ThamesWey

1999–2019
20 years of building sustainable communities

ThamesWey Group Environmental Report

For the reporting period 1st January to 31st December 2019.

Housing | Energy | Development | Sustainability

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1. Purpose

The purpose of this document is to provide a report on ThamesWey's core impacts on the environment, both positive and negative, during the period 1st January 2019 – 31st December 2019. The report is designed for internal use to allow us to understand, analyse and track our environmental performance over time, and provides part of ThamesWey's corporate reporting. However, we are proud of the work we do at ThamesWey therefore this report will be published to our website.

References are made to which core themes of Woking Borough Council's 'Woking 2050' climate change strategy[1] each activity contributes towards, in recognition of ThamesWey's role in helping the council achieve their environmental targets.

2. Executive summary

In 2019, ThamesWey crossed the boundary into 20 years of operation. During the year, ThamesWey continued to experience growth in its core businesses of development, housing, low-carbon energy services and locally delivered environmental projects.

ThamesWey's most significant interaction with the environment is the direct release of Greenhouse Gases (GHGs) from the generation and supply of energy services over the 12 months of 2019. Direct emissions from our energy centres have decreased by ten percent to 11,612 tonnes of carbon dioxide equivalent. However, ThamesWey was still able to create a gross GHG saving of over 2,000 tonnes and a net benefit of almost double this figure, owing to a switch to a fully renewable electricity supplier. A new customer was connected to the Woking Town Centre network, which also benefited from replacement absorption chillers.

Our portfolio of solar photovoltaic arrays maintains a total peak capacity of 2 MW and produced 3% more renewable electricity this year compared to last – this is enough electricity to supply 428 average homes[2] for an entire year during 2019. The substantial drop in hours of sunlight in 2019 should have caused a corresponding decrease in generation, however increased attention was given to fixing under-performing solar PV systems, which allowed us to reverse this trend.

The number of properties let out by ThamesWey Housing grew by 79, with almost this number receiving thorough energy efficient renovations. Suitable family sized homes were upgraded with renewable solar thermal hot water systems, providing the residents with free hot water and therefore reduces the use of their gas boilers. Every light was changed to ultra-low power LEDs and even the new kitchen appliances were high efficiency models, to ensure the electricals used most by tenants were as efficient as possible.

11 properties were also subject to an innovative trial of domestic battery storage systems. These captured any unused renewable electricity from solar panels on each property and released it back to the property later in the day when this electricity was needed. This helped to displace grid electricity, particularly in the evening when the national grid is most carbon intensive.

Biodiversity has become a stronger focus in 2019, led by the Swifts in Woking project. To help the local population of the endangered Common Swift recover, 134 swift nesting sites have been created this year. 108 of these sites are on private properties in Woking Borough with the remaining sites incorporated into suitable ThamesWey developments or existing stock. This project collaborated with Surrey County Council's Family Services and local charities Woking Community Furniture Project and Horsell Common Preservation Society, to help construct nest boxes in the community.

The primary opportunities for improving our environmental impacts are energy network optimisation, phasing in suitable renewable heat generators, increasing the electrification of our vehicle fleet, reduction in loss of heat in district heating pipes and striving to meet the highest environmental standards for every piece of the built environment we can influence.

[1] Woking Borough Council. 'Woking 2050 A Vision for a Sustainable Borough'.
[2] Based on 3,000 kWh/year.

3. Background

One of the key reasons for the establishment of ThamesWey is to help Woking Borough Council progress its sustainability goals - most recently the Woking 2050 strategy. Sustainability is placed at the heart of our operations and it is essential that we show leadership in this area by taking responsibility for our own environmental footprint. This is reflected in the company's Business Plan 2019 – 2022, which expresses the desire to continue to "develop an overall Sustainability Plan for the Group to set out how the Group will reduce its carbon impact through its own operation and how its activity, including procurement, will also reduce carbon consumption and promote sustainability in Woking"[3].

ThamesWey's main operations span four sectors: Housing, Energy, Development, and locally delivered environmental projects. These sectors are tightly intertwined, with our energy often supplying our developments, our developments becoming a part of our housing stock and our environmental projects engaged with the local community who occupy our properties. The scope of this environmental report is relevant to all four of these sectors, the activities 'scoped in' are described in each section.

4. Summary of Methodology

This report follows the Environmental Reporting Guidelines published by DEFRA[4], which separates environmental impacts into six main categories:

- Greenhouse gases (GHGs)
- Water
- Waste
- Materials and resource efficiency
- Biodiversity/ecosystem services
- Emissions to air, land and water

For GHG emissions, data from contributing activities is combined with BEIS conversion factors[5] to calculate impacts. Further methodological guidance is sought from the GHG Protocol[6].

GHGs are separated into three categories or 'Scopes'. Scope 1 GHG emissions are the direct result of releasing GHGs to the atmosphere, such as the combustion of fuels. Scope 2 emissions are indirect from use of electricity only. Scope 3 covers the remaining indirect emissions, such as employee commuting and goods purchased. All GHG emissions are reported in a common unit, 'tonnes of carbon dioxide equivalent' (tCO2e) to allow a straightforward comparison between different emission sources.

GHG emissions for electricity consumption are 'dual reported', as gross emissions and net emissions. Gross emissions are calculated from a location-based average (the UK grid average), whereas net emissions reflect market-based data.

The remaining groups of environmental impacts are reported in their magnitude - specific methods are detailed in relevant sections of the report. In addition to reporting absolute figure(s), data will be normalised where possible against suitable values to enable better comparisons. For example, office electricity use is reported as the total usage, but also normalised per person, to reflect that a growing or shrinking workforce would affect the amount of energy required.

[3] Section 8.6, Thameswey Ltd Business Plan 2019 covering the period 2019-2022, Thameswey Ltd. p9.
[4] Department for Environment Food & Rural Affairs. Environmental Reporting Guidelines: Including mandatory greenhouse gas emissions reporting guidance. June 2013. Last updated March 2019.
[5] https://www.gov.uk/government/collections/government-conversion-factors-for-company-reporting
[6] http://ghgprotocol.org/guidance-0

Comparisons have been made to the previous year where data availability allows, though not for all parts of the report. Over time, longer datasets will permit a more robust understanding of our changing environmental performance.

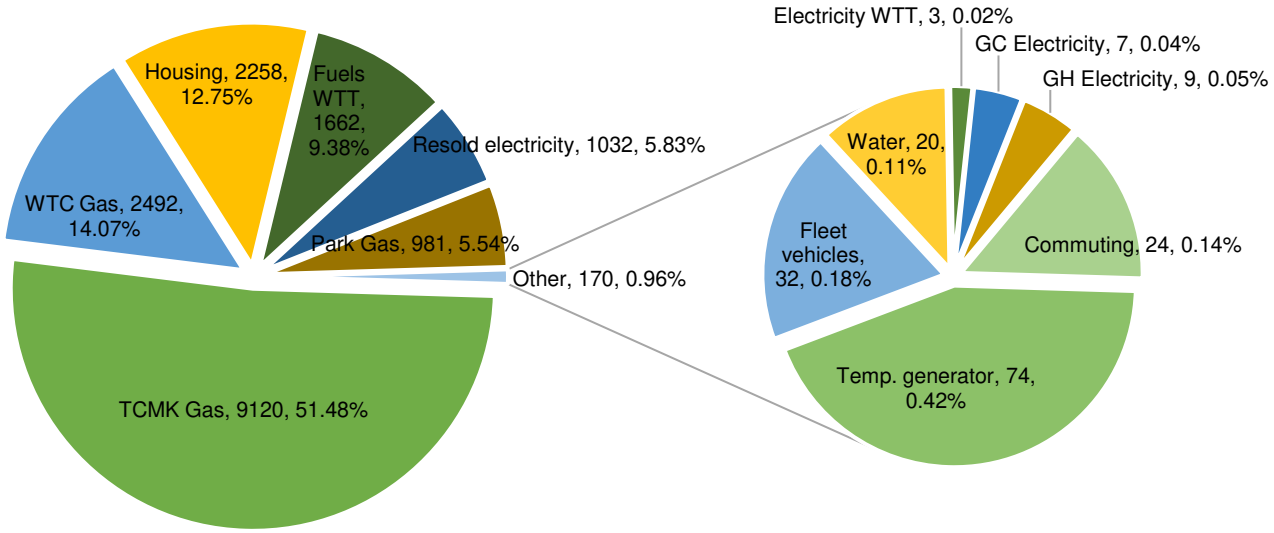
5. Summary of Greenhouse Gas (GHG) emissions

Gross emissions in 2019 were **18,127 tCO2e**, a decrease of 13% from 2018. A reduction in demand (and generation) for energy services drove this reduction, particularly in Milton Keynes.

The majority of ThamesWey's gross GHG emissions (70%) throughout the reporting period, were Scope 1 emissions. Scope 2 emissions from electricity usage were insignificant in comparison, responsible for only 0.1% of the total. Scope 3 emissions made up the remaining 30% and were dominated by energy service-related and from housing stock.

The relative contribution of all measured emissions is shown in Figure 1, absolute values are summarised in Appendix 1, with comparisons to the previous year.

Figure 1: ThamesWey Group net GHG emissions in 2019 by source, quantity (tCO_2e) and percentage



ThamesWey provides a significant reduction in GHG to the wider community through a range of activities:

- Emissions are directly prevented by providing low-carbon heat, cooling and electricity to customers in Woking, Milton Keynes and the national grid – at least **998 tCO2e** in 2019.
- 2MW peak generating capacity of Solar Photovoltaic (PV) panels supply renewable electricity to buildings in Woking and the national grid - **406 tCO2e**
- Upgrading the energy efficiency of our property portfolio – creating projected annual savings of **72 tCO2e** or lifetime savings of **2,169 tCO2e**.
- Locally delivered projects directly target emission savings through energy efficiency, for businesses in Woking and domestic properties across Surrey. Domestic installations create savings of **143 tCO2e** annually or a projected **5,382 tCO2e** over their lifetimes.

6. Scope 1 GHG emissions

6.1 Generation of heat, electricity and cooling

Supporting Woking 2050 Theme 1: Home is where the heart is and Theme 2: In the workplace.

ThamesWey owns and operates two energy networks in Woking (WTC) and Milton Keynes (TCMK). They are fuelled by gas-fired Combined Heat and Power (CHP) engines, gas-fired boilers, condensing and electric chillers, which supply heat, electricity and cooling (WTC only) to commercial and domestic customers. ThamesWey also operates heat and power generation plant at Pool in the Park.

Results

Table 1 shows the Scope 1 emissions in the reporting period, measured in tCO2e, compared to the same period in the previous year. Emissions are separated by site to show the contributions of each.

Table 1: Scope 1 energy centre emissions.

	WTC	TCMK	Park	Total emissions
2018	2,946	9,945	2,073	14,964
2019	2,492	9,120	981	12,593
Change	-15%	-8%	-53%	-16%

There were meaningful reductions in emissions from the main energy centres in 2019: over 1,250 tCO_2e less this year. The Woking Park site too showed significant Scope 1 reductions, as discussed below.

Figure 1: CHP Engine at TCMK energy centre.

This 20-cylinder engine is capable of producing over 3MW of electrical and thermal output. 1100 domestic and commercial customers are supplied with energy services in Milton Keynes.

Three main factors can affect the scope 1 emissions released from the energy networks: connected load, generator mix and weather.

Connected Load

In Woking, the new SPACE office was connected to the power network, increasing demand on the network from May 2019 onward. There were no changes in connected load in Milton Keynes, though heat-for-cooling sales more than halved compared to 2018 as a customer's faulty absorption chiller returned to normal operation.

Generator Mix

In Milton Keynes, CHP availability was excellent. Compared to 2018, The engines provided a higher proportion of the required electricity (rather than the grid) and the same for heat, with the boiler generating only 3% of the heat in 2019. In Woking however, electricity imports rose by 10% as the CHP availability to generate was lower. Similarly, heat generation from the CHP reduced though dumped heat increased.

At Woking Park, the CHP was unavailable for much of the year which meant that boilers provided most of the heat and the grid provided the vast majority of electricity. This is the primary reason for the reduction in Scope 1 emissions at this site.

Seasonal weather conditions

Weather conditions can best be represented using Heating Degree Days (HDDs) and Cooling Degree Days (CDDs), which are the measurement of deviation in air temperature against a base temperature (and for how long) – indicating a need to heat or cool a space.

As shown in Table 2, there was a greater need for heating in 2019 in both regions with 9-15% more HDDs during 2019 than 2018. There was also a significantly reduced need for cooling with 61-72% less CDDs compared with 2018. Trigeneration, absorption chillers and year-round demand for hot water will skew the relationship between emissions and climate, though it is still a useful indicator for the main energy centres.

Table 2: Emissions adjusted for changes in weather. Whilst not a key factor for changes observed this year, weather has a fundamental influence.

	HDDs in Woking	CDDs in Woking	tCO_2e emitted per HDD/CDD	HDDs in Milton Keynes	CDDs in Milton Keynes	tCO_2e emitted per HDD/CDD
2018	1,972	272	1.31	1,964	247	4.50
2019	2,147	107	1.11	2,251	69	3.93
Change	+9%	-61%	-15%	+15%	-72%	-12.6%

6.2 Fleet vehicles

Supporting Woking 2050 Theme 3: Getting around.

To maintain the energy networks and other assets, ThamesWey owns several vans used by our team of engineers. To reduce the emissions from the fleet, ThamesWey took delivery of two fully electric Renault Kangoo Z.E. vans in February 2019 to replace two of the most polluting diesel vans. This created an added benefit of demonstrating the practicality of electric vehicles, as in Figure 2.

Results

During the reporting period, the fleet emitted **32 tCO_2e** over 130 active van months, including the two electric vans. Compared to the previous year, this is an absolute decrease of 3 tCO_2e emitted over 98 active van months.

The average emission per active van month has decreased by 31% from 0.36 to 0.25 tCO_2e.

The average tailpipe emissions per km from fleet vehicles has also decreased, by 19% from 160g CO_2/km to 128g CO_2/km, based on manufacturer ratings.

6.3 Fugitive emissions

Refrigerants found in air conditioning units and other equipment are powerful GHGs. They are often thousands of times stronger than carbon dioxide, therefore leakage of these to the atmosphere must be carefully monitored and prevented. These leaks are known as fugitive emissions.

Results

The maintenance record from 2019 shows no leakage of refrigerant and therefore **zero fugitive emissions**. This is no change from 2018.

6.4 Other fuels

In 2019, a temporary generator was used to provide power to a temporary electric chiller at Victoria Way energy centre. This generator was fuelled by gas oil (red diesel).

Results

26,950 litres of gas oil were used, releasing GHG emissions of **74 tCO_2e**.

7. Scope 2 GHG emissions

7.1 Office electricity use

ThamesWey's office-based staff are based at two Woking town centre sites: Gloucester Chambers (GC) and Griffin House (GH). Electricity is used at both sites for office appliances, lighting, kitchen appliances and HVAC.

Results

At GC, electricity usage has risen by 7% to 29MWh, though as the national grid has decarbonised in 2019, gross carbon emissions have reduced by 4% to **7.3 tCO_2e**.

GC office occupancy has reduced as some staff moved to GH, causing emissions per full-time equivalent (FTE) employee to rise slightly to 0.37 tCO_2e. As the supplier is unknown, net emissions are the same.

At GH, ThamesWey used 26MWh of electricity resulting in gross emissions of **6.7 tCO_2e**, and net emissions of **8.6 tCO_2e**. Usage within the office (i.e. excluding car charger electricity and landlord allocation) per FTE employee equates to gross emissions of 0.28 tCO_2e and net emissions of 0.36 tCO_2e.

7.2 Energy centre parasitic electricity consumption

The parasitic consumption is the electricity used by the energy centres to fulfil core functions, such as running the district heating pumps, fans, lighting and all other electrical systems. In Milton Keynes, an electric vehicle is also charged at the energy centre.

Additionally, the small network distribution losses incurred by transformers and substations are included in this calculation.

Results

The GHG emissions from the energy stations in Milton Keynes and Woking are accounted for in Scope 1, though quantities are below.

- In Woking, the parasitic consumption has increased substantially from 464 MWh to 787 MWh.

A contributor to this increase is the installation of a new electric chiller, which was additional to the previous baseload. Another is a line strike to a DH pipe that occurred early in the year, causing a leak of DH water for a number of months. This would result in more pumping required for the same amount of heat to be distributed to customers, especially as it occurred fairly close to the energy centre.

- In Milton Keynes, the parasitic consumption has increased slightly, by 3% to 1,719 MWh.

The cause of this increase is not known, though the electric car charger will not have made a significant contribution.

7.3 Scope 2 subtotal

Gross Scope 2 emissions are **14 tCO_2e**.

Net Scope 2 emissions are 16 tCO_2e, before considering solar photovoltaic assets (see 9.1) which reduce total net emissions to **0 tCO_2e**.

Figure 2: ThamesWey's Pool Car

In January 2019, a fully electric Renault ZOE arrived at the ThamesWey office to be the first company pool car.

It is used by staff in the housing team, environmental projects team and others who need to travel across Woking and to Milton Keynes.

The Zoe has been used for 3870 business miles. This has saved ThamesWey £1742 in business travel expenses, whilst demonstrating locally that electric vehicles are practical, available and convenient.

Fuel for an electric car costs only 3.5p /mile whereas a small petrol car costs approx. 15p /mile – this is over 4x as expensive.

When taking electricity spend into account, the net saving from the pool car is still well above £1600.

8. Scope 3 emissions (upstream)

Upstream Scope 3 emissions are the indirect emissions that are a consequence of ThamesWey's actions, which occur at sources which are not owned or controlled.

8.1 Employee commuting

ThamesWey is responsible for the emissions resulting from how its employees travel to work.

Results

The following figures take into account the well-to-tank (WTT) emissions from each journey, which are the emissions associated with the processing, refining and transportation of fuels before they are combusted.

The most common mode of employee transport to work in 2019 was by car, followed by train travel. The emissions from employee commuting totalled **24.5 tCO_2e** in 2019 from an equivalent of 28.8 FTE employees travelling a total of 466km to work each day, and back.

This is an increase of 2.4 tCO_2e from 21.3 FTE employees travelling 401km. Per FTE, emissions have reduced by 18%. The average one-way journey length is 14km, though almost 1/3 of employees have a commute of 5km or less.

Staff commuting journeys in 2019 also included **76km of zero carbon travel** per day, through cycling/walking, an increase of 11km this reporting period.

These trends are predominantly due to staff turnover rather than specific policies put in place to reduce commuting emissions, though this does not account for all emission reductions. A change in policy from 2019 for those receiving a company car allowance has encouraged some to change to lower emissions vehicles. For example, one employee who has benefitted from this incentive has achieved a reduction in emissions by 1.4 tCO_2e (50%) over the reporting period.

Other minor reductions can be attributed to a reduction in national average emissions for most modes of transport.

8.2 Imported Electricity

ThamesWey's energy centres import electricity from the grid to supplement the electricity generated on site, which is fed into the private wire networks in Woking and Milton Keynes. The imported electricity supplies the network, when network demand exceeds power produced by ThamesWey's generators. Typically, this is during maintenance or at night when the engine(s) are not running.

Although this is purchased by ThamesWey, it is passed through to customers and therefore is a Scope 3 emission.

Results

The amount of electricity imported to the main energy networks has stayed fairly consistent, decreasing in 2019 by only 48 MWh, to 11,608 MWh.

However, imports at Woking Park increased substantially (130%), to 2986 MWh, for the reasons discussed previously.

Gross emissions have increased only slightly to **3,705 tCO_2e** as the decarbonisation of the national grid since 2018, has compensated for the rise in grid consumption. In contrast, net emissions have reduced significantly to 1,032 tCO_2e, as ThamesWey switched to a fully renewable supplier mid-way through the year.

8.3 Fuel well-to-tank (WTT) emissions

These are the emissions associated with extraction, refining and transportation of the raw fuels that ThamesWey's energy centres and vehicles use (natural gas and diesel).

Results

Corresponding with the reduction in Scope 1 emissions from natural gas, the WTT emissions for this fuel have reduced by **427 tCO_2e** (20%) to **1,662 tCO_2e**.

Likewise, fleet vehicle WTT emissions have decreased by 8% to **7.6 tCO_2e**.

WTT emissions from the temporary generator resulted in emissions of **16 tCO_2e**.

8.4 Electricity well-to-tank (WTT) emissions

As above, there are emissions associated with the raw materials used to generate electricity and the transmission/distribution (T&D) of this to the end user. This therefore applies only to the electricity used by ThamesWey and not the electricity purchased and imported to the private wire networks – these WTT emissions are the responsibility of the end user.

Results

In 2019, these emissions amounted to **3.3 tCO_2e**.

This is an increase of 1.4 tCO_2e as ThamesWey expanded into Griffin House.

8.5 Water usage

Water use is reported in more detail in another section of the report, though the GHG emissions are relevant here. Water is used at both office sites as well as at both energy centres.

Results

In this reporting period, emissions were **20 tCO_2e**. This is an increase of 43% from 2018 due in part to increased consumption at both energy centres and increased need for water treatment.

At WTC, less water was used (and evaporated) by the cooling towers in 2019, which results in a greater proportion of the total water consumed going to the foul water drain. Foul water requires treatment – a separate and additional activity to water supply.

9. Scope 3 emissions (downstream)

Downstream Scope 3 emissions are the indirect emissions that occur as a result of ThamesWey's activities.

9.1 Solar Photovoltaic (PV) sites

Supporting Woking 2050 Theme 2: In the workplace and Theme 5: What the council is doing.

ThamesWey has 74 active solar PV sites[7] around Woking with a combined peak capacity of 1,992 kW. They supply renewable electricity to a variety of different sites in Woking, such as schools, sheltered accommodation, council assets and homes. The local community benefits from these arrays, as does the national grid from any unused electricity.

[7] Most sites are grouped, comprising numerous arrays in close proximity, therefore the total number of individual properties or units supplied by ThamesWey's PV is much greater than this.

Results

ThamesWey's PV sites generated 1,285 MWh of renewable electricity in 2019, avoiding the emission of **406 tCO_2e**. This equates to the power consumed by 428 homes over an entire year.

Generation has increased by 3% during 2019 over 2018, though avoided emissions decreased by 8%, as the alternative (grid) electricity is less carbon intensive.

The most significant factor that affects generation is availability of sunlight, which has decreased in 2019. However, Table 3 shows that ThamesWey's solar assets were more productive this year compared to last, generating 13% more electricity given the same amount of sunlight. The most important factor causing this improvement is an increased attention to fixing tripped or under-performing systems.

Table 3: Renewable electricity generation, normalised for changes in weather and capacity

	MWh Generated	No. of sunlight hours	kWh per sunlight hour per installed kWpk	Avoided emissions in tCO_2e
2018	1,249	1,719	0.37	440
2019	1,285	1,566	0.41	406
Change	+ 3%	- 9%	+ 13%	- 8%

9.2 Owned properties

Supporting Woking 2050 Theme 1: Home is where the heart is.

ThamesWey Housing owns and leases out domestic properties primarily within Woking Borough. A core aim is to provide high-quality and well-designed housing both by acquiring on-street properties and by creating purpose-built units. ThamesWey can influence the emissions from these assets, so are therefore Scope 3 emissions.

Results

ThamesWey's property portfolio grew from 482 to 561 properties in 2019. This excludes void properties being refurbished and properties secured for re-development.

The GHG emissions associated with this portfolio grew too, from 2,087 to **2,258 tCO_2e**, despite a reduced (average) carbon intensity.

10. Other GHG emission reduction activities

Sustainability is at the heart of what ThamesWey does and these other activities highlight how ThamesWey integrates this core value on a daily basis. Whilst no specific GHG Protocol guidelines exist for how carbon reduction activities should be reported, these estimates follow the same method as for emission reporting whilst accounting for product lifecycles. Appendix 3 summarises these activities.

10.1 Upgrading our tenanted properties

Supporting Woking 2050 Theme 1: Home is where the heart is.

ThamesWey Housing let 561 properties in and around Woking, in 2019. A strategic target of ThamesWey is to have each property at an EPC rating of 'C' or higher, compared with the legislated minimum of 'E' for private rented properties. To achieve this improvement, new and existing properties are refurbished to be as resource efficient as possible. There is a significant capital cost to improving these properties by this much, but the benefits felt by the tenants and the community (through carbon reduction) are equally significant.

Results

Throughout the reporting period, the energy efficiency of 61 properties was upgraded by ThamesWey Housing.

These properties received a total of 15.6m (depth) of loft insulation, 15 solar-thermal systems, 41 high-efficiency condensing boilers, 59 water efficient bathrooms, 171 'A' or higher rated appliances, 105 new double-glazed windows and every bulb changed to LED. The upgraded energy efficiency is estimated to avoid the emission of **72 tCO_2e per year** or **2,169 tCO_2e** over the lifetime of the improvements, a sizeable increase from the 24 tonnes annually or 839 lifetime tonnes avoided in 2018 from the upgrade of 25 properties. The increase of improvements is due to the corresponding increase of activity that ThamesWey Housing has experienced over this time.

In Autumn 2018, ThamesWey commenced a trial of battery storage in 11 tenanted properties, to maximise the direct use (as opposed to export) of renewable electricity generated from recently installed Solar PV. Over the course of the trial, the batteries supplied 1.77MWh of stored solar electricity to the properties, saving **560 $kgCO_2e$** by avoidance of importing an equivalent volume of grid power to the homes The batteries typically discharged during the afternoon, which is the most carbon intensive time of the day, therefore the carbon savings will be higher than the average footprinting suggest. The solar-generated electricity delivered from the batteries is enough to drive an electric car roughly 7,500 miles.

Figure 3: ThamesWey Housing property (L) receiving a Moixa battery (R).

10.2 Action Surrey

Supporting Woking 2050 Theme 1: Home is where the heart is.

Action Surrey is a project delivered by ThamesWey as part of a long-standing partnership between ThamesWey and the county, district and borough councils in Surrey. Its aim is to increase domestic energy efficiency across Surrey by providing advice and facilitating energy-saving installations.

Results

In the reporting period, **207** energy efficiency improvements were installed through Action Surrey. These are projected to save **143 tCO_2e** annually and based on the expected longevity of each installation, would save **5,382 tCO_2e** over their lifetimes.

Compared to 2018, this is a decrease from 344 installations with projected savings of 245 tCO_2e annually and 9,296 tCO_2e over their lifetimes.

The quantity of installations is highly dependent on the amount of funding available, as this reduces the up-front capital contributions the recipients must pay. The amount of funding has decreased steadily in recent years, though 2018 saw a series of significant changes to restrict the measures, the properties and the individuals who could receive funding.

To mitigate this, Action Surrey used capital reserves to partially fund the installation of condensing boilers from late 2018 into early 2019. These grants were allocated to 23 vulnerable residents[8] with broken heating systems, each needing to pay an average of less than £500 for the improvement. The associated avoided GHG emissions are incorporated into the annual figure stated above.

11. GHG opportunities for 2020

11.1 Opportunities for reducing Scope 1 emissions.

ThamesWey's most significant impact is use of natural gas in the energy centres to create heat, power and cooling. Any activities that reduce the generation and/or demand are therefore favourable. These could include:

- Improved/renewed insulation of plant and equipment within the energy centre or on secondary networks. TW's thermal imaging camera could be used to identify areas of high heat loss.
- Fixing metering issues, where unmetered supplies or similar exist.
- Leak detection study(s), to reduce losses and wasted generation.
- Sub-metering of parasitic load or individual circuits, to help identify and upgrade inefficient equipment (e.g. pumps).
- New renewable heat generators, such as heat pumps, to operate strategically during low carbon periods.

Irrespective of generation equipment now or in the future, the first four points are no-regret actions that will help to create a more efficient network.

By procuring more electric vehicles, fleet vehicle emissions can be reduced further, but this is difficult as the electric van market is not as developed as the electric passenger car market. However, used electric passenger vehicles can be cheaper and better performing than new electric vans, so this opportunity should be explored for engineer roles that require transport of small tools and materials.

[8] Eligibility criteria for those vulnerable to the cold matched that of Ofgem's 'ECO3' Energy Company Obligation.

Temporary generators should always be avoided at sites with a viable grid connection, as this is more carbon intensive than grid electricity. Where they are unavoidable, biofuel generators can be used to minimise emissions.

11.2 Opportunities for reducing Scope 2 emissions.

The most measurable reductions to gross Scope 2 emissions can be made within the office at GH, as this is the only location where our usage is not blended with that of other organisations. Opportunities include installing automatic light sensors, mandatory computer screen sleep timers and continuing to procure energy efficient equipment. TW cannot affect net emissions at this site as the electricity supply contract is fixed for another three years.

The same opportunities could be sought at GC though as our consumption meter is shared with the neighbouring office, the effect is likely to be difficult to measure.

11.3 Opportunities for reducing Scope 3 emissions.

Several company policies incentivise sustainable travel to work, though not all employees may be aware of them. Greater communication of these policies could help to reduce emissions from commuting. Additionally, greater encouragement of working-from-home will reduce commuting emissions, which would be especially impactful (and beneficial) for those who commute the furthest.

Emissions from electricity imported to the energy networks can reduce with similar actions to those described in 11.1 and by encouraging general energy efficiency among our customers.

Scope 3 emissions based on fuel combustion and electricity consumption can be reduced alongside corresponding decreases with scope 1 and 2 emissions.

Eliminating DH leaks is the main opportunity to reduce emissions from water use, though improvements in office water efficiency can contribute.

Improving response times to restore PV generation following outages will increase the avoided emissions from Solar PV generation. Increasing overall capacity of PV sites will also help and this can be achieved with new installations or optimising installations that perform poorly.

12. Water

Supporting Woking 2050 Theme 1: Home is where the heart is

Water is an essential environmental resource used by ThamesWey. In the UK, water is facing increasing levels of stress in the future[9], so national resources should be protected by minimising our usage – lowering the risk of shortages in the future.

The majority of water consumed by ThamesWey is at the energy centre sites where it is used for cooling, cleaning and system water. A small volume of water is also used at both office sites in kitchens and bathrooms. Water is also used at Woking Park, though there is insufficient data at this site to include in the report.

Results

In 2019, **22,045 m³** of water was used – 99% of this was used in the energy centres.

This is an increase of 23% compared to 2018, due to increased consumption at both WTC (23%) and MK (30%) – GC saw a slight decrease. Figure 4 shows this trend.

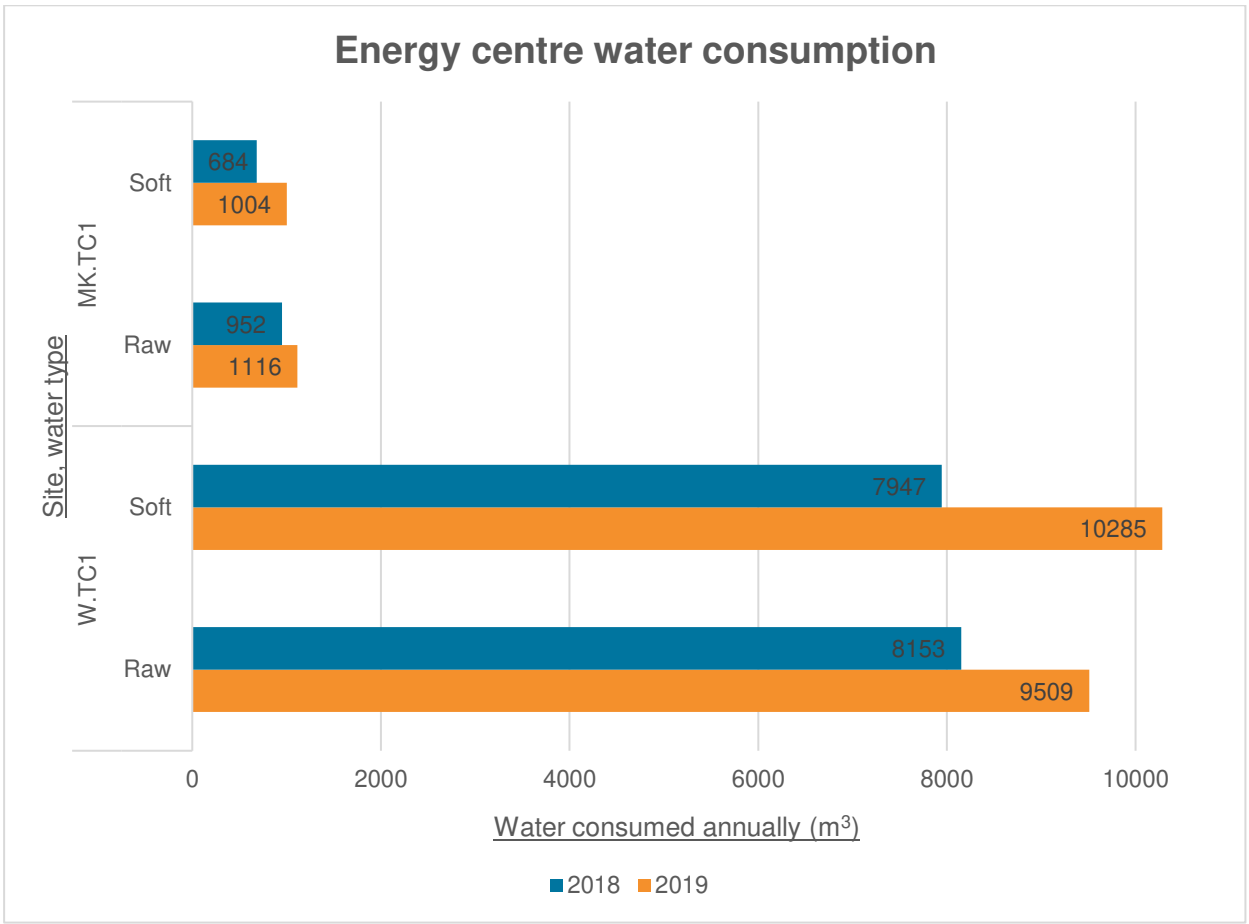


Figure 4 (above): Change in water consumption at energy centre sites from 2018-19, 1m³ = 1000L. Office sites consumed a combined 234 m³ in 2019.

[9] Environment Agency, The state of the environment: water resources. May 2018

Opportunities and targets for water efficiency

At WTC, leaks in District Heat distribution pipes in late 2019 are likely to be a significant cause of increase in consumption. In addition, from June 2019 onwards no water was used in cooling towers in WTC and Woking Park whilst absorption chillers were replaced. If cooling tower operation was maintained after June, even more water would have been consumed at WTC.

There is no known source of increased water demand at MK, therefore this data suggests there could be a leak in the system, which should be examined.

Water usage is very low at office sites low flow water appliances may offer savings, subject to a review of the facilities present.

13. Waste

The generation of waste has serious environmental implications, efforts should therefore be made to lessen these impacts and follow the waste hierarchy.

Results

In 2019, waste from maintenance activities amounted to **1,060kg**, **2,422kg** from WTC energy centre and **746kg** of waste was produced from the office at GH.

This includes waste from normal activities, major equipment replacements are not recorded in this way.

Of this, over half was recycled, just under half was used to generate energy and the remaining 4kg (0.6%) was sent to landfill, based on the average waste destination of the waste treatment site.

Whilst no data was available for GC, food waste from the office was collected and composted by one enthusiastic employee, avoiding the emissions that food waste causes in landfill. Almost 5kg of crisp packets were also collected, which will be sent for specialist recycling.

Opportunities for reduction in waste

Limited waste reduction opportunities exist to replace disposable items for reusable alternatives. These include eliminating takeaway containers and blue roll (swap for towels). The former will be targeted in a bespoke project run by ThamesWey in early 2020.

14. Material and resource efficiency

This has not been evaluated in the report. Priority materials and resources will be defined and records built up so that this may be reported in the future.

15. Biodiversity and Ecosystem services

ThamesWey, like all others, are dependent on the services provided by the ecosystem. Therefore, effort should be made to understand what impacts we have and how these can be mitigated.

15.0.1 ThamesWey's relationship with the ecosystem

The following ecosystem services are affected by ThamesWey's activities:

- **Provisioning services**: Timber (negative effect, from its use in construction and paper use)
  These are the physical products obtained from ecosystems.
- **Regulating services**: Air quality, climate and water regulation (negative effects through GHG emissions, positive effects through emissions prevented)
  These are the benefits gained from the regulation of ecosystem processes and cycles.
- **Cultural services:** Impact on wild species (positive effects from biodiversity projects such as swifts)
  These are non-material effects, realized through recreation and aesthetics.

ThamesWey's assets are located in urban and sub-urban areas, with some close to areas of high environmental value such as the River Wey, Hoe Stream, Basingstoke Canal, protected heathland and several other areas of greenspace.

15.1 Biodiversity and ecosystem improvements

Supporting Theme 1: Home is where the heart is and Theme 4: The great outdoors

ThamesWey targets positive changes to biodiversity through specific projects - the 'Swifts in Woking' project is one such project, which aims to improve the provision of nesting sites to support the local population of the Common Swift[10] – a bird classed as endangered in Great Britain[11]. In the reporting period, **134 nesting boxes** were installed including 28 on ThamesWey properties, a significant increase from the 19 installed in 2018.

Figure 4: Integrated swift nesting sites on a ThamesWey development (L) and external swift nest boxes on a privately-owned property in Woking (R).

ThamesWey has engaged residents of Woking Borough who have received the majority of nesting boxes. The remaining boxes were installed into new residential ThamesWey developments, both are shown in Figure 5. As swifts are site and partner faithful, each nesting site will provide a home each summer that they return. The project

[10] www.woking.gov.uk/swiftsinwoking
[11] Stanbury *et al.* (2017) The risk of extinction for birds in Great Britain. British Birds, 110, pp.502-517.

has had an impact across the borough with installations scattered across most corners of Woking and numerous swifts have been spotted near the nest boxes in their first year.

This project collaborated with several community groups who all helped make the project the success it was. A youth carpentry project ran by Surrey County Council's Family Services built a number of nest boxes and local charities Woking Community Furniture Project and Horsell Common Preservation Society both ran nest box building workshops open to interested members of the public. ThamesWey is extremely grateful for their support.

ThamesWey Housing also promotes biodiversity, particularly when refurbishing void properties. Over **100m^2** of artificial turf was removed from gardens in 2019, which was replaced with natural turf to improve biodiversity and drainage. Additionally, small mammal runs in fences are often created and established flora is retained.

In 2019, ThamesWey Developments gained planning permission to extend Middle Walk in the town centre, which was designed with an extensive green roof, semi-intensive green roof, modular living walls and balcony planters. This ambitious design demonstrates ThamesWey's increased efforts to facilitate and lead in local biodiversity.

Figure 5: A computer generated image of Middle Walk, highlighting green areas containing the described features.

15.2 Biodiversity and Ecosystem services opportunities

The main influence ThamesWey has on biodiversity is from development projects. Depending on each site, opportunities can exist to promote biodiversity ranging from preventing damage (e.g. retaining trees or the area of greenspace) to making a net gain (e.g. creating additional habitats, wildlife corridors, greenspace).

There is also a vast opportunity across our residential portfolio. A process could be put in place to evaluate properties for suitable biodiversity improvements. This could coincide with other works to the property or key milestones such as the regular property inspections already carried out.

Non-residential, or community developments can be assessed using BREEAM, a point-based system which includes a section on land use & ecology. By achieving these points, ThamesWey can make a positive contribution to local biodiversity.

The Sheerwater regeneration project is one such project, which is aiming for a 'Very Good' under BREEAM communities. The ecology strategy within this programme ensures that existing ecology is protected, or experiences minimal disruption where this is impractical. Additionally, measures to promote biodiversity within the site and locally are promoted. Work toward this is ongoing and will be reported on in the future.

16. Emissions to air, land and water

This has not been evaluated in the report, as no emissions to air, land and water have been released in the reporting period.

Appendix 1: Summary of GHG data sources, gross and net emissions

Scope	Emission source		Data source	2018 Gross (net) emissions in tCO_2e		2019 Gross (net) emissions in tCO_2e		+/- Change in tCO_2e
1	Generation of heat, electricity and cooling	WTC	CHPQA F4	2,946		2,492		-454
		TCMK		9,945		9,120		-825
		Park	CHPQA F4 & Invoices	2,073		981		-1,092
1	Fleet vehicles		Fuel cards, litres purchased	35		32		-3
1	Fugitive emissions		Maintenance records	0		0		0
1	Temporary generator		Invoices, litres purchased	0		74		+74
Scope 1 subtotal				*14,999*		*12,700*		*-2,300*
2	Electricity consumption - GC		Grouped meter reads, estimation of proportion used.	7.6	(7.6)	7.3	(7.3)	-0.3
2	Electricity consumption GH		Meter reads with part of the usage estimated	n/a		6.7	(8.6)	+8.6
Scope 2 subtotal				*8*	*(0)**	*14*	*(0)**	*0*
3	Employee commuting		Survey of all employees	22		24		+2
3	Electricity Well-to-tank		Same as Scope 2 sources	1.9		3.3		+1.4
3	Electricity re-sold through networks		CHPQA F4	3,667	(3,122)	3,705	(1,032)	-2,090

3	Fuels used Well-to-tank	Same as Scope 1 sources	2,088		1,662		-427
3	Water usage	Meter reads with small element estimated	14		20		+6
3	Waste	Weight, partial estimation of shared element	n/a		0.09		+0.09
3	Owned properties	Estimation based on local authority average.	2,087		2,258		+171
Scope 3 subtotal			*5,793*	*(5,248)*	*5,414*	*(2,742)*	*-2,506*
Year total			**20,800**	**(20,247)**	**18,127**	**(15,441)**	**-4,806**

*Net Scope 2 emissions are zero to compensate for the renewable energy generated by ThamesWey, that is fed into the grid and/or third parties.

Figures rounded as appropriate.

Appendix 2: Breakdown of the GHG benefits from operating WTC & TCMK energy centres in 2018 and 2019

		Emissions from ThamesWey's energy centres (tCO_2e)			Emissions from on-site gas boiler and average grid electricity (tCO_2e)		
	Emission source	Scope 1	Scope 2	Scope 3	Scope 1	Scope 2	Scope 3
2018	Gas	12,892	0	1,792	5,784	0	804
	Electricity	0	0	4,112 (3,621)	0	9,978	2,456
	Gross benefit	**-227**					
	Net benefit	**-718**					
2019	Gas	11,612	0	1,510	4,817	0	626
	Electricity	0	0	3,636 (1,675)	0	8,374	1,988
	Gross benefit	**+963**					
	Net benefit	**-998**					

This calculation is based on the **average** grid electricity and does not take into account the strategic benefit the time of day that gas-CHP operates at, which is the most carbon intensive time of day and year.

A negative figure denotes reductions/savings in emissions. Net emissions in brackets reflects electricity supplier-specific carbon intensity. Gross emissions reflect UK average emissions. This assumes heat and power at WTC, cooling is excluded due to insufficient data.

		Emissions from ThamesWey's energy centres (tCO_2e)			Emissions from on-site gas boiler and marginal grid electricity (tCO_2e)		
	Emission source	Scope 1	Scope 2	Scope 3	Scope 1	Scope 2	Scope 3
2018	Gas	12,892	0	1,792	5,784	0	804
	Electricity	0	0	4,112 (3,621)	0	12,969	2,456
	Gross benefit	**-3,218**					
	Net benefit	**-3,708**					
2019	Gas	11,612	0	1,510	4,817	0	626
	Electricity	0	0	3,636 (1,675)	0	11,448	1,988
	Gross benefit	**-2,110**					
	Net benefit	**-4,071**					

This calculation is based on CHP displacing electricity that is more carbon intensive than the annual average, due to the time of day and year it operates. The counterfactual is known as the 'marginal' plant, which has been calculated by BEIS[12] in specific relation to gas-CHP.

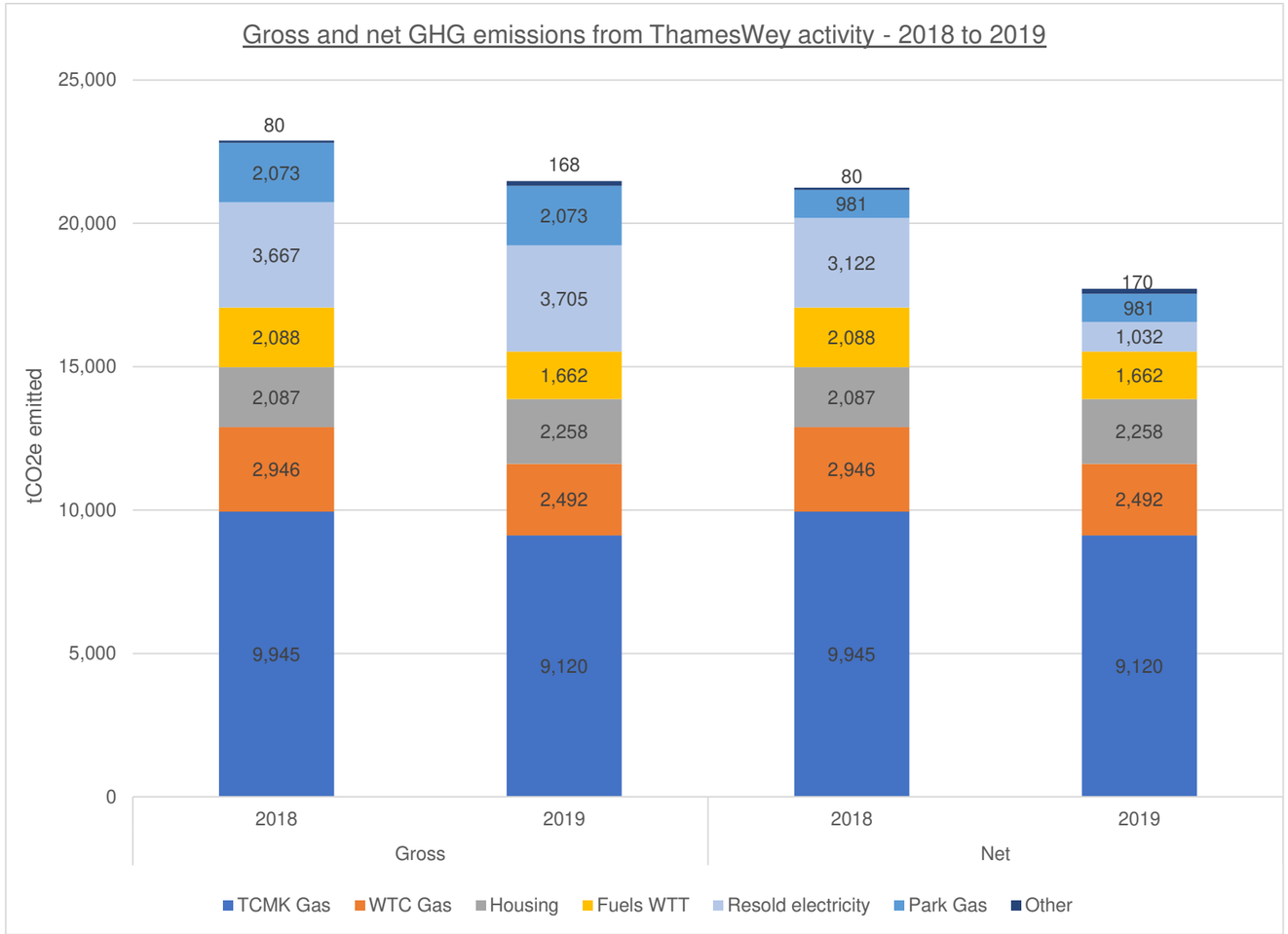
Grid electricity imported and re-sold through ThamesWey's energy centres is still treated as the grid average/supplier specific figure, as this will predominantly be imported at times when the CHP is not operating. So, the counterfactual scope 2 electricity emissions are a blend of average and marginal.

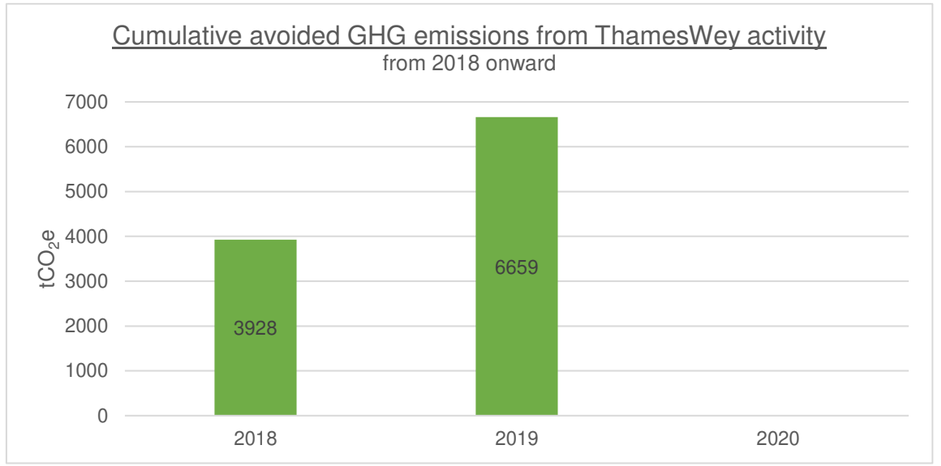
[12] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/389070/LCP_Modelling.pdf

Appendix 3: GHG benefits of ThamesWey's activities

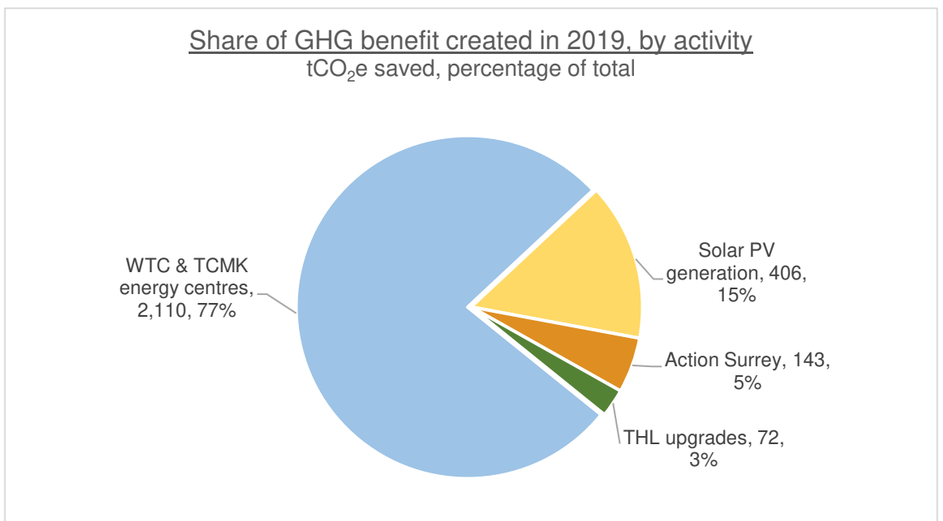
	2018		2019		
GHG reduction activity	Annual avoided emissions in tCO_2e	Projected lifetime avoided emissions in tCO2e	Annual avoided emissions in tCO_2e	Projected lifetime avoided emissions in tCO2e	+/- Change in tCO_2e
Supply of energy services	3,218	n/a	2,110	n/a	-1,108
Solar PV generation	440	n/a	406	n/a	-36
Upgrading tenanted properties	24	839	72	2,169	+48
Action Surrey	245	9,296	143	5,382	-102
Totals	**3,928**	**10,135**	**2,731**	**7,551**	+190
			Cumulative savings: **6,659**		

Appendix 4: Environmental performance dashboard





	Gross GHGs (tCO_2e)	PV generation (MWh)	Water (m^3)	Waste (kg)
2018	20,432	1,249	17,884	No data
2019	17,271	1,285	22,045	4,228



ThamesWey

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