraging. Lairage Multi-Storey car park also has a pair of charge points.

| | Detail of Measure Identified | Identified Energy Savings Yr 1 (kWh) | Averaged annual savings (£) | Tn CO2e Reduced | Capital cost to instigate (£) | Ranked Payback Period | Rank HML (RAG) |
|---|---|---|---|---|---|---|---|
| MC9 | Electrify | 64,858 | 1,472 | 17 | 1,876 | 1.27 | |

### Electric Vehicle charging:

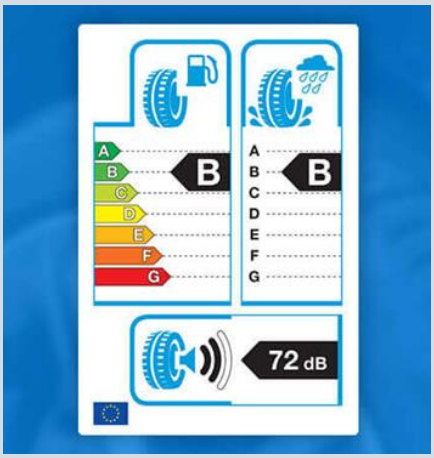
Electric Vehicle range has improved dramatically in the last 2-3 years with ranges up at around 200 miles and more.

The grant system will pay up to 75% of the purchase and installation costs, up to a maximum of £500 per socket. As such, a dual headed charger can claim up to £1,000. When your installer redeems the payment voucher, the system checks the installation costs provided by

your installer and generates the grant level that the installer will then discount from your bill.

### MC10 Tyre Rolling Resistance (RR) (Commercial vans)

All tyres are available in a range of options to improve various aspects of their delivery. One of these is rolling resistance. The higher the rating, the better the efficiency. Higher rated tyres will typically be less robust and so care should be taken where vehicles are regularly travelling distances on construction type tracks as tyre damage may occur more frequently. We have factored for efficient but not the most efficient tyres at next natural change as A rated tyres (which are less physically robust) may not meet the needs of the environment. Selecting a good RR tyre mean that fuel efficiency is improved. We understand that the refuse fleet travel onto the landfill site and do not necessarily tip on concrete hard standing. Similarly, the Grounds Maintenance fleet may not always be on tarmac road surfaces.




As such, B or C rated RR tyre (which are more robust than D or E rated tyres) ought to be acceptable for the application and would save significant fuel. We have ignored the refuse and grounds fleet in these calculations.

| | Detail of Measure Identified | Identified Energy Savings Yr 1 (kWh) | Averaged annual savings (£) | Tn CO2e Reduced | Capital cost to instigate (£) | Ranked Payback Period | Rank HML (RAG) |
|---|---|---|---|---|---|---|---|
| MC10 | Tyre Rolling Resistance | 1,356 | 135 | 0 | 320 | 2.37 | |

### MC11 Eco Training

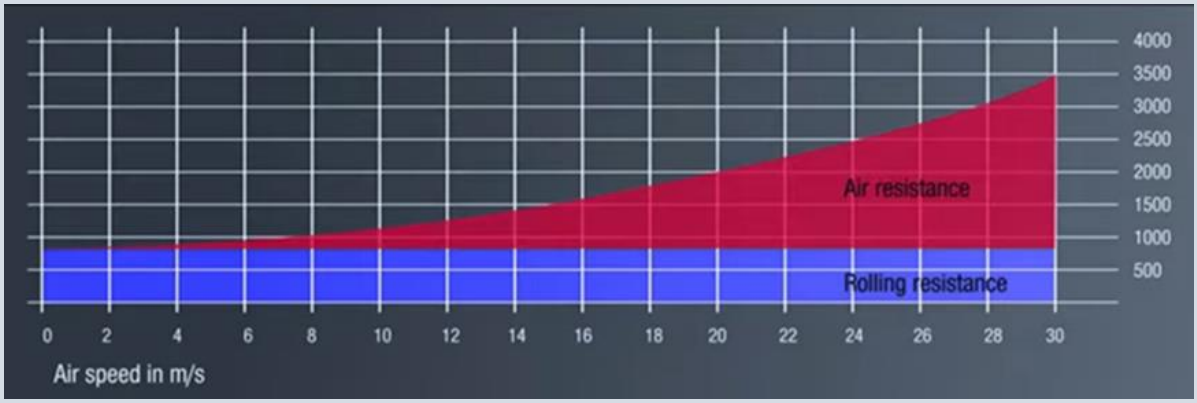
There are large savings available through eco driver training and the undoing of poor driving habits.

| | Detail of Measure Identified | Identified Energy Savings Yr 1 (kWh) | Averaged annual savings (£) | Tn CO2e Reduced | Capital cost to instigate (£) | Ranked Payback Period | Rank HML (RAG) |
|---|---|---|---|---|---|---|---|
| MC11 | Eco Driver Training | 3,990 | 397 | 1 | 1,200 | 3.02 | |

## MC12 Speed Restriction

Vehicles that are not speed restricted use significantly more fuel than those that are. We understand that NHDC, A roads and dual carriageways and the presence of speed restrictions will remind staff of the importance of keeping within limits.

At average speeds above 60kph (37mph), wind resistance consumes more fuel than all other aspects of the vehicle put together. Once all vehicles are speed limited (around 53mph) the opportunities lie in reducing parasitic drag or wind resistance.




As can be seen in the graph above, a doubling of speed leads to 4-fold increase in air resistance (red). The highest point here - 30m/s equates to 67.1mph.

| | Detail of Measure Identified | Identified Energy Savings Yr 1 (kWh) | Averaged annual savings (£) | Tn CO2e Reduced | Capital cost to instigate (£) | Ranked Payback Period | Rank HML (RAG) |
|---|---|---|---|---|---|---|---|
| **MC12** | Speed Restriction | 3,192 | 318 | 1 | 1,200 | 3.77 | |

## MG13 Grey Car Fleet opportunities

By moving the fleet to a managed fleet, we would expect to see a minimum saving of £9,790/year which would equate to a quarter of costs saved. In fact, by factoring costs against the payment made to staff to drive their cars (£0.45/mile), the savings as seen below are much larger. It is likely that the benefits will be more greatly improved when essential user allowances are factored and when other historic payments are considered.

| | Detail of Measure Identified | Identified Energy Savings Yr 1 (kWh) | Averaged annual savings (£) | Tn CO2e Reduced | Capital cost to instigate (£) | Ranked Payback Period | Rank HML (RAG) |
|---|---|---|---|---|---|---|---|
| MG13 | Managed Pool Fleet | 31,323 | 12,080 | 8 | 18,000 | 1.49 | |

## MCo14 Commuter Data Findings:

The table below shows national UK data for commuting travel modes:

| Travel Mode (National) | %age split |
|---|---|
| Car/Van | 0.68 |
| Rail | 0.11 |
| Walk | 0.1 |
| Bus | 0.07 |
| Other | 0.05 |
| Total | 1.01 |

However, we have elected to utilise national data specific to workplace destinations in the East of England area as this provides more accuracy for NHDC in the reporting. As can be seen, due to its rurality, the percentage of car use in East of England is significantly higher than the national average and this should be factored in the consideration of public transport alternatives. The total decimal figure which should be one (1.00) is slightly over due to the rounding up of figures by DEFRA.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The table below shows the percentage splits as used for NHDC:

| NHDC: More accurate (East Anglia workplace): | %age using mode (P) |
|---|---|
| Car | 0.78 |
| Motorcycle | 0.01 |
| Bicycle | 0.04 |
| Bus/Coach | 0.03 |
| All rail | 0.03 |
| Walk | 0.1 |
| Other mode (taxi used) | 0.01 |
| Total | 1 |

To calculate these data, the total average miles driven is factored against the percentage mode of travel for the East of England. Whilst in most cases, we would assume working days per year to be 260 (Monday to Friday, less bank holidays), National Statistics show that UK workers work on average 235 days per year (this includes factors for sick leave and interviews etc). As such, we have used this latter figure in our calculations. The calculation for establishing GHG figures is as follows:

$\sum N \times P \times C \times W \times F = kgCO_2e$ (GHG) where the following applies:

| | |
|---|---|
| Total employees (NHDC) | N1 |
| %age using mode | P |
| Ave Daily Commute (two ways) | C1 |
| Working days/yr | W |
| EF for mode (kgCO2e) | F |

## North Herts District Council (NHDC) data

For NHDC, the data calculated is as follows:

| NHDC: More accurate (East Anglia workplace): | %age using mode (P) | CF 2019 kg CO2e km | Corrected for miles (F) | NHDC staff numbers (FTE) using travel mode (N1) | Ave miles travelled / day (return) by staff (NHDC) | Ave Miles factored by route frequency | Average commute miles per Year (NHDC) | kgCO2e / Year (from EF) (OCC) | TnCO2e / Year (from EF) (NHDC) |
|---|---|---|---|---|---|---|---|---|---|
| Car | 0.78 | 0.177 | 0.285 | 274 | 4,301 | 4,832 | 1,696,002 | 483,394 | 483 |
| Motorcycle | 0.01 | 0.116 | 0.186 | 4 | 55 | 62 | 21,744 | 4,042 | 4 |
| Bicycle | 0.04 | 0.000 | 0.000 | 14 | 221 | 248 | 86,974 | 0 | 0 |
| Bus/Coach | 0.03 | 0.121 | 0.194 | 11 | 165 | 186 | 65,231 | 12,677 | 13 |
| All rail | 0.03 | 0.041 | 0.066 | 11 | 165 | 186 | 65,231 | 4,320 | 4 |
| Walk | 0.1 | 0.000 | 0.000 | 35 | 551 | 619 | 217,436 | 0 | 0 |
| Other mode (taxi used) | 0.01 | 0.212 | 0.318 | 4 | 55 | 62 | 21,744 | 6,907 | 7 |
| Total | 1 | | | 351 | 5,514 | 6,195 | 2,174,361 | 511,340 | 511 |

As can be seen, the total carbon footprint established from these calculations for commuting to and from work (place of work stated as SG6 3DF) for the year to 31st March 2020 is 511,340kg CO2e or 511 tonnes CO2e.

In order to enhance its business continuity plan going forward, if North Herts District Council (NHDC) were to implement a structured working from home policy following its experience of Covid-19. Then GHG (CO2e) emissions reductions for North Herts and the wider environment could be expected to be as follows:

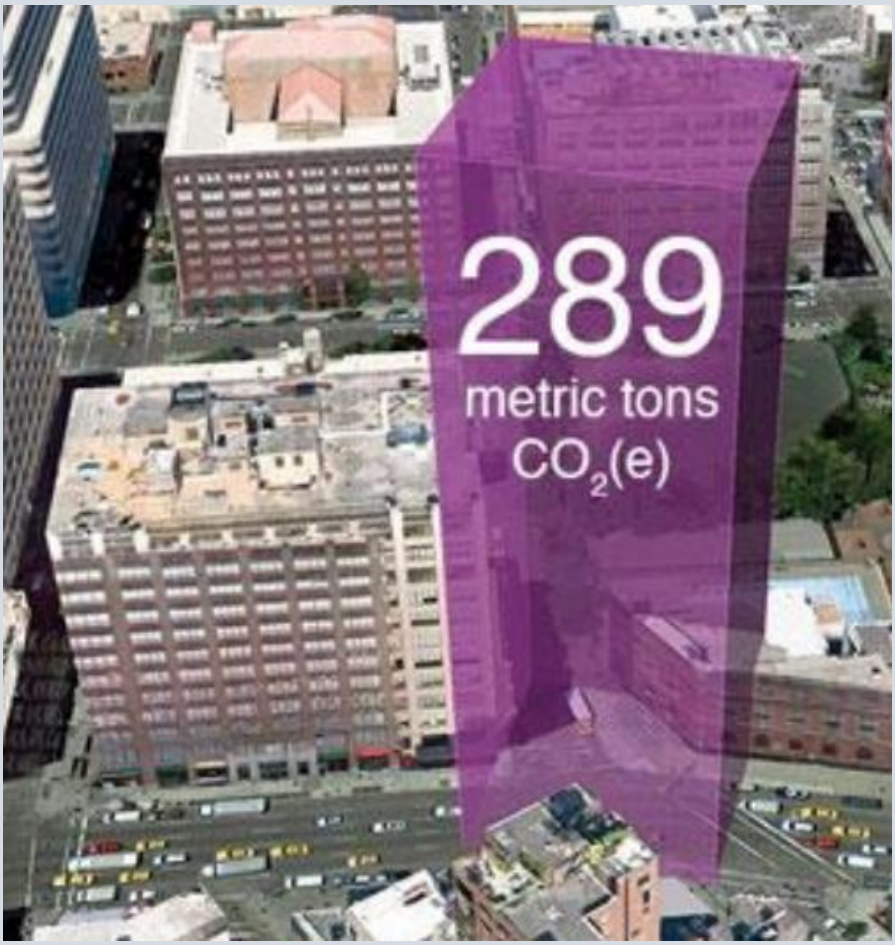
| Work from home NHDC all FTE employees | Tonnes Per Year CO2e reduction | Miles Reduced Per Yr |
|---|---|---|
| 1 day per week | 102 | 434,872 |
| 2 days per week | 205 | 869,744 |
| 3 days per week | 307 | 1,304,617 |
| 4 days per week | 409 | 1,739,489 |
| 5 days per week | 511 | 2,174,361 |
| No Change | 0 | 0 |

As can be seen in the table above, if the Council were to work from home or use active travel for 4 days per week throughout the year, NHDC would reduce its CO2e emissions by 409 tonnes per year and its distance travelled (leading to reduced congestion and air quality issues) by over 1,739,000 miles per year.

## Visualisation

It is difficult to visualise the weight of a gas. To help explain this, it may be reasonable to visualise a fossil fuel, say a one kilo lump of coal which is essentially made from Carbon, Oxygen and Hydrogen.

When this lump of coal is burned, the hydrogen reacts with oxygen in the air to produce water. The carbon in the coal forms CO2 released to the atmosphere, since matter cannot be created or destroyed, the kilogram mass is not lost, it is converted into gaseous and particulate form, ash, smoke, soot, and heat.



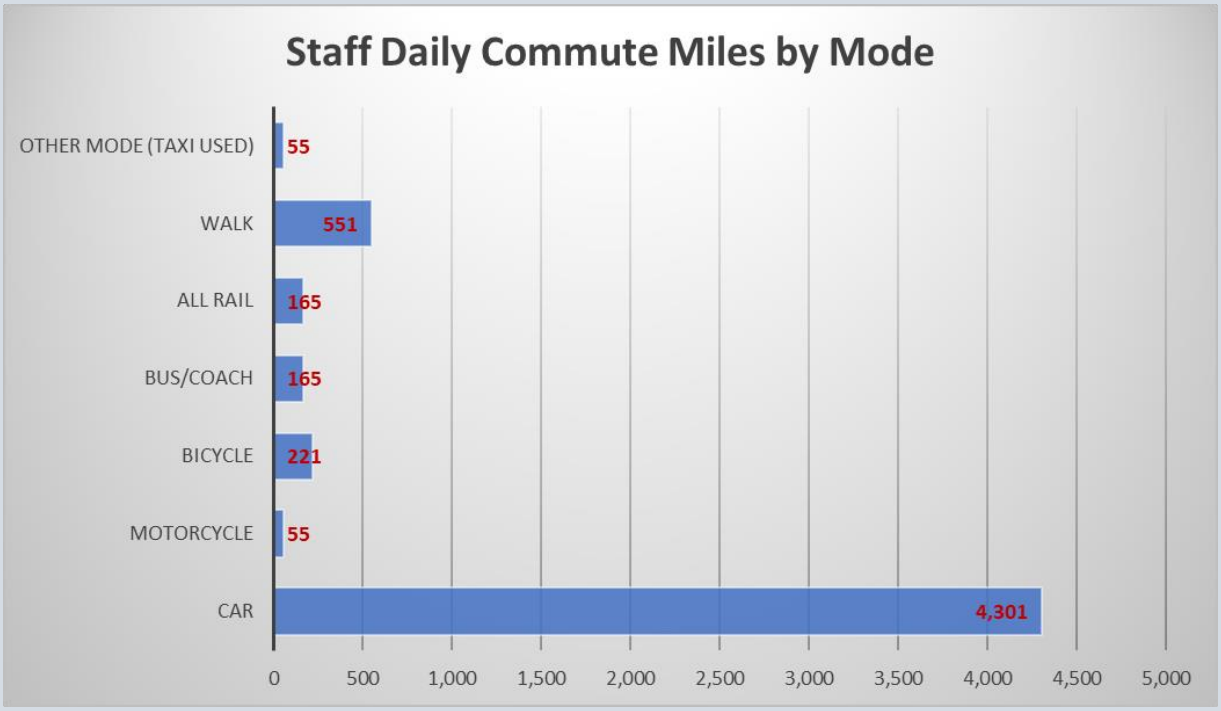
Burning organic material such as petrol and diesel in an internal combustion engine releases CO2. To contextualise what 511 tonnes of CO2e equates to, the image above shows what 289 tonnes of CO2e would look like at standard temperature and pressure. Clearly the commuter patterns of North Herts District Council for this one-year period amount to 511 tonnes of CO2e or almost two towers of this height.

www.conservationmagazine.org/2013/06/visualizingcarbon/

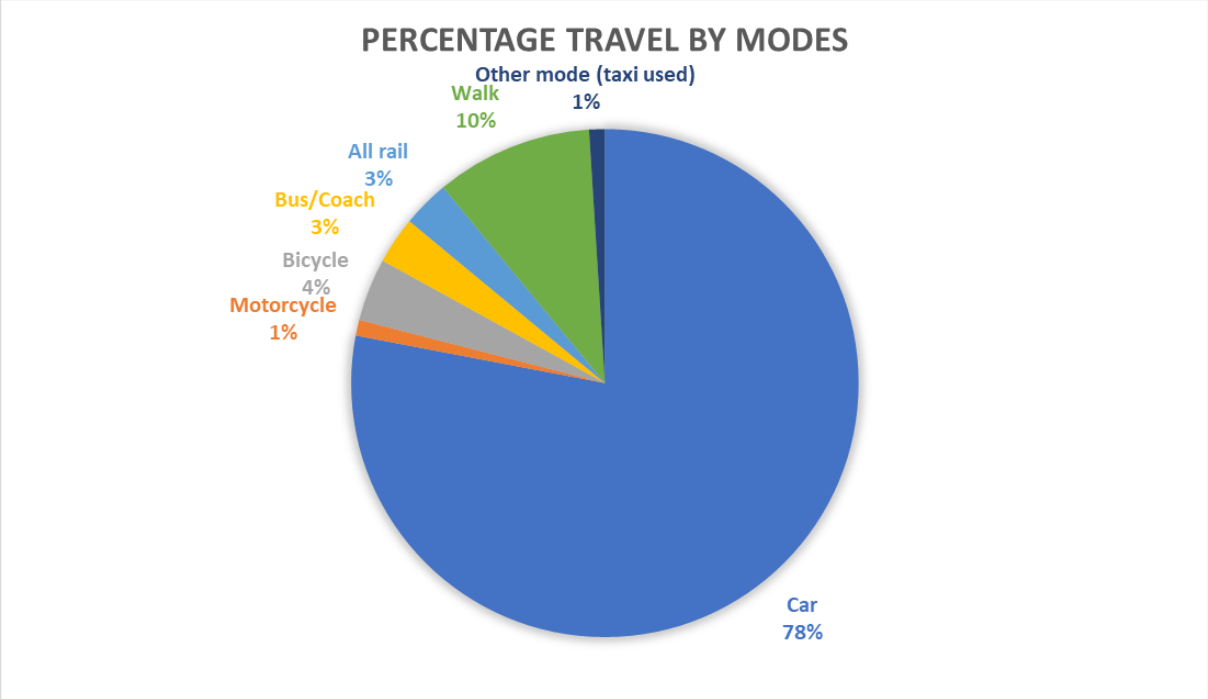
To further contextualise what 511 tonnes of CO2e equates to, the image below shows what one tonne spheres of CO2 would look like at standard temperature and pressure. The commuter patterns of NHDC for this one-year period would amount to the annual production 511 such spheres.

www.conservationmagazine.org/2013/06/visualizing-carbon/

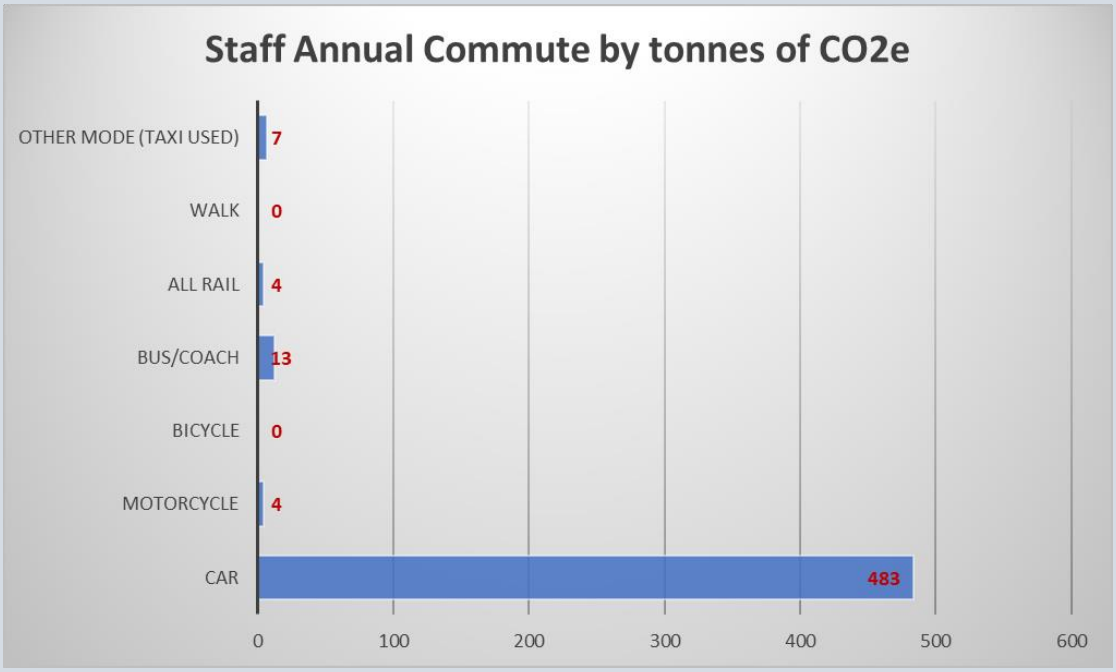
The graph below shows NHDC staff's daily commute patterns by mode of travel used. Naturally, the percentage split is based on the UK derived data for the East of England because actual local data for the district is unavailable.




The above graph is explained in percentage terms in the pie chart below:




The graph below shows the breakdown of annual commuting in tonnes of carbon dioxide equivalents (CO2e) for NHDC staff:




As is clear from the graph, even by factoring for 78% car use (The Council's survey indicated an even higher figure at 89%), car commuting is the dominant cause of CO2e emission for the Council's commuting.

It must be borne in mind that the Covid-19 lockdown for the UK commenced at midnight on Friday 20th March 2020. Given this is average data and this only leaves seven working days until 31st March 2020 and the end of the study period, we would not see this as significant.

Because organisations do not collect commuting data, the calculations used to achieve them have had to be based on a less than perfect dataset.

CLS Energy have used the international protocols to assess these data. We have used what data that could be provided by NHDC to compare against in order to confirm assumptions. Specifically, this amounts to:

- The results of a July 2020 staff survey

We have not used staff survey data for actual assumptions for the following reasons:

- This is a one-off survey conducted mid lockdown.
- It does not consider all staff.
- Staff responding to such a survey are likely to be more likely to act positively than those that do not.
- It is unlikely to provide replicable data going forward.
- It does not allow for ease of calculations into the future.
- It is subjective.

For these reasons, we have elected to use regional data provided by UK Government.

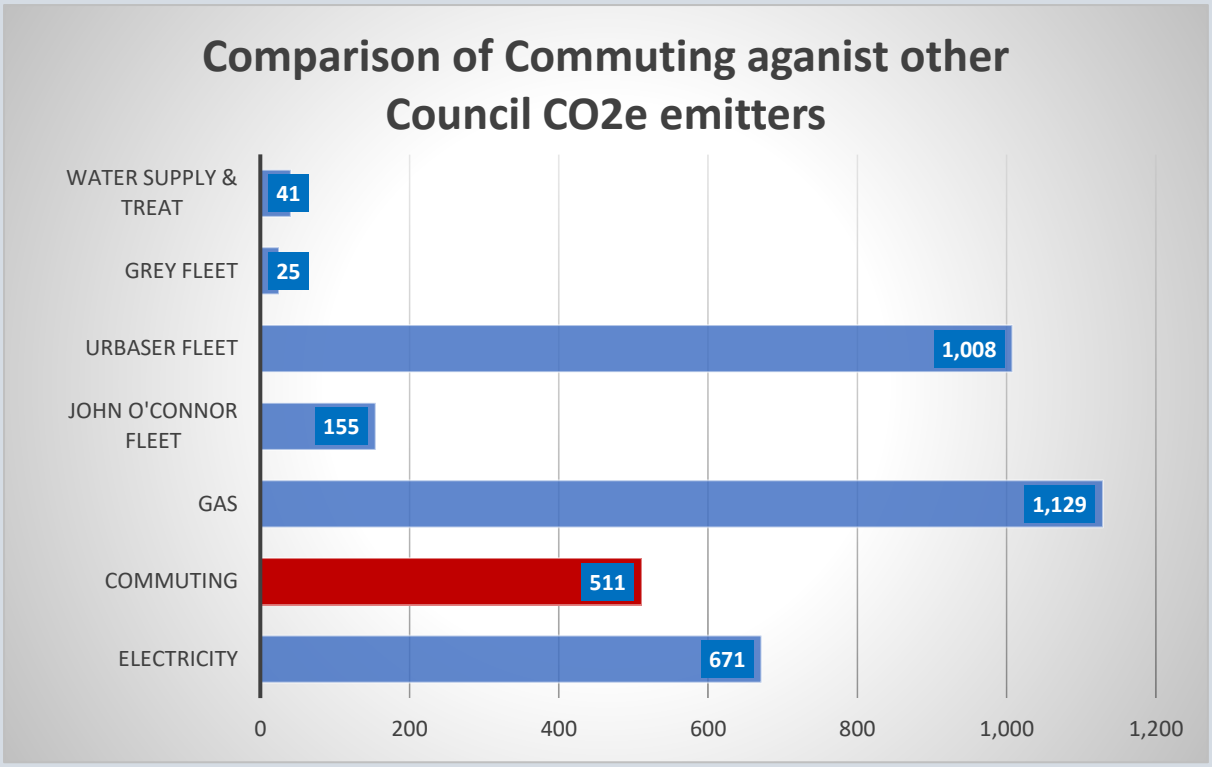
Because of data protection concerns and GDPR, we have requested home information that does not provide an identifier as to the actual officer's home. This means that we have requested and received only the first three or four characters of the postcode (e.g., SG1 or SG15). By only acting on these data, we have been able to avoid any unnecessary breaches in data protection whilst gaining a good understanding of location, typically within a village or limited number of streets.

From the staff survey we were able to ascertain that over 86% of officers typically work at the Council offices in Letchworth Garden City. In order to avoid complicating matters for future years of assessing carbon emission reductions, we have assumed that all staff work here and utilised this postcode for all journey end points.

We have factored in government-based percentages on cycling, walking and public transport as there is insufficient data from the survey to draw meaningful conclusions. We have ignored part time working because, as we understand it, it is unclear how many staff work say Monday to Wednesday as compared to mornings only Monday to Friday. The former would mean 6 trips per week, the latter would mean 10 trips and as such, would be identical to a full-time employee. Until such time as accurate data on this is provided, it would be meaningless to make assumptions.

We have grouped the 351 officer postcodes and find that only 65 are unique. We have factored this by shortest travel distance (in miles) and by agreeing an average annual working week factoring out any differences for part time workers (gleaned from the July 2020 survey), we have derived a total annual commuter milage of 2,174,361 miles for 1st April 2019 to 31st March 2020. Naturally, national lockdown began at midnight on 20th March 2020 and so, but for the sake of a week, the data in this report is broadly based on a business-as-usual year. Commuter data for the year April 2020 to March 2021 is likely to be vastly reduced due to the lockdowns imposed as part of the Government's response to the pandemic.

To put Commuting in context for NHDC, the CO2e emissions for a year of commuting are shown in red in the graph below, set against other sources of the Councils emissions:




Whilst commuting is not the highest emitter for the Council, at 14%, it is significant. If commuter data is to be used in the NHDC reporting going forward, then it is important that this data becomes better recorded going forward.

The carbon emissions from these 2.174 million annual miles equates to around three quarters of the carbon dioxide equivalent (CO2e) emissions of the council's total electricity consumption from its eight largest consuming sites of:

- North Herts Leisure Centre
- Letchworth Outdoor Swimming Pool
- Royston Leisure Centre
- Archers Health and Fitness
- Hitchin Swim Centre (inc. outdoor pool)
- NHDC Council Offices
- Hitchin Town Hall
- Hitchin Museum

This makes the emissions from the Council's commuting processes highly significant.

The encouraging news is that the Council (like many other organisations across the world) has been able to experiment with home working during 2020 with computers provided in the home and different ways of working, meeting, and reporting. The result is that there is a far greater understanding of what home working means and, as has been summed up

recently by Roland Busch, the CEO of Siemens, on management strategy in considering their vision for home working going forward:

- Focus on outcomes rather than time spent in the office.
- Trust and empower your employees.

By moving towards more home working, combined with active travel (cycling and walking), and greater use of public transport, the Council has the potential to reduce its commuter emissions significantly.

Having carried out a similar exercise for a city council, they have now agreed to set a target for 80% home working and public transport, meaning that cars are effectively used for commuting less than one day per week.

A similar approach at NHDC could similarly see emissions drop by 80% which would produce CO2e savings of 409 tonnes per annum.

| | Detail of Measure Identified | Identified Energy Savings Yr 1 (kWh) | Averaged annual savings (£) | Tn CO2e Reduced | Capital cost to instigate (£) | Ranked Payback Period | Rank HML (RAG) |
|---|---|---|---|---|---|---|---|
| **MCo14** | Build Back Better (80%) | 930,318 | 0 | 409 | 0 | 0.00 | |

## Water

The Council pays for water at 55 of its sites. Over the reference year, it consumed 48,572m3 of water and of this, 34,097.7m3 of this water was treated.

Total cost of this water consumed and treated was £98,596.85. Dominant uses for water are as follows. This cost of £2.03 per m3 (£2.03 per tonne) of water, makes this utility extremely reasonably priced and is one of the main reasons why organisations rarely concern themselves with addressing their water consumption and treatment. Given the water scarcity in the south of England, the Council is wise to measure and include this in its carbon footprint:

| Location | Consumed m3 | Number of | Percentage of total |
|---|---|---|---|
| Recreation Grounds | 13,349.8 | 6 | 27.48 |
| Gardens | 9,654.9 | 2 | 19.88 |
| Cemetery Consumption | 8,950.65 | 8 | 18.43 |
| Public Convenience consumption | 2,637.2 | 4 | 5.43 |
| Allotment Consumption | 2,635.6 | 8 | 5.43 |

These 28 site types described in the table above, account for over 76.6% of all water consumed (excluding the Councils owned but not operated swimming pools).

The Council's leisure sites consume:

| Location | Consumed m3 | Data |
|---|---|---|
| Hitchin | 19,781 | Incomplete |
| Royston | 1,142 | Incomplete |
| LODP | 4,556 | Incomplete |
| NHLC | 14,065 | Complete |
| Pools Supply | 39,544 | Incomplete |
| Pools Treatment | | Incomplete |

The data in the table above remains incomplete, further data could not be made available.

## Consumption

There are a range of methods for minimising water use in the Council's premises. These include:

- Aerated tap heads
- Percussion taps
- Signage and educational campaigns
- Hippos in cisterns
- Move to waterless urinals (also saves electricity from pumped water)
- Low flow efficient shower heads
- Auto shut off nozzles
- Toilet cistern duel flush converters
- Grey water diverters
- Rainwater collection tanks
- Rainfall shutoff devices

This list is not exhaustive. Naturally, there are more advanced methods including rainwater capture and usage should the Council wish to consider any of these.

| | Detail of Measure Identified | Identified Energy Savings Yr 1 (kWh) | Averaged annual savings (£) | Tn CO2e Reduced | Capital cost to instigate (£) | Ranked Payback Period | Rank HML (RAG) |
|---|---|---|---|---|---|---|---|
| **MWt1** | Reduce consumption by 10% | | | 3 | 1,000 | 0.00 | |

### Treatment

By reducing water consumption, treatment volumes reduce accordingly.

| | Detail of Measure Identified | Identified Energy Savings Yr 1 (kWh) | Averaged annual savings (£) | Tn CO2e Reduced | Capital cost to instigate (£) | Ranked Payback Period | Rank HML (RAG) |
|---|---|---|---|---|---|---|---|
| **MWt2** | Reduce treatment by 10% | | | 5 | 1,000 | 0.00 | |

## Waste

Commercial waste and recycling are collected from the council sites by Urbaser Ltd as commercial waste from Eurobins. There is in-situ recycling taking place in the Council's premises and these materials are segregated at source.

NHDC Offices: 1100lt Eurobins and 120lt wheelie bins

Museum: Eurobins and 240lt wheelie bins:


The Councils annual waste collected from its estate properties as calculated by Urbaser is set out below:

| Site | Type of waste | Size of bin | Day of collection | Frequency | Estimated Tonnage per week | Estimated tonnage for a year (52 weeks) | Annual Refuse Tn | Annual recycling Tn |
|---|---|---|---|---|---|---|---|---|
| DCO | General waste | 1 x 1100lt bin | Wednesday and Friday | Twice a week | 0.1513 tonnes | 7.867 tonnes | 7.867 | |
| | Recycling | 1 x 1100lt mixed recycling | Wednesday | Once a week | 0.06 tonnes | 3.12 tonnes | | 3.12 |
| Museum Resources, Burymead | General waste | 1 x 240lt bin | Thursday | Once a week | 0.0165 tonnes | 0.858 tonnes | 0.858 | |
| North Hertfordshire Museum | General waste | 1 x 240lt bin | Monday | Once a week | 0.0165 tonnes | 0.858 tonnes | 0.858 | |
| Hitchin Town Hall | General waste | 1 x 1100lt bin | Monday | Once a week | 0.0757 tonnes | 3.936 tonnes | 3.936 | |
| | Recycling | 1 x 360lt mixed recycling | Friday | Once a week | 0.06 tonnes | 3.12 tonnes | | 3.12 |
| | | 1 x 240lt paper | | | | | | |
| Multi Storey Car Park, Paynes Park | General waste | 1 x 360lt bin | Monday | Once a week | 0.0248 tonnes | 1.289 tonnes | 1.289 | |
| Citizens Advice Centre, Thomas Bellamy House | General waste | 1 x 360lt bin | Thursday | Once a week | 0.0248 tonnes | 1.289 tonnes | 1.289 | |
| **Totals** | | | | | | | **16.097** | **6.24** |

Total waste collected from the Council's premises (which includes sites that are not part of the eight assessed in part I) amounts to 22.337 tonnes. Of this 6.24 tonnes (27.94%) are recycled.

Based on the assumption that half of the refuse collected is transported to incineration (EfW) and half to landfill, this means that 0.80 tonnes of CO2e are emitted from the landfilling of this waste set against 0.17 tonnes of CO2e to EfW and with 0.13 tonnes from it is the recycling across the Council's estate. It is reasonably accepted that recycling rates of 50% are readily achievable in office environments. It should be remembered that EfW does not currently capture CO2 emissions. Waste is also a small fraction of the Council's Carbon Footprint, as such, there are several other areas where focus should be targeted.

As such, to reduce its carbon emissions related to waste, the Council would need to move 5 tonnes of its refuse to instead be recycled. This would take refuse emissions down from 1.11 to 0.67 tonnes of CO2e. This can be achieved with behavioural change, peer pressure, signage and appropriate receptacles.

| | Detail of Measure Identified | Identified Energy Savings Yr 1 (kWh) | Averaged annual savings (£) | Tn CO2e Reduced | Capital cost to instigate (£) | Ranked Payback Period | Rank HML (RAG) |
|---|---|---|---|---|---|---|---|
| MWs4 | Move recycling to 50% | | 1,334 | 1 | 1,000 | 0.00 | 0.03 |

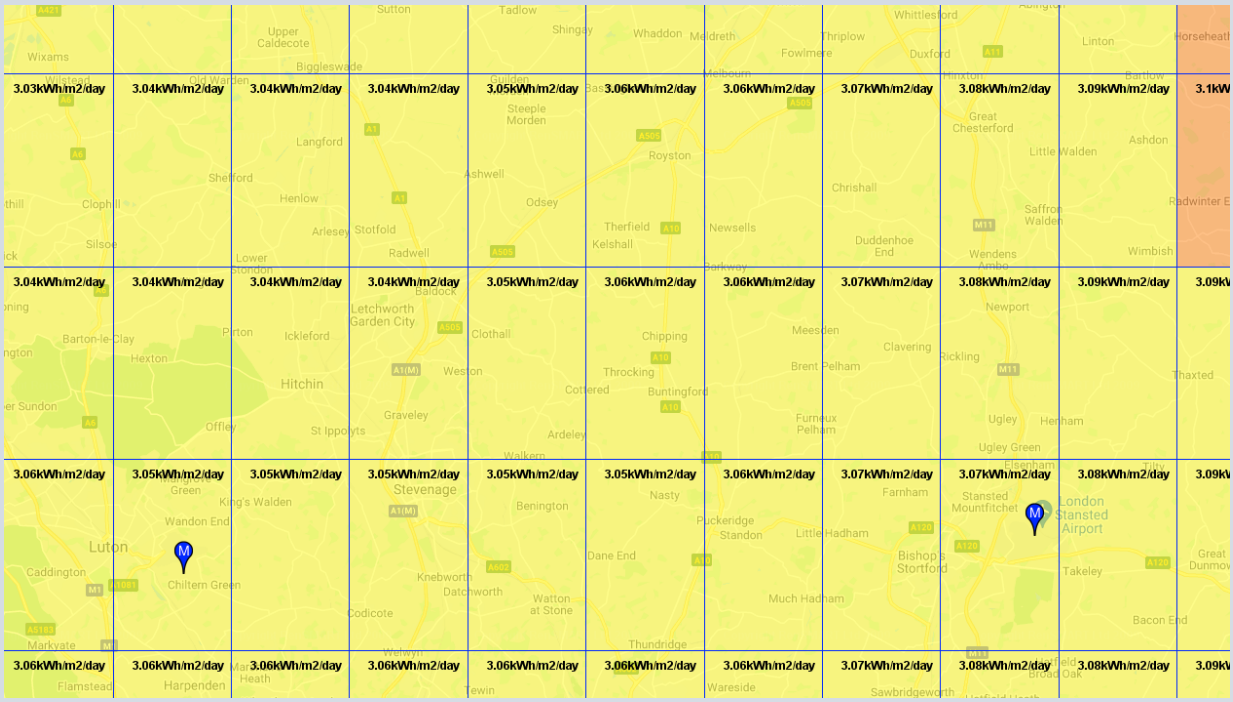
## Renewable Energy

The installation of solar car port arrays at the Council's Lairage MSCP site would provide significant benefits including:

- Guaranteed energy costs for the next 20-25 years.
- Payback on investment in around 7-8 years
- Security of supply
- Strong return on investment (ROI) potential
- Environmental and reputational credentials
- Greenhouse gas reduction

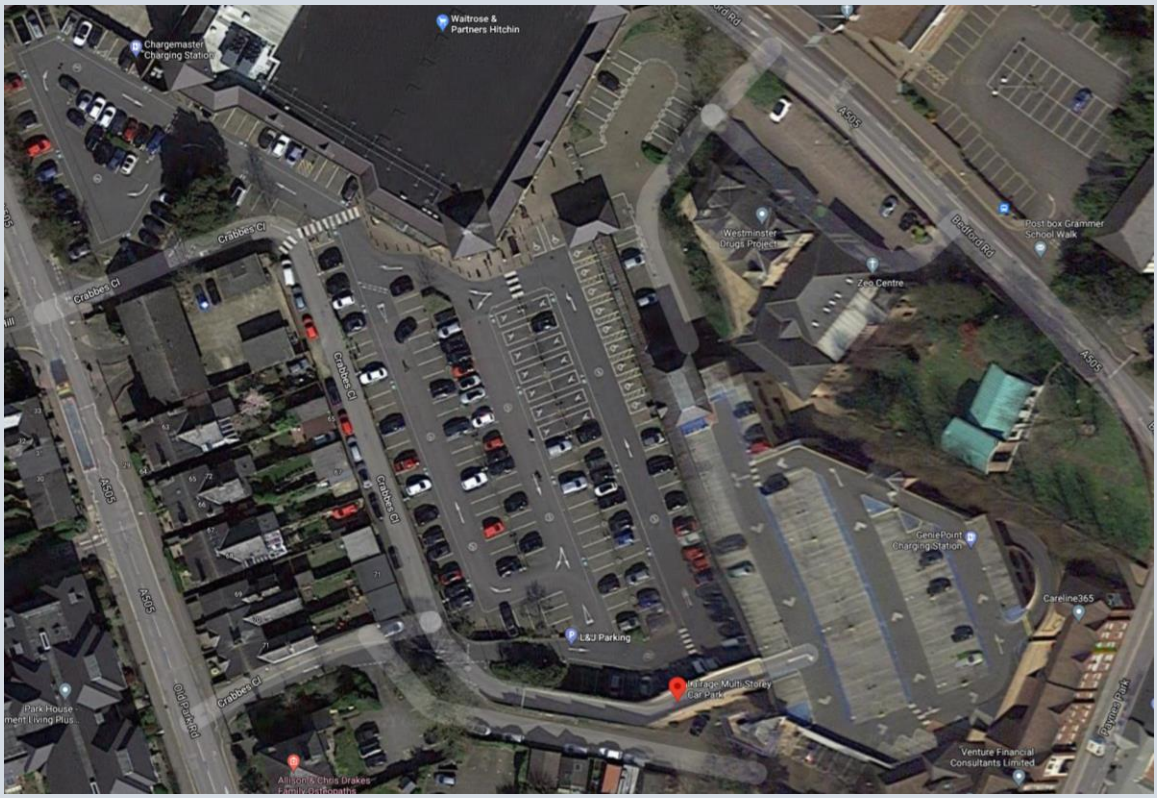
Furthermore, it would provide power to charge the Councils' fleet as well as provide a revenue stream for the Council from the charging of cars parked on site.

Solar irradiance around Letchworth is good at levels reaching 3.04kWh/m2/day.




*Source: Google Earth*

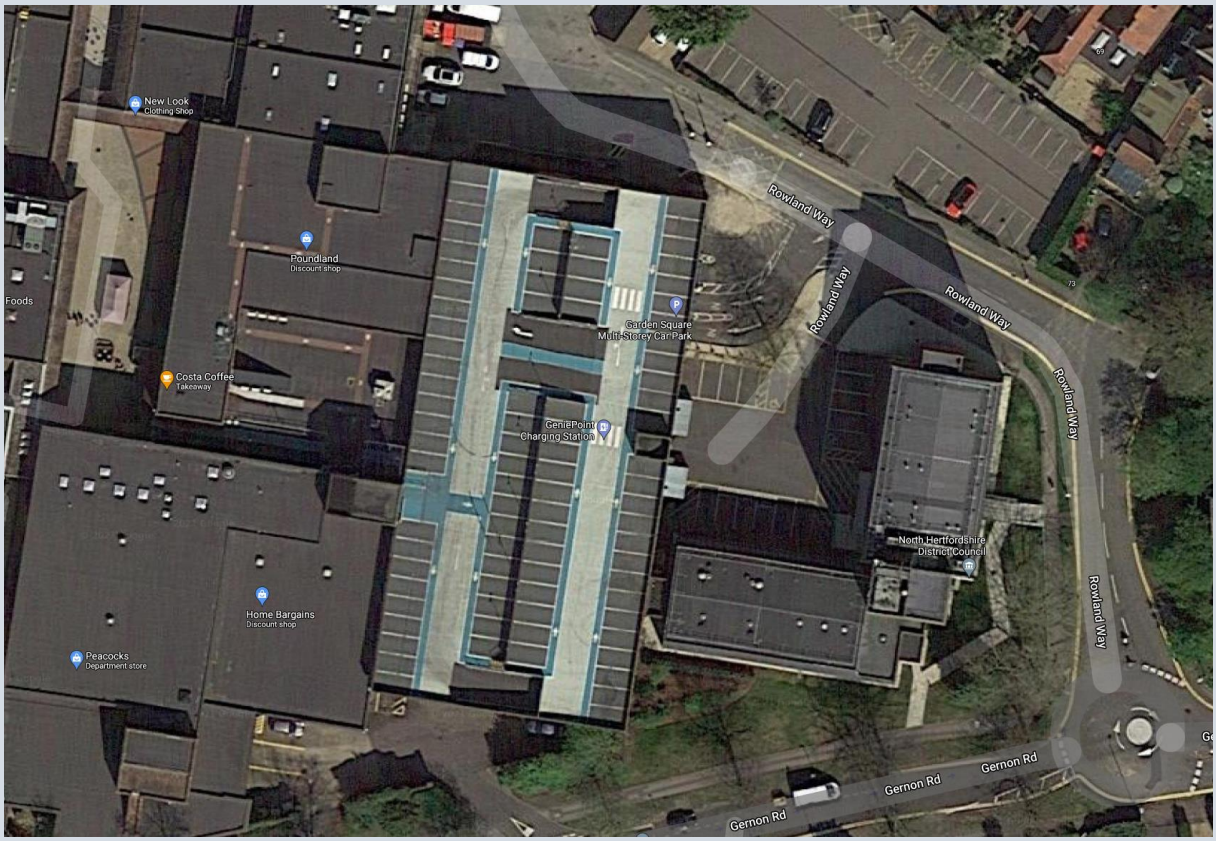
We would expect the potential for around 280kWp is possible at the site below. This at a cost of around £406,000 and with energy generation at around 259,000kWh. This will require further shading analysis:




| | Detail of Measure Identified | Identified Energy Savings Yr 1 (kWh) | Averaged annual savings (£) | Tn CO2e Reduced | Capital cost to instigate (£) | Ranked Payback Period | Rank HML (RAG) |
|---|---|---|---|---|---|---|---|
| MR1 | Solar Car Port Array Lairage | 259,000 | 33,670 | 66 | 406,000 | 12.06 | |

The site at the Councils offices would similarly lend itself to the installation of solar PV car ports.

We would expect the potential for around 250kWp is possible at the site below. This at a cosy of around £365,000 and with energy generation at around 234,000kWh. This will require further shading analysis:




| | Detail of Measure Identified | Identified Energy Savings Yr 1 (kWh) | Averaged annual savings (£) | Tn CO2e Reduced | Capital cost to instigate (£) | Ranked Payback Period | Rank HML (RAG) |
|---|---|---|---|---|---|---|---|
| MR2 | Solar Car Port Array Council Offices | 234,000 | 30,420 | 60 | 365,000 | 12.00 | |

Solar irradiation around Hitchin is around 3.05kWh/m2 per day.

The solar PV car ports are only designed to provide an indicative overview of the possibilities at a desktop level. Full surveys of the site will need to be conducted before firm figures can be given.

More detail is required regarding unknown quantities around the structural requirements, integrity, and infrastructure of the multi-storey carpark buildings.

Please take note of the below points at this stage:

- High Level appraisal only
- Carport costs exclude development works such as structural investigation / Civils.
- The carparks will have a low demand unless the feed is shared / sleeved by other sites or charge points to battery electric vehicles (BEVs) can be optimised.
- Local connection points may need to be upgraded if the larger systems are fed into them.

- Full planning will be required for these projects (carport only).
- DNO costs including upgrade works are excluded.

Renewable energy is a good technology and would assist the council towards achieving zero carbon. However, given that energy not consumed by Council sites will be exported to the national grid and payment for this is currently low, it makes sense to get the Council estate in order first. Specifically, by addressing energy efficiency measures laid out earlier in this report, energy consumption is reduced 9aling with carbon emissions and cost and the investment required to fill or part fill the remaining energy use is reduced meaning less renewable energy required and less cost. There are opportunities to utilise vehicle batteries going forward as storage for excess renewable energy generated and we would be pleased to discuss such opportunities with you.

Arrays would typically be designed to match site consumption whilst electrical energy storage costs remain high.

A professionally installed solar roof array should be delivering 80% of its initial yield at 20 years into the future. We would always recommend a minimum of three quotes, sizing of array to meet consumption load and the inspection of array post install to ensure proper stringing and cabling. This is something we would be happy to assist with.

The renewable energy figures above, like all numbers in this report are conservative and we would expect better returns and paybacks from this, particularly if charged for EV charging is introduced alongside the PV arrays.

## Next Steps:

**Below are a list of proposed next steps and opportunities to enact or move the savings agenda forward. We would be pleased to discuss any aspect of these.**

- Complete the Council's baseline with all remaining buildings and F gases assessed.
- Follow-up audits post Covid-19 closures to include clamping to address energy audits more accurately.
- Set up a route-map to zero carbon by 2030 using science-based targets.
- Establishing district-wide Carbon ($CO_2e$) reduction targets
- Assist with instigation of any of the measures recommended in this report.
- Assessment of quotes received.
- Assess sites on a case-by-case basis for electric vehicle charging infrastructure.
- Assistance with public or business consultation events.
- Drafting, updating checking, or writing of policies and strategies (for example: Carbon Management Plan, Energy Strategy, Travel Plan, Travel Action Plan, Low Carbon Impacts Profile, data normalisation etc).
- Assistance with seeking Salix funding and/or other potential funding grant or loan sources.
- Deep assessment and recommendations for managed grey fleet (mileage reimbursement) travel solutions.
- Work to measure and verify ongoing energy consumption and conversion to $CO_2e$ (GHG) emissions leading towards a later agreed target.
- Support at Cabinet and Member briefings.
- Provide Staff and member training.
- Target setting.
- Assistance with planning for a potential future zero carbon (GHG) emissions target should the Council decide to follow such a trajectory.
- Work up proposals and/or specifications for solar arrays based on consumption vs generation, roof area, storage, and vehicle to grid (V2G) storage options.
- Assess good practice and bring the other Councils in Hertfordshire into line with NHDC so that a comprehensive and unified approach can be instigated to achieve zero carbon and reduce Council costs.
- Assess and work up consideration of CNG, $H_2$ or EV for next refuse truck purchase.
- Quantify savings using RCV fleet routing software.
- Assessment and independent advice on renewable energy, specification provisions and engineer's inspection of final solar PV installations.


VAT Registered: 202897895

**Alan Asbury**

Energy Institute Chartered Fellow (FEI) Energy Manager Member Number 0043209. Chartered Member of the Institute for Logistics and Transport (CMILT), Chartered Environmentalist (CEnv), Fellow of the Institute of Environmental Management and Assessment (FIEMA). Chartered Resource and Waste Manager (CRWM), EnCO Registered Consultant.

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**END.**

## Observations

Wednesday 9th December 2020

**North Herts District Council**

The Lairage Multi Storey car park appears as though it would lend itself to the introduction of a greater number of EV charge points. We would be pleased to conduct further and more in-depth capacity research on the practicability of this following our proposal, should this be required.

Lairage MSCP Carpark

## IT Services

Callum Newell: inspected Citroen Berlingo estate 1500CC LS69 KSY typically drives no more than 1,000 miles a year. The vehicle is on a three-to-four-year lease and no off-road travel takes place.


The vehicle has Michelin tyres  all round

## Waste Services

Giuseppe D'Amico: Waste management vehicle Citroen Berlingo estate 1.5 blue HDI LS69 VVP Vehicle travels 200 miles per week since September when Giuseppe started work includes inspecting of missed bins around the district. There is no off-road operation with this vehicle.

LT69 VVP:

Mix of Michelin and Continental tyres in place.

No onboard cameras in any of the fleet.

## Refuse fleet observations.

Urbaser Limited Depot: Sue and Jason: Inducted and shown the site. Inspected Iveco refuse disposal vehicle 4.0 diesel 2 axle rigid body vehicle GK63 ZZL.

Only permitted to access to GK63 ZZL.

All vehicles are owned, not leased and site is owned by Urbaser. All vehicles observed have beacons built into cabs vehicles do not offload materials at waste transfer stations or hard standing. All attend landfill sites or compost sites or similar and therefore limited case for low rolling resistance tyres.

Vehicles seen include open backs, twin packers, commercial vans, box vans and small refuse and green waste. Standard and open back RCV vehicles used for recycling.

No access any cabs other than GK63 ZZL.

Trip computer was broken in this vehicle and the site operator states that Urbaser do not use telematics on this contract (although it appears this may only be the case on this contract).

## Museum:



Vehicle has Roadstone Tyres all round.

Ros Allwood: Museum - inspected Vauxhall Astra combo crew vehicle 1.7 TDI van LL08 KNH Vehicle is owned and was bought from waste Department at a very low price and is only used by the museum option for electric vehicle at museum with charging points at location but limited mileage and would recommend this be a joint purchase with other departments of the council.

Attended Lairage multi-storey car park and viewed three parking services (enforcement) vehicles for Amanda Machin all Volkswagen Polo 1.4 TDI 75 match edition five door cars.

Vehicles inspected for Parking services:

- EY67AUK
- EY67AUH
- EY67AUN

These three vehicles all typically travelling 10,000 miles per year per vehicle no off-road operation vehicles on a 3-year lease is due to expire and new vehicles are to be arranged in 2021 would be worthwhile considering electric vehicles for all three of these.

VW Polo TDi Bluemotion EY67 AUK – 32815 miles driven:

These vehicles all operate on BP Plus fuel cards:


Average MPG since refuel 47.5mpg (6hrs 41mins) and since start (1hr 28mins), Long term 53.7mpg (81hr 10min):

Goodyear and Hankook tyres

VW Polo TDi Bluemotion EY67 AUH - 33714 miles driven:

Average MPG since refuel 56.7mpg (6hrs 41mins) and since start 73.2mpg (1hr 47mins), Long term 55.9mpg (43 hrs 57mins):

Continental, Pirelli and Hankook tyres

VW Polo TDi BlueMotion EY67 AUN – 29642 miles driven:

Average MPG since refuel 55.7mpg (14hrs 02mins) and since start 62.2mpg (0hr 16mins), Long term 53.2mpg (78 hrs 56mins):

Continental and Hankook tyres

Replace these three vehicles with EVs such as the Leaf, Zoe, or MG ZS EV.

Tyre Rolling Resistance

Speed limiters

### Enforcement

Beacons/roof bars

Tyre Rolling Resistance

Speed limiters

Replace with Kia eNiro, MG ZS EV or Hyundai Kona if mileage is appropriate.

Continental and Hankook tyres


Continental tyres

Charge Points:

NHDC Offices MSCP:


**End.**

## Biog for Alan Asbury; Director of CLS Energy (Consultancy) Ltd.

CLS Energy Ltd Company Director Alan Asbury has been a professional Energy Manager for over 15 years. A Chartered Energy Manager, Chartered Fleet Manager (CMILT), Chartered Environmentalist and Chartered Wastes Manager, Alan was trained by the Energy Institute to its highest European (now Advanced) Energy Manager level in 2010 and has been a full member (MEI) of the Energy Institute since 2011. He was elected to Fellowship (FEI) In September 2018 and is an Energy Institute Interviewer and Assessor.

Alan achieved Certified Measurement and Verification Professional (CMVP® ) status with the UK Association of Energy Engineers (UKAEE) in July 2014, updated in December 2017. This allows for demonstration of guaranteed savings as required using IPMVP global industry software. In October 2014, Alan was announced amongst the first ESOS (EED) Lead Assessors by virtue of his Chartered Energy Manager status and completed training in the first 20 ESOS Lead Assessors in the UK. As such, he is registered and qualified to provide and oversee mandatory four yearly energy and fleet assessments for large companies in the UK, Eire, Denmark, and Sweden.

Alan has personally completed more than 20 ESOS Phase 1 Audits to full compliance/completion. These include Titan Airlines, Harvard Engineering, Ultraframe, AW Jenkinson, Uniserve, Craghoppers, Regatta, Beiersdorf (Nivea), Oxford Airport and joint Lead Assessor for Qatar Airways. He has completed a further 52 ESOS Phase 2 Assessment delivering savings of over £31m and 20,550tn of GHGs and is currently finalising work on a further four.

On 8th June 2018, Alan became registered to conduct EED Article 8 (ESOS) Assessments by the Irish (Eire) Government; registration number EA10135. He is now registered & qualified to conduct EED (ESOS) audits in the UK, Sweden, Denmark & Southern Ireland (Eire).

Alan is delivering Climate Emergency work with Rother, Wokingham, Oxford, Gloucester, South Northants, North Herts, Copeland, and Stevenage Councils.

Alan has been an Associate of the Institute of Environmental Management and Assessment (IEMA) Registration No 0002347 for 15 years, upgraded to Practitioner in 2016 and elected to Fellowship (FIEMA) in June 2020. He conducts energy assessments, audits, and presentations.

As a qualified trainer, he also provides training on behalf of CLS Energy Ltd and is a visiting MSc lecturer at Universities of Greenwich and Middlesex and has spoken nationally at Scotland 2019, Britain (Westminster) 2018, Scotland (Edinburgh) 2018, Britain (Westminster) 2017, Workspaces 2017, Scotland, Edinburgh 2017, London, and Dublin 2017.

Alan was awarded National Sustainability Manager of the Year in 2012 by the National PSSA Journal. He is a Critical Friend Panellist to UK Power Networks and Western Power Networks (Distribution Networks Operators). As Chair of the UK Low Carbon Club, Alan is an Associate Energy Consultant and Principal ESOS Lead Assessor to NQA (1153), Comply Direct Ltd and

Authentic AEM. He has provided Energy, Fleet and ESOS Consultancy for LHW Partnerships LLP, Energy Savings Trust and Engie (formerly Cofely Suez). Alan is also qualified to conduct ISO 50001 audits for energy and fleet. Alan achieved the National Energy Savings Trust Silver Fleet Hero Award in Nov 2015. He is a full member of the Institute of Car Fleet Managers (MICFM) and the Chartered Institute of Logistics and Transport (CMILT) and the FTA.

He has delivered up to 47% savings for corporate fleets. He has authored and produced the professional guide to fleet assessment for the Energy Managers Association and the Grey Fleet Toolkit for the Energy Savings Trust launched in London on 29th Jan 2018. Alan has been a professional environmental and sustainability manager since the mid-1990s. He is passionate about the subject.

He lives with his wife and two children in Oxford, England and enjoys canoeing, rowing, rugby, travel, reading and learning Chinese (Mandarin).

Alan Asbury

MSc, BSc (Hons), CEnv (2315), FEI, FIEMA (No 0002347), CMVP® (3202) (IPMVP), EurEM (AEM), MCIWM, Chartered Energy Manager, MICFM, CMILT and ESOS Lead Assessor (registered with the Energy Institute, London; No 0043209), ISO 50001 Assessor, EnCO Registered Consultant.

Director

CLS Energy (Consultancy) Ltd

Testimonials

## Glossary of Terms

A/C – Air conditioning

AHU – Air Handling unit

ASC – Available Supply Capacity

BEV – Battery Electric Vehicle

BMS – Building Management System

CFL – Compact Fluorescent lamp

CH4 – Methane gas (GHG)

CHP – Combined Heat and Power

CNG – Compressed natural gas

CO2 – Carbon Dioxide

CO2e – Carbon Dioxide equivalents (aka Greenhouse gases)

CWI – Cavity wall insulation

DBMO – Dynamic burner management optimiser

DEC – Display energy Certificate

EC Fan – Efficient fan motor

EfW – Energy from Waste (Incineration)

EPC – Energy Performance Certificate

EV – Electric Vehicle

F Gases – Fluorinated Gases (GHGs)

F&V – Flange and Valve

FM – Facilities Management

GHG – Greenhouse Gas

H2 - Hydrogen

HDD – Heating Degree Day data

HFC - Hydrofluorocarbons aka F Gas (GHG)

HGV – Heavy Good Vehicle

HHD – Half hourly data

kW - Kilowatt

kWh – kilowatt hour

kWp – Kilowatt peak

LED – Light Emitting Diode (efficient lighting)

LEV – Low emission vehicle

L/100km – Litres per 100 kilometres

LPG – Liquid petroleum Gas (aka Propane)

M2 – Square metre

m/s – Metres per second

MFD – Multi Function device aka PSC – Printer Scanner Copier

Mpg – Miles per gallon

Mph – Miles per hour

MWH – Megawatt hour

N2O - Nitrous oxide (GHG)

NF3 - Nitrogen trifluoride (GHG)

NHDC – North Herts District Council

PFC - Perfluorocarbons aka F Gas (GHG)

PHEV – Plug-In Hybrid Electric Vehicle

PV – Photovoltaic

R2 – R Squared (coefficient of determination)

RCV – Refuse Collection Vehicle

RE – Renewable Energy

ROI – Return on Investment

SEC – Significant Energy Consumer

SEU – Significant Energy User

SF6 - Sulphur hexafluoride (GHG)

TEC – Total Energy Consumption

TFT – Flat screen monitor

Tn – Metric tonne

TRV - Thermostatic radiator valve

ULEV – Ultra Low emission vehicle

UPS – Uninterrupted power supply

V2G – Vehicle to Grid

VAS – Value at Stake

VFD – Variable Frequency Drive

VSD - Variable Speed Drive