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Research on the impact of the COVID-19 pandemic, and shift to more agile working, on Public Health Wales' carbon footprint



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Key Terms & Definitions

The following key terms are used in this Report. For reference, a definition of each term has been provided in the following table.

Key Term/Acronym	Definition
Carbon Dioxide Equivalent (CO₂e)	Standard unit of measurement of Greenhouse Gas (GHG) emissions used to compare relative impacts of different GHG's based upon their global warming potential.
Greenhouse Gas Emissions (GHG emissions)	Greenhouse gases (GHGs) which are emitted into the Earth's atmosphere as a result of anthropogenic and natural activities. The main GHG includes carbon dioxide (CO ₂), methane (CH ₄), sulphur dioxide (SO ₂), nitrous oxide (NO ₂), PFCs, and HFCs.
Location Based GHG Emissions	GHG emissions from the generation and distribution of electricity procured through the National Grid. Carbon intensity of generation is reflective of a national (country-wide) average supply mixture.
Market Based GHG Emissions	GHG emissions from the generation and distribution of electricity procured using green or renewable energy tariffs provided by utility providers. Market-based GHG emissions demonstrate the impact sustainable procurement choices have upon an organisation's GHG emissions however these must be reported in conjunction with location-based emissions totals.
Scope 1 GHG Emissions	Scope 1 GHG emissions result from sources directly owned/operated by the reporting organisation.
Scope 2 GHG Emissions	Scope 2 GHG emissions result from generation of purchased grid electricity, heat and steam.
Scope 3 GHG Emissions	Scope 3 GHG emissions result from other indirect operations of the reporting organisation including business travel, water, waste, and procurement.
Total GHG Emissions (per annum) (tonnes CO₂e)	An organisation/entity's annual GHG emissions total before adjustments are applied for sequestration or GHG removals, measured in tonnes CO ₂ e.
Well-to-Tank GHG Emissions (tonnes CO₂e)	Emissions from the processing and refinement of fuels and energy consumed by reporting organisations.
GHG Emissions Grouping (Section 3 of this report)	
Procurement GHG Emissions	Emissions resulting from the procurement of goods, materials and services by PHW during the reporting year.
Staff Commuting GHG Emissions	GHG emissions resulting from the use of personal vehicles and public transport by staff commuting to and from their place of work.
Site Operations GHG Emissions	GHG emissions resulting from the operation of PHW's offices and laboratories including, grid electricity, natural gas, other fuels, water consumption and waste disposal.
Business Travel GHG Emissions	GHG emissions resulting from staff using their own vehicles (Grey Fleet), hire cars, taxis, and coaches to travel for PHW business. Category also includes the use of couriers during the reporting year.
PHW Vehicle Fleet GHG Emissions	GHG emissions resulting from the operation of PHW's owned vehicles including cars, vans, and HGVs.
Staff Homeworking GHG Emissions	GHG emissions resulting from the use of power, heating, and waste disposal by staff who work from home.

Executive Summary

Project Background

The COVID-19 pandemic, which reached its peak in the UK in November 2020, was an extreme situation placing health boards and trusts under significant pressures, and led to the implementation of nationwide measure to curb infection, including lockdowns, travel restrictions, as well as the temporary closure of many offices and workspaces. Almost overnight organisations had to adapt to a new 'agile' way of working, with many staff becoming permanently home-based, commuting traffic declining significantly and some workspaces now being left empty. For Public Health Wales this meant that many of our office staff switched to homeworking whilst our laboratory staff (including key site-based roles) continued to work at these sites. Our shared experience of the pandemic has now transitioned into broader considerations regarding the benefits and the sustainability of increased agile/home working within organisations.

GEP Environmental (GEPEnv) in conjunction with PHW undertook a study to understand the impact the COVID-19 pandemic had upon the organisation's GHG emissions footprint; in particular, the sustainability of switching to home working. The findings and key recommendations of this study will be used to inform ongoing discussions around implementing more sustainable future ways of working; through the implementation of agile/homeworking for staff, as part of PHW's Work How it Works Best (WHIWB) initiative, making more considerate use of energy across PHW's buildings and estate, as well as through supporting staff to make sustainable travel choices.

The Well-being of Future Generations (Wales) Act (WFG Act) is about improving our social, economic, environmental and cultural well-being. Public bodies, including PHW strive to incorporate the seven well-being goals of the WFG Act, and the recommendations within this report supports PHW to contribute to a more resilient and prosperous Wales, and think about the long-term impacts of the decisions that we as a business make.



Assessment Process

The assessment process comprised of two distinct phases of work to first calculate PHW's GHG emissions footprint for the 2019-20 and 2020-21 reporting years and then commission staff surveys to obtain information surrounding staff behaviours for homeworking and for commuting.

PHW's GHG Emissions Footprint:

The calculation of PHW's emissions footprints for both the 2019-20 and 2020-21 reporting years were undertaken following best practice guidance from Welsh Public Sector Net Zero Reporting as well as the GHG Protocol. Both footprints for each reporting year were then compared against each other to determine the impact the COVID-19 pandemic had upon GHG emissions. This project involved the calculations of emissions footprints for the 2019-20 and 2020-21 reporting years and a supporting assessment of staff homeworking emissions and behaviours. PHW's GHG emissions footprint (for both reporting years) covers the following reporting scopes:

Scope 1 (Direct GHG Emissions):

GHG emissions from sources which are directly owned/operated by PHW; including fuels used onsite for heating, travel by PHW's vehicle fleet, and fugitive emissions (refrigerants).

Scope 2 (Energy Indirect GHG Emissions):

GHG emissions from the consumption of purchased grid electricity across PHW's offices, clinics, and laboratories.

Scope 3 (Other Indirect GHG Emissions):

GHG emissions resulting from wider indirect impacts of PHW's operations including business travel, waste disposal, water consumption, procurement (including supply chain), staff commuting and homeworking.

The calculation process also included the development of PHW's market-based emissions footprint, which demonstrates the emissions reduction from the procurement of green/renewable energy tariffs by PHW and staff (homeworking). Further detail on this assessment is provided in Appendix 2 of this report.

Staff Commuting & Homeworking Survey:

GEPEnv worked closely with PHW to develop a homeworking and commuting survey which was completed by staff. The aim of this survey was to better understand not only the amount of homeworking and commuting undertaken by staff but also to understand associated staff behaviours. The survey was also designed to highlight further areas where PHW can look to support flexible working for staff moving forwards.

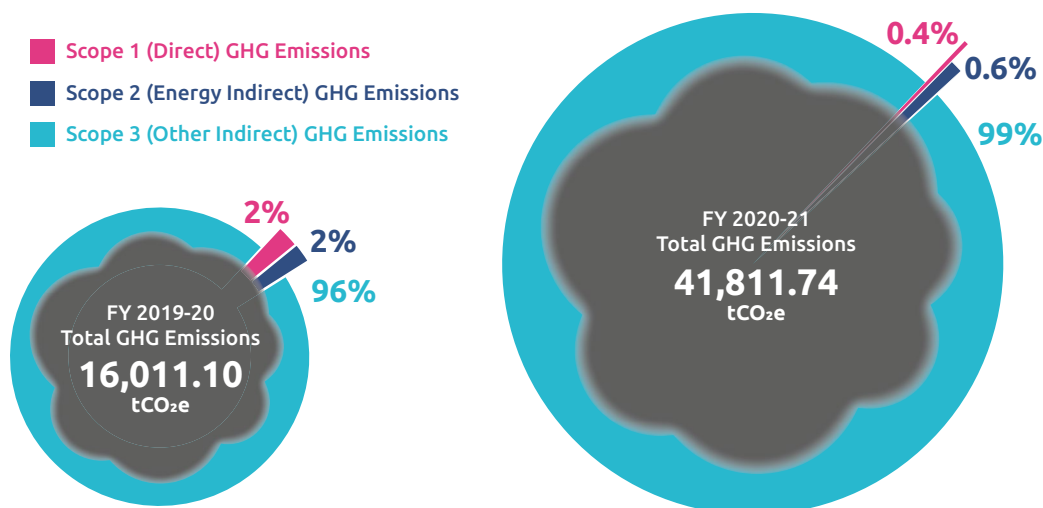
Study Results & Conclusions

PHW's GHG emissions footprint for the 2019-20 and 2020-21 reporting years and the comparison between the two are presented below (split between emissions reporting scope). Overall, when comparing 2019/20 to 2020/21 emissions increased significantly, from 16,011 CO₂ to 41,811 CO₂.

This trend was an unexpected result, emissions were expected to decrease due to the closure of offices and restrictions to travel during the pandemic. An explanation on the reasons for the increase in emissions is detailed below.

GHG Emissions Reporting Scope	GHG Emissions (tonnes CO ₂ e)		Year-on-Year Comparison (%)
	2019-20 (Baseline)	2020-21 (Year 1)	
Scope 1 GHG Emissions	327.41	177.58	-45.8%
Scope 2 GHG Emissions (Location-Based)	298.13	268.18	-10.0%
Scope 3 GHG Emissions	15,385.56	41,365.98	+168.9%
Total GHG Emissions (tonnes CO₂e)	16,011.10	41,811.74	+161.1%
GHG Emissions per Employee (tonnes CO ₂ e)	7.65	19.99	+161.1%

Figure 1 - Comparison of PHW's total GHG emissions between 2019-20 and 2020-21 (split by reporting scope).



As a result of increased Procurement spend during the 2020-21 reporting year, PHW's overall GHG emissions have increased by 161% compared to 2019-20. This is understood to be a result of the requirement for additional health care supplies and equipment procured through NHS Wales to support PHW's response to the COVID-19 pandemic. Expenditure during 2020-21 totalled £94,113,330 compared to £31,106,388 for the 2019-20 reporting year. Readers should note that the current cost-based methodology for calculating procurement emissions does not factor in sustainable procurement choices (which currently tend to cost more) with reductions only being achieved by spending less.



PHW's operational GHG emissions (all Scopes excluding Procurement) totalled 2,366.65 tonnes CO₂e in 2020-21 a reduction from 4,552.39 tonnes CO₂e for the same period in 2019-20. When comparing 2020-21 against 2019-20 significant reductions are seen within Business Travel

categories, the operation of the owned vehicle fleet, and fuel consumption onsite. This is reflective of restrictions and temporary site closures put in place as a result of the COVID-19 pandemic. The reduction in operational emissions accounts for the reductions seen in PHW's Scope 1 and Scope 2 GHG emissions by 45.8% and 10.8% respectively when compared against 2019-20 results.

2020-21
2,366.65
tonnes CO₂e



Total staff homeworking GHG emissions for the 2020-21 reporting year totalled 380.60 tonnes CO₂e. The use of domestic heating was the largest contributor to emissions from this category; accounting for 62% of overall homeworking emissions.

2020-21
380.60
tonnes CO₂e



Total staff commuting GHG emissions for the 2020-21 reporting year totalled 1,297.83 tonnes CO₂e which is a significant reduction from 3,208.57 tonnes CO₂e for the same period in 2019-20.

2020-21
1297.83
tonnes CO₂e

The reduction in staff commuting GHG emissions between 2019-20 and 2020-21 significantly outweighed equivalent operational emissions for the 2019-20 and 2020-21 reporting years; highlighting how a change in behaviour due to imposed workplace restrictions helped to reduce the organisation's emission footprint.

The most popular mode of travel for staff was their own vehicle reflecting the diverse geographical spread of PHW staff to their offices/sites.

Key Recommendations

GHG Emissions Reduction Priorities

- ✓ **Where possible PHW must look to reduce unnecessary travel and optimise use of teleconferencing facilities. If travel is required then PHW should (where practical) encourage staff to utilise car sharing, public transport and active travel to reduce emissions.**
- ✓ **Through the 'Work How it Works Best' initiative, PHW should encourage staff to use public transport and/ or active travel options when commuting.** The fact that the most popular mode of travel for staff was their own vehicles reflects the diverse geographical spread of PHW staff to their offices.
- ✓ **PHW should look to improve the understanding of how energy is used within buildings and sites to improve energy management and increase energy efficiency across the portfolio.**
- ✓ **PHW should revise existing building management system and lighting schedules to reduce the amount of unnecessary energy consumption associated with offices/clinics/ laboratories on reduced occupancy.**
- ✓ **PHW should look to increase the proportion of their energy sourced from green/renewable tariffs.**
- ✓ **PHW should continue to engage with their supply chain and wider NHS partners to determine if information regarding supplier emissions footprints and/or product emissions footprints can be used in preference to cost data for supply chain categories.**



Staff Commuting & Homeworking Recommendations

- ✓ **Home/agile working has been found to have a lower emissions footprint when compared against a combination of commuting and office GHG emissions.** PHW should take this into account when reviewing ways of working going forward, being mindful that home/agile working may not be suitable for all staff.
- ✓ **PHW should look to provide guidance to staff on improving energy efficiency in their home, as well as providing further information on green/renewable energy tariffs.**
- ✓ **PHW should promote the organisation's Healthy Travel Charter to staff. When questioned in the survey 68% of respondents were not aware of these commitments.**



Improving PHW's GHG Emissions Assessment

- ✓ **To better understand commuting GHG emissions (and behaviours) across the whole organisation PHW should conduct further research and data collection.**
- ✓ **PHW should include emissions from the use of other public transport modes (rail travel, ferry travel) as well as air travel.**
- ✓ **It is recommended that PHW works closely with waste contractors and building landlords (where offices are co-located in shared sites) to improve the amount of waste collection data recorded.** This will help reduce data gaps within supporting datasets and reduce the requirement for additional modelling.



1. Introduction

1.1. Project Overview

GEPEnv was commissioned by PHW to undertake a detailed calculation of the organisation's 2019/20 and 2020/21 GHG emissions footprint. The primary aim of the assessment is to help qualify and understand the impact of the COVID-19 pandemic and shift to more agile working on PHW's carbon footprint, focusing on both operational and staff homeworking.

1.2. Methodology

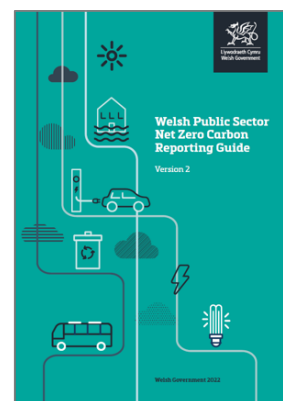
The following methodologies have been applied to calculate PHW's GHG emissions footprint for both 2019-20 and 2020-21 reporting years. Further background detail has also been provided on the assumptions and benchmarks used to support the calculation of homeworking and staff commuting GHG emissions.

1.2.1 GHG Emissions Assessment Methodology

PHW's carbon footprint is calculated following best practice guidance set out by the Greenhouse Gas Protocol (GHG Protocol) as well as following specific requirements set out by Welsh Public Sector Net Zero Reporting Guidance (version 2.0 June 2022).

GEPEnv has calculated emissions based on activity data provided by PHW using 2019 and 2020 GHG Conversion Factors for Reporting developed by the UK Department for Environment, Food and Rural Affairs (Defra) and the Department for Business, Energy & Industrial Strategy (BEIS).

This methodology is a recognised national approach and follows the principles of the GHG Protocol. The presentation of results in this report and supporting information has been prepared in accordance with Part 1 of BS ISO 14064:2019, the international standard for organisational GHG emissions assessments.



1.2.2 Homeworking GHG Emissions Assessment

GEPEnv worked closely with PHW to develop a homeworking survey which was completed by 241 members of staff.. The aim of this survey was to better understand the level of and approach to homeworking which was undertaken during 2020-21, but also to highlight further areas where PHW can look to support flexible working for staff moving forwards.

GEPEnv utilised existing reporting guidance from EcoAct's White Paper on Homeworking Emissions (published in 2020) which outlines a recognised approach to calculation of homeworking GHG emissions. GEPEnv included the following detailed assumptions within the methodology:



- ✓ Electricity use modelled based on assumed power ratings for laptops (22.5W), screens (30W), radios (5W), televisions (60W), and printers (60W).
- ✓ Heating consumption is based on cost per month (entered as a range into the survey).

Consumption calculated on the mid-range value using UK Government statistics for domestic energy costs.

- ✓ Study assumes that all green tariffs are 100% renewable energy tariff backed by REGOs and that waste bins are 100% full when collected from domestic properties.
- ✓ Survey results are extrapolated across the whole of PHW's staff to determine the final GHG emissions.

1.3. Scope of GHG Emissions Assessment

GEPEnv has assessed PHW's GHG emissions for the 2019-20 and 2020-21 reporting years resulting from energy consumption, water consumption, and waste disposal across operational sites. The scope of the assessment also includes the organisation's owned fleet, business travel and procurement as well as staff homeworking and commuting.

1.3.1 Operational boundaries

PHW has accounted for all quantified GHG emissions over which it has operational control. Indirect GHG sources that are outside of the assessment boundary have been excluded from the assessment.

The assessment covers the following **operational boundaries**:

Scope 1 Direct GHG Emissions	Scope 2 Energy Indirect GHG Emissions	Scope 3 Other Indirect GHG Emissions
Site Fuel Combustion Natural Gas Gas Oil	Consumption of Purchased Electricity, Heat & Steam	Utility & Fuel Related Activities Electricity Transmission & Distribution Well-to-Tank GHG Emissions Water (Supply & Treatment)
Owned Transport PHW Owned Vehicles	Grid Electricity (Location-based Reporting)	Purchased Goods & Services Procurement (PHW & NHS Supply Chain)
Fugitive GHG Emissions Refrigerants	Consumption of Purchased Electricity, Heat & Steam	Transport Related activities Business Travel Staff Commuting
Process Emissions n/a	Grid Electricity (Market-based Reporting)	Waste Disposal activities Residual, Recyclable, & Hazardous Wastes
Guidance Green shading indicates emissions sources within scope of assessment		Offsite Operations Staff Homeworking

Figure 2 – Operational reporting boundaries for PHW's 2019-20 and 2020-21 GHG emissions assessment.

1.4. Primary Data Quality & Accuracy

Primary data provided for the assessment of PHW's GHG emissions footprint is derived from energy, utilities, and expenses claim data collected covering the full 12-month reporting period for 2019-20 and 2020-21 (1st April - 31st March) which includes:

- Utilities consumption data (electricity, natural gas, water) sourced from analysis of utility bills covering all PHW's operational sites.
- Gas Oil (Red Diesel) consumption data sourced from analysis of invoices and delivery records for PHW sites which are not connected to the mains gas network.
- Annual distance travelled of PHW's owned vehicles, business mileage claimed by staff using their own vehicles (Grey Fleet) or using hire vehicles, and mileage of third-party couriers (taxis).
- Business travel (taxis and coach hire) of PHW staff. Air travel information was not provided for this assessment. However it is likely that these are significant sources of business travel emissions.
- Waste collection data sourced from waste transfer notes and supporting information covering PHW's operational sites.
- Procurement GHG emissions data (calculated separately by NHS Wales) based on expenditure for PHW's procured goods and services.
- Homeworking data sourced from response to a staff survey (see section 1.1.2 for further details) developed by GEP in support of this assessment.

1.4.1 Accuracy & Materiality Assessment

The result of a carbon footprint calculation varies in accuracy depending on the data set provided. The more accurate the data supplied, the more accurate the result which will subsequently allow for better targeting of areas where improvements can be made. Overall, the quality and completeness of data provided for the assessment was very high with minor gaps appearing in a select few datasets.

Further information and an overview of the expected accuracy provided per element for this assessment is shown in the following tables. For ease of reference Procurement has been presented separately with materiality assessments being completed for PHW's emissions footprint including and excluding Procurement.

Dataset	Overview & Supporting Comments	Expected Accuracy	Materiality Assessment	
			Including Procurement	Excluding Procurement
Procurement	Procurement emissions have been calculated externally by NHS Wales. Calculations are informed by detailed expenditure data split by supply chain category for both reporting years. This is currently the best available methodology for determining emissions; utilising UK Government conversions previously updated in 2011, as well as specific NHS conversions for some supply chain categories.	Low	Very High (70% - 95%)	n/a

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Dataset	Overview & Supporting Comments	Expected Accuracy	Materiality Assessment	
			Including Procurement	Excluding Procurement
Staff Commuting	Data sourced from Commuting survey completed by a sample of PHW staff. These results were then extrapolated to the whole organisation (see section 1.2 for further details).	Medium	Medium (5% - 20%)	High (20%-60%)
Staff Homeworking	Data sourced from Homeworking survey completed by a sample of PHW staff. These results were then extrapolated to the whole organisation (see section 1.2 for further details).	Medium	Low (<5%)	Medium (5% - 20%)
Grid Electricity	Emissions calculated based on complete 12-months dataset provided for each site operated by PHW.	High	Low (<5%)	Medium (5% - 20%)
Well-to-Tank GHG Emissions	Utilises the same activity data for all utilities, fuels, commuting, and business travel emissions sources.	-	Low (<5%)	Medium (5% - 20%)
Business Travel	Emissions calculated based on annual distances claimed by staff (Grey Fleet), travel in hire vehicles, the use of taxis and coaches. Vehicle information split by fuel type, and engine size.	High	Low (<5%)	Medium (5% - 20%)
Site Fuels	Emissions calculated based on complete 12-months dataset from invoices provided by PHW.	High	Low (<5%)	Medium (5% - 20%)
Owned Vehicles	Emissions calculated based on annual distance information for each vehicle split between type and size of vehicle.	High	Low (<5%)	Low (<5%)
Natural Gas	Emissions calculated based on complete 12-months dataset provided for each site operated by PHW.	High	Low (<5%)	Low (<5%)
Waste	Emissions calculated based on tonnages of different waste streams for each site. Not fully complete dataset as some information was not provided/collected.	Medium	Low (<5%)	Low (<5%)
Water (Supply & Treatment)	Emissions calculated based on complete 12-months dataset provided for each site operated by PHW.	High	Low (<5%)	Low (<5%)
Fugitive Emissions (Refrigerants)	Activity information sourced from maintenance records/logs covering both reporting years detailing type and quantity of refrigerant replenished.	High	Low (<5%)	Low (<5%)

Tables 1 & 2 - Accuracy & materiality assessment of datasets used to support calculation of PHW's GHG emissions.

2. PHW's 2019-20 & 2020-21 GHG Emissions Assessments

The following section outlines in detail PHW's GHG Emissions Assessment results for the 2019-20 and 2020-21 reporting years. For ease of reference this section details PHW's location-based GHG emissions; market-based results are presented in Appendix 2.



2.1. GHG Emissions Assessment Results

2.1.1 GHG Emissions including Procurement

Public Health Wales's baseline GHG emissions footprint (2019-20) totals 16,011.10 tonnes CO₂e.

For the baseline year, the majority of emissions are associated with the procurement of goods and services; accounting for 72% of total emissions. Other significant sources of emissions include staff commuting (20%), Grey Fleet business travel (3%), and site fuel consumption (1%).

The organisation's 2020-21 GHG emissions footprint totals 41,811.74 tonnes CO₂e; an increase of 161% on the baseline year. This is primarily a result of a significant increase in emissions from the procurement of goods and services which again accounts for the majority (95%) of total emissions. When comparing non-procurement totals, most emissions sources show a reduction compared to the 2019-20 baseline; the most significant reduction being seen within PHW's Grey Fleet (77.5% reduction) and hire car (92.6%) business travel activities. The following results table and accompanying graphs provide a summary of results of PHW's emissions footprint split by scope and source activity.

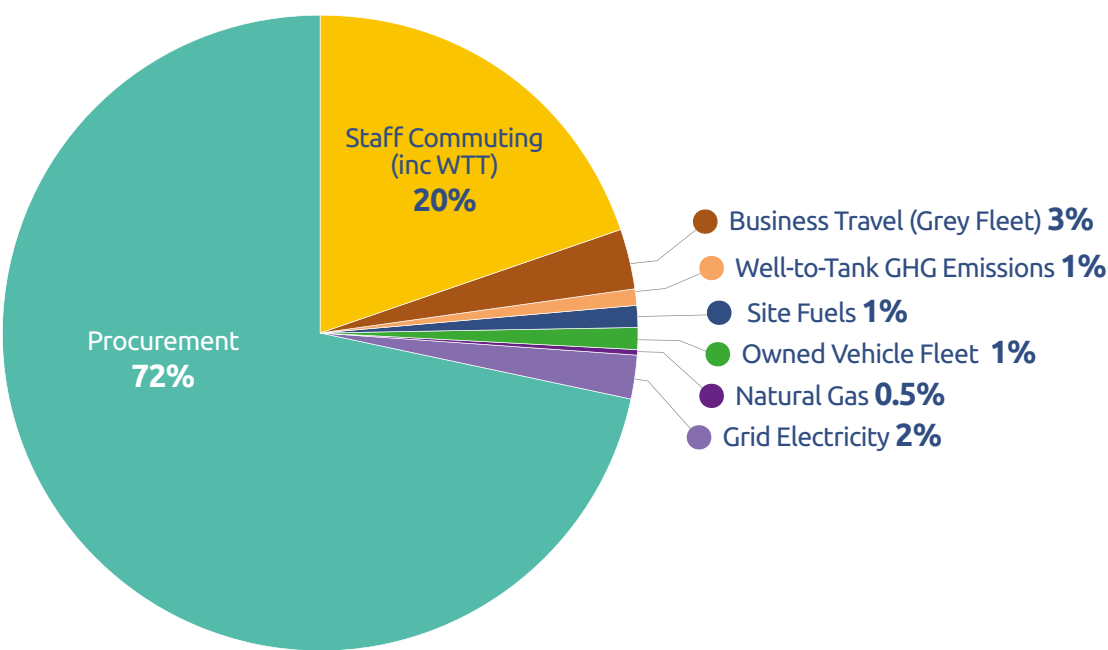
GHG Reporting Scope	GHG Emissions Source	GHG Emissions (tonnes CO ₂ e)		Year-on-Year Comparison (%)
		2019-20 (Baseline)	2020-21 (Year 1)	
Scope 1 (Direct GHG Emissions)	Site Fuels	144.19	54.56	-62.2%
	Owned Vehicle Fleet	92.19	30.13	-67.3%
	Natural Gas	83.72	92.89	+11.0%
	Fugitive Emissions (Refrigerants)	7.31	0.00	-100.0%
	Total Scope 1 GHG Emissions (tCO₂e)	327.41	177.58	-45.8%
Scope 2 (Energy Indirect GHG Emissions)	Grid Electricity (Location Based)	298.13	268.18	-10.0%
	Total Scope 2 GHG Emissions (tCO₂e)	298.13	268.18	-10.0%
Scope 3 (Other Indirect GHG Emissions)	Procurement	11,458.71	39,445.08	+244.2%
	Staff Commuting ¹	3,208.57	1,297.83	-59.6%
	Business Travel – Grey Fleet	422.26	95.21	-77.5%
	Well-to-Tank GHG Emissions	233.38	97.11	-56.5%
	Grid Electricity Transmission & Distribution	25.31	23.06	-8.9%
	Waste	23.17	20.44	-11.8%
	Staff Homeworking ²	0.00	380.60	+100.0%
	Business Travel – Hire Cars	12.70	0.94	-92.6%
	Water Supply & Treatment	6.58	4.36	-33.8%
	Business Travel - Other ³	4.89	1.34	-72.5%
	Total Scope 3 GHG Emissions (tCO₂e)	15,385.56	41,365.98	+168.9%
Total GHG Emissions (tonnes CO₂e)		16,011.10	41,811.74	+161.1%
GHG Emissions per Employee (tonnes CO₂e)		7.65	19.99	+161.1%

1 Results include associated well-to-tank GHG emissions (indirect emissions) from fuels used in different modes of travel.

2 Homeworking emissions are only included within PHW's 2020-21 GHG emissions footprint. A similar assessment has not been completed for 2019-20. Homeworking emissions results include associated well-to-tank emissions from energy consumption.

3 Business Travel – Other contains emissions from the following sources: Taxi travel, Coach travel, and Couriers.

Public Health Wales 2019-20 Location Based GHG Emissions
(% split by source)



Public Health Wales 2020-21 Location Based GHG Emissions
(% split by source)

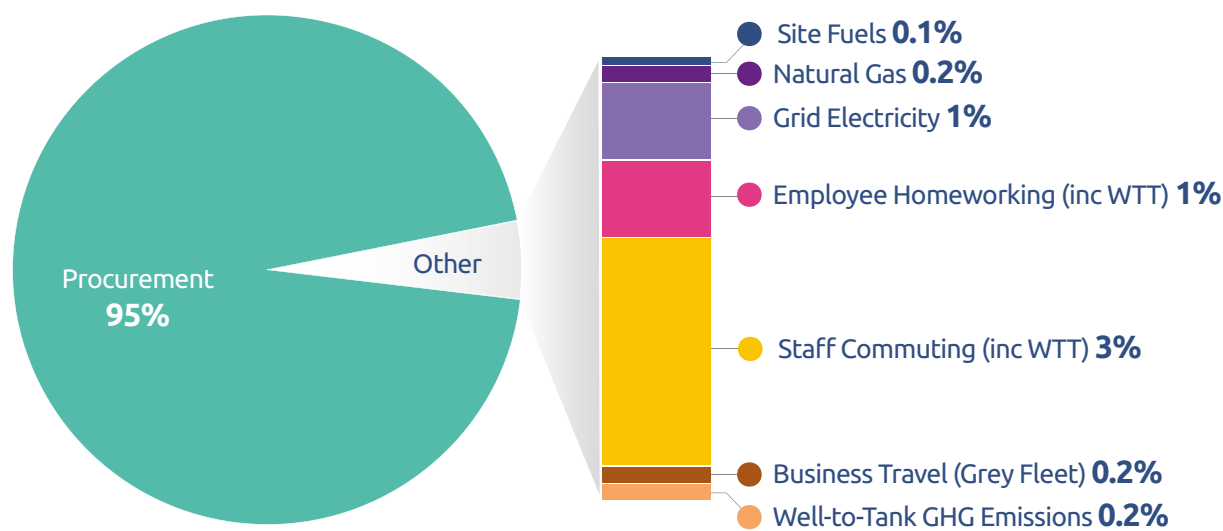


Figure 3 (top) & Figure 4 (bottom):
Split of PHW's Location-based GHG Emissions for the 2019-20 (top) and 2020-21 (bottom) reporting years.

2.1.2 GHG Emissions excluding Procurement

The results table below and accompanying graphs (see following page) below detail the split of PHW's GHG emissions footprint for both reporting years excluding Procurement. Emissions per employee have also been provided. This split has been provided to better define the contribution of other emissions sources to the organisation's emissions footprint and better define those sources over which PHW has the most direct control.

GHG Reporting Scope	GHG Emissions Source	GHG Emissions (tonnes CO ₂ e)		Year-on-Year Comparison (%)
		2019-20 (Baseline)	2020-21 (Year 1)	
Scope 1 (Direct GHG Emissions)	Site Fuels	144.19	54.56	-62.2%
	Owned Vehicle Fleet	92.19	30.13	-67.3%
	Natural Gas	83.72	92.89	+11.0%
	Fugitive Emissions (Refrigerants) ⁴	7.31	0.00	-100.0%
	Total Scope 1 GHG Emissions (tCO₂e)	327.41	177.58	-45.8%
Scope 2 (Energy Indirect GHG Emissions)	Grid Electricity (Location Based)	298.13	268.18	-10.0%
	Total Scope 2 GHG Emissions (tCO₂e)	298.13	268.18	-10.0%
Scope 3 (Other Indirect GHG Emissions)	Staff Commuting	3,208.57	1,297.83	-59.6%
	Business Travel – Grey Fleet	422.26	95.21	-77.5%
	Well-to-Tank GHG Emissions	233.38	97.11	-56.5%
	Grid Electricity Transmission & Distribution	25.31	23.06	-8.9%
	Waste	23.17	20.44	-11.8%
	Staff Homeworking	0.00	380.60	+100.0%
	Business Travel – Hire Cars	12.70	0.94	-92.6%
	Water Supply & Treatment	6.58	4.36	-33.8%
	Business Travel - Other ⁵	4.89	1.34	-72.5%
	Total Scope 3 GHG Emissions (tCO₂e)	3,926.86	1,920.89	-51.1%
Total GHG Emissions (tonnes CO₂e)		4,552.39	2,366.65	-48.0%
GHG Emissions per Employee (tonnes CO₂e)		2.18	1.13	-48.0%

Staff commuting is still a significant source of GHG emissions for PHW, accounting for 70% and 55% of total emissions (excluding Procurement) for 2019-20 and 2020-21 respectively. PHW staff operate across many different NHS sites across Wales with most using personal vehicles for travel, accounting for the high levels of associated GHG emissions (see Section 4 for further detailed analysis). Unlike other public sector bodies, PHW does not have a large portfolio of offices and sites, tending to operate out of existing NHS hospitals and clinics. This means that emissions from utilities consumption (electricity, gas and other site fuels) make up a smaller proportion of PHW's operational emissions footprint.

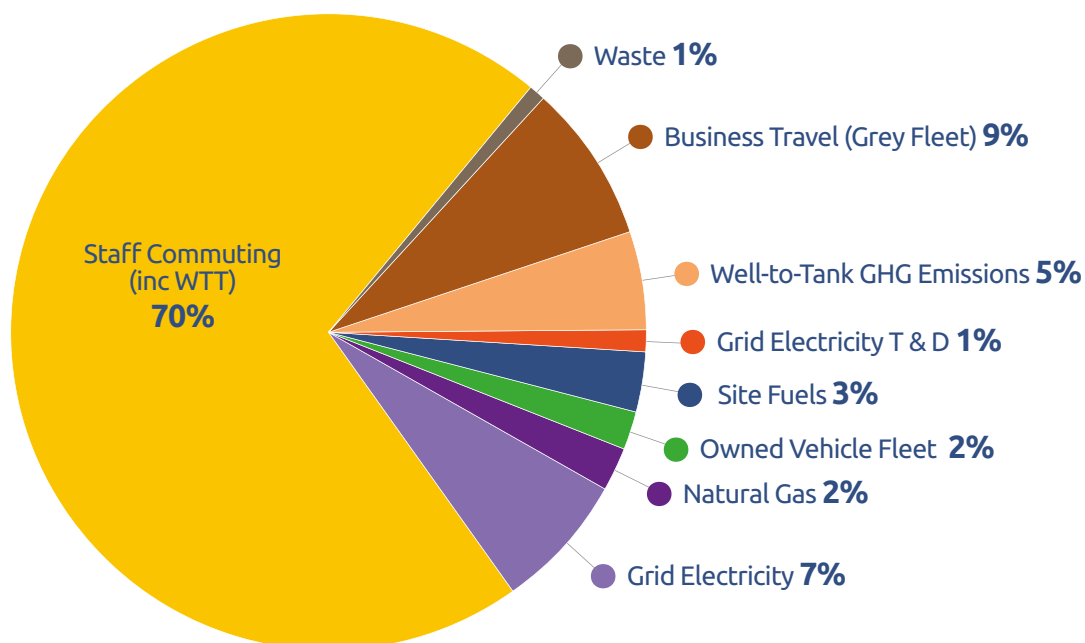
GHG emissions per employee decreased by 48% in 2020-21 when compared to the 2019-20 reporting year; a result of a reduction in commuting as well as site based operational GHG emissions. This reduction has been achieved even with the inclusion of homeworking GHG emissions in the 2020-21 reporting year. When procurement emissions are included (see section 2.1.1) emissions per employee increase to 7.65 tCO₂e and 19.99 tCO₂e for the 2019-20 and 2020-21 reporting years respectively. The following graphs provide a summary of results of PHW's emissions footprint split by scope and source activity.

4 Fugitive emissions (refrigerants) are calculated based on top-up/replenishments applied during the reporting year. PHW did not provide details of refrigerant top-up/replenishment for the 2020-21 reporting year.

5 Business Travel – Other contains emissions from the following sources: Taxi travel, Coach travel, and Couriers.

Public Health Wales 2019-20 Location Based GHG Emissions

(% split by source - excluding Procurement)



Public Health Wales 2020-21 Location Based GHG Emissions

(% split by source - excluding Procurement)

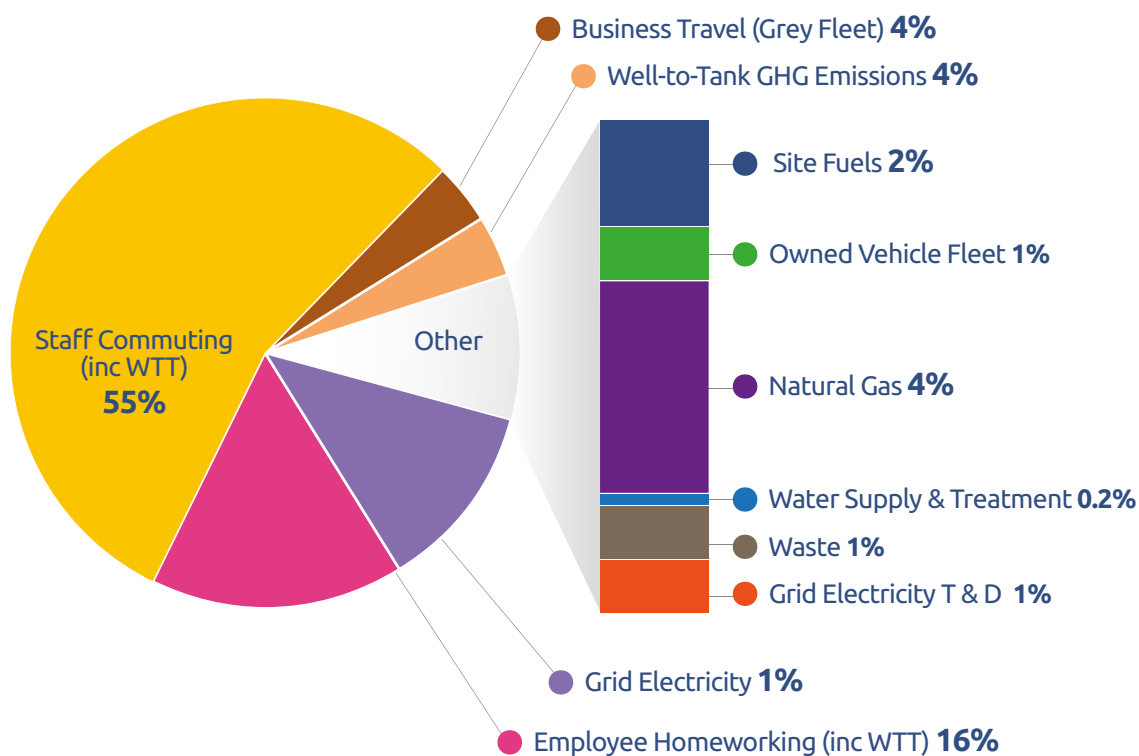


Figure 5 (top) and Figure 6 (bottom): Split of PHW's Location-based GHG Emissions for the 2019-20 (top) and 2020-21 (bottom) reporting years; excluding Procurement.

3. Impact of the COVID-19 Pandemic on PHW's GHG Emissions

As a provider of essential support services and specialist technical services for NHS Wales, the COVID-19 pandemic impacted upon the organisation's service provision and its business-as-usual operations. To demonstrate the impact this had upon associated GHG emissions, the results table and accompanying chart below detail the year-on-year comparison for specific emissions groupings (details of the emissions sources included within each grouping are provided in the Key Terms & Definitions section (page 4)). Detailed analysis and commentary for each emissions grouping (where data has been captured for both reporting years) is also provided within defined sub-sections.

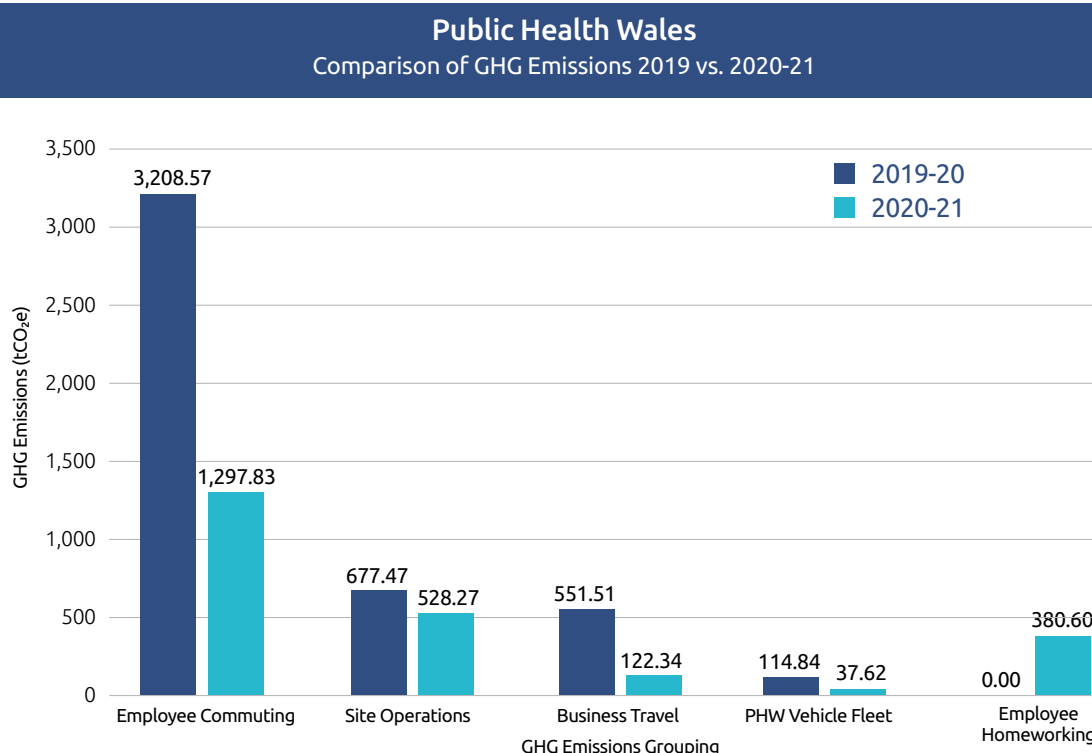


Figure 7 - Comparison of GHG emissions between 2019-20 & 2020-21. Procurement has been excluded from the chart for ease of reference.

GHG Emissions Grouping	GHG Emissions (tonnes CO ₂ e)		Year-on-Year Comparison (%)
	2019-20 (Baseline)	2020-21 (Year 1)	
Procurement ⁶	11,458.71	39,445.08	+244.2%
Staff Commuting	3,208.57	1,297.83	-59.6%
Site Operations	677.47	528.27	-22.0%
Business Travel	551.51	122.34	-77.8%
PHW Vehicle Fleet	114.84	37.62	-67.2%
Staff Homeworking	0.00	380.60	+100%
Total GHG Emissions (tonnes CO₂e)	16,011.10	41,811.74	+161.1%
GHG Emissions per Employee (tonnes CO₂e)	7.65	19.99	+161.1%

⁶ Procurement has been excluded from Figure 7 due to the difference in the magnitude of emissions compared to other categories.

3.1.1. Procurement

Expenditure on the procurement of goods and services during 2020-21 totalled £94,113,330 compared to £31,106,388 for the 2019-20 reporting year. The main identified cause of this increase was due to the additional equipment, PPE and consumables which had to be procured by PHW through NHS Wales to support their response to the pandemic.

Please note, the current GHG emissions accounting methodology does not allow for the impact of existing sustainable and green procurement practices to be identified within reporting. PHW should treat these results as advisory, to help identify opportunities to engage with suppliers to better quantify emissions from procured goods and services moving forwards.

3.1.2. Business Travel GHG Emissions

The majority of PHW's business travel GHG emissions (77%) for both reporting years is associated with staff using their own vehicles (Grey Fleet) for business travel.

To obtain a more detailed overview of business travel behaviours, PHW should include emissions from the use of other public transport modes (rail travel, ferry travel) as well as air travel. It is understood that this information is recorded within PHW's expenses system however this is recorded as a financial cost rather than detailed journey details. PHW should therefore review current systems to identify where further information on business travel can be recorded.

When emissions for 2020-21 are compared, there has been a significant (77.8%) reduction in GHG emissions between the reporting years. Business travel completed by staff using their own vehicles and hire vehicles reduced significantly during 2020-21. Total distance travelled for the 2020-21 reporting year was 607,288 km compared to 2,584,123 km in 2019-20.

GHG Emissions Source	GHG Emissions (tonnes CO ₂ e)		Year-on-Year Comparison (%)
	2019-20 (Baseline)	2020-21 (Year 1)	
Grey Fleet	529.52	119.48	-77.4%
Hire Cars	15.95	0.99	-93.7%
Other Sources (Bus/Coach, Taxis, Couriers)	6.04	1.87	-69.0%
Total GHG Emissions (tonnes CO₂e)	551.51	122.34	-77.8%

Public Health Wales Comparison of GHG Emissions 2019 vs. 2020-21

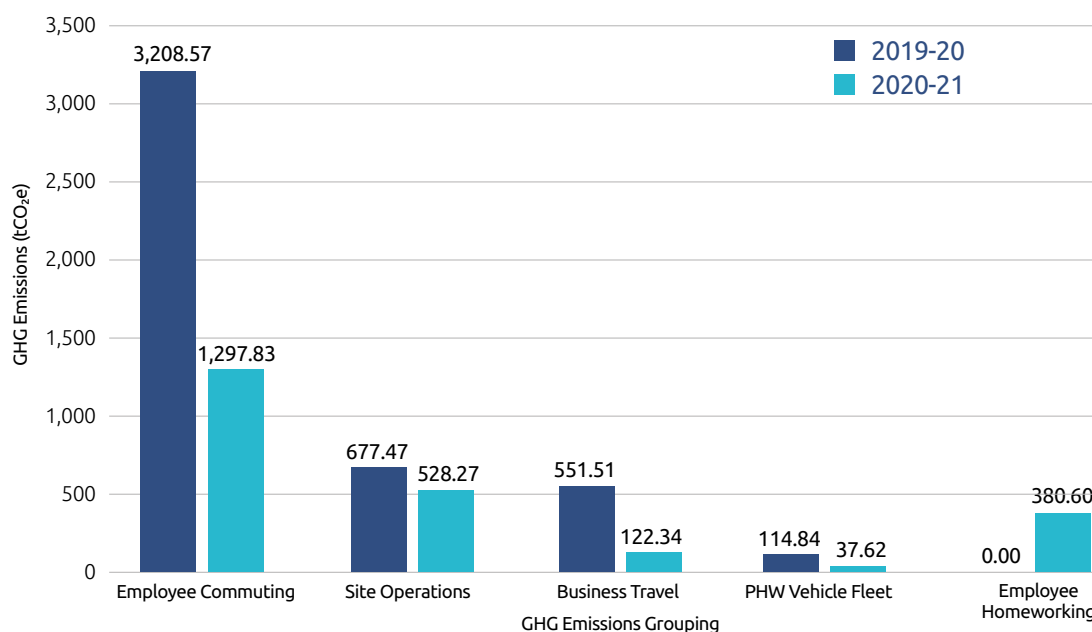


Figure 8 - Comparison of business travel GHG emissions (2019-20 vs. 2020-21).

3.1.3. Operational GHG Emissions

GHG emissions from energy and fuels consumption across PHW's offices, laboratories, and clinics account for the majority of the organisation's operational GHG emissions footprint. Significant sources of emissions include grid electricity consumption (46.5% of operational emissions in 2019-20), and gas oil consumption (22.4% of operational emissions in 2019-20).

GHG Emissions Source	GHG Emissions (tonnes CO ₂ e)		Year-on-Year Comparison (%)
	2019-20 (Baseline)	2020-21 (Year 1)	
Grid Electricity	368.55	331.43	-10.1%
Site Fuels (Gas Oil)	177.25	67.07	-62.2%
PHW Vehicle Fleet	114.84	37.62	-67.2%
Natural Gas	94.61	104.97	+10.9%
Waste	23.17	20.44	-11.8%
Fugitive GHG Emissions (Refrigerants)	7.31	0.00	n/a
Water Supply & Treatment	6.58	4.36	-33.7%
Total GHG Emissions (tonnes CO₂e)	792.31	565.89	-28.6%

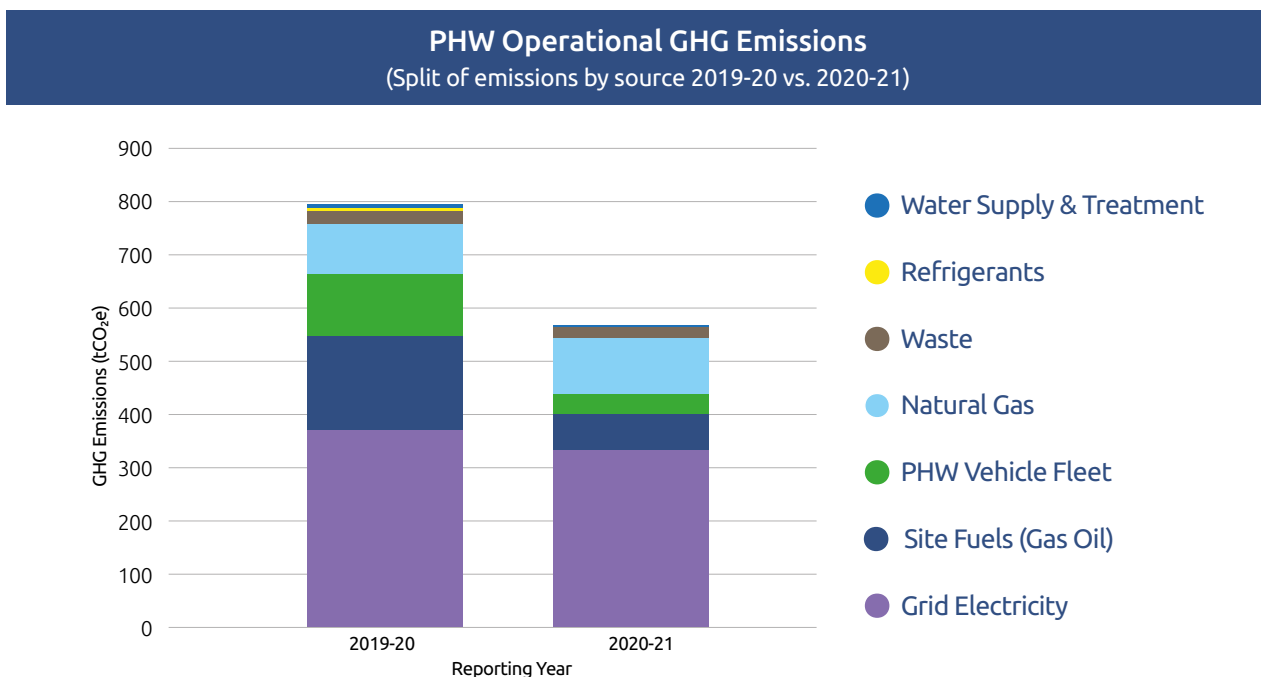


Figure 9 – Comparison of operational GHG emissions (2019-20 vs. 2020-21).

Overall a 28.6% reduction in operational GHG emissions was identified between the 2019-20 and 2020-21 reporting years; with the most significant reductions in emissions being seen within PHW's gas oil consumption (-62.2%), and the operation of PHW's vehicle fleet (-67.2%).

The consumption of gas oil at PHW's sites reduced from 52,275 litres in 2019-20 to only 19,783 litres in 2020-21. This reflects the changes to healthcare delivery and co-located spaces during the reporting year; particularly those sites in more rural locations which are not connected to the mains gas network.

PHW's vehicle fleet accounted for 14.5% of operational emissions in 2019-20. The operation of the vehicle fleet was significantly curtailed during the pandemic with fleet-wide distances dropping from 561,324 km in 2019-20 to only 211,760 km in 2020-21.

Grid electricity consumption only marginally decreased by 1.4% (16,099 kWh) in 2020-21, despite many of PHW's sites being closed due to pandemic restrictions. This is perhaps a result of changes to operational practice during the pandemic.

It is also likely that the building management system and timers within offices would have been left on their original occupancy schedules, meaning that offices were still being lighted and heated as if fully occupied.

Gas consumption increased by 9.9% (49,824 kWh) in 2020-21 compared to the previous reporting year. This is likely to be a result of increased heating requirements in those PHW buildings which remained operational or were used as temporary testing/vaccination clinics.

4. Staff Homeworking & Commuting Emissions

This section provides further detail on the staff homeworking and commuting assessments completed as part of this research. The methodology used to calculate homeworking emissions was based upon a recently published EcoAct White Paper on Homeworking (<https://info.eco-act.com/en/homeworking-emissions-whitepaper-2020>) supplemented with modelling assumptions developed by GEPEnv. GEPEnv worked with PHW to develop a staff survey which was used to capture the following information to calculate emissions from homeworking and staff commuting:

- ✓ Number of days and hours spent working at home per week
- ✓ Heating fuels and typical hours of operation
- ✓ Equipment (e.g., laptop, screen, printer) used
- ✓ Waste collections and disposal
- ✓ Energy tariff selection
- ✓ Commuting distance, frequency (days per week) and transport mode



4.1. Homeworking GHG Emissions Assessment

4.1.1. 2020-21 Homeworking GHG Emissions

Outlined below is a detailed split of homeworking results (location and market-based reporting). Emissions have been calculated based on the answers provided by a sample size of 166 respondents (7.9% of total staff numbers) which was then extrapolated for all staff members in PHW (2,092) for the 2020-21 reporting year.

Market based emissions have been presented alongside location-based emissions to demonstrate the carbon reduction associated with staff members using green/renewable energy tariffs for their electricity supply. For further details on calculation results and how homeworking emissions have been determined please review the calculation reporting spreadsheets which accompany this report ('*PHW Carbon Emissions Calculations FINAL*' and '*PHW Survey Calculations FINAL*').

GHG Reporting Scope	GHG Emissions Source	Location-Based GHG Emissions	Market-Based GHG Emissions
Scope 3 (Other Indirect GHG Emissions)	Homeworking – Heating (Gas, Fuels, Electricity)	234.85	234.85
	Homeworking – Power (Electricity)	55.69	35.55
	Homeworking – Waste (Residual & Recycling)	90.06	90.06
	Total Homeworking GHG Emissions (tonnes CO₂e)	380.60	360.46
	GHG Emissions per Employee (tonnes CO₂e)	0.18	0.17

2020-21 Homeworking GHG Emissions (% split per source)

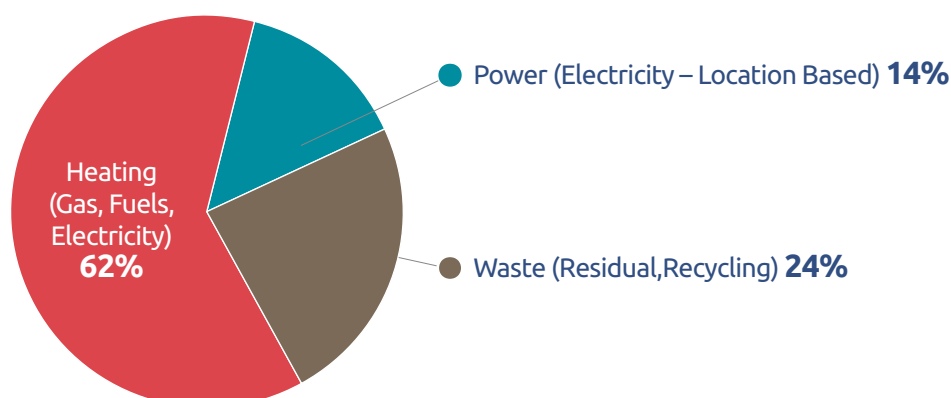


Figure 10: Split of Homeworking GHG emissions sources.

4.2. Staff Commuting GHG Emissions Assessment

Staff commuting GHG emissions are presented in detail in the table below for each reporting year. GHG emissions for both reporting years have been calculated based on the answers provided by a sample size of 95 respondents (4.5% of total staff numbers) which was then extrapolated for a commuting pool of 1,092 staff in PHW.

This is the only commuting data that PHW has access to, meaning that the only option was to extrapolate findings of the survey across all staff members.

Further research and data collection will need to be completed, to develop a greater sample of home to work commuting patterns for staff in 2019/20 and 2020/21 to generate more accurate commuting emissions data.

4.2.1. 2020-21 Commuting GHG Emissions

The following results table outlines PHW's 2020-21 commuting GHG emissions model developed for this study. GHG emissions for each response received were calculated based on total commuting distance (in km), the frequency of commuting (number of days), as well as the different modes of transport used for the commute. The model has been developed using the following assumptions:

- The proportion of staff (FTE) who commuted during the reported years is calculated as 52%, with the remaining 48% of staff only working from home and not commuting to PHW sites. This assumes therefore that 1,092 staff (out of a total staff of 2,092) commuted during the 2020/21.
- Detailed GHG emissions totals have been calculated for 95 respondents and then extrapolated based on a commuting pool of 1,092 staff.
- A total of 241 responses for the Homeworking & Commuting Survey were received; with 59 no responses for the commuting survey. 87 respondents did not commute during the period and were excluded, leaving a representative sample size of 95.

- Vehicle emissions calculated where possible using size and fuel type GHG conversion factors. Average size and unknown fuel conversions were used when vehicle details were not provided.
- Where commuting distances were not provided it was assumed that commuting distance totalled 15.3km; the average distance of a commute presented within Welsh Public Sector Reporting Guidance.

Reporting Year	Number of FTE Commuters	Commuting GHG Emissions per FTE (tCO ₂ e)	Extrapolated Commuting Emissions (tCO ₂ e)
2020-21	1,092	1.19	1,297.83

For further details on calculation results and how commuting emissions have been determined please review the calculation reporting spreadsheets which accompany this report ('*PHW Carbon Emissions Calculations FINAL*' and '*221130 PHW Commuting Carbon Emissions Calculations FINAL*').

4.2.2. 2019-20 Commuting GHG Emissions

The following results table outlines PHW's 2019-20 commuting GHG emissions model developed for this study. This model has been developed based on the same commuting distances and transport modes used in the 2020-21 reporting year. However, the model does have the following key differences:

- Assumes that 100% of staff (2,092) commuted into work each day (based on employment status) and did not work from home.
- Detailed GHG emissions totals have been calculated for 95 respondents and then extrapolated based on a commuting pool of 2,092 staff.
- Where commuting distances were not provided it was assumed that commuting distance totalled 15.3km; the average distance of a commute presented within Welsh Public Sector Reporting Guidance.



Reporting Year	Number of FTE Commuters	Commuting GHG Emissions per FTE (tCO ₂ e)	Extrapolated Commuting Emissions (tCO ₂ e)
2019-20	2,092	1.53	3,208.57

Further background information and detailed methodology can be found within '*PHW Commuting Carbon Emissions Calculations FINAL*' which accompanies this report.

4.2.3. Year-on-year Commuting GHG Emissions Comparison

Overall commuting GHG emissions decreased by 59.5% between both reporting years as a result of a reduction in the total number of PHW staff who commuted into work. The total number of commuters decreased by 47.8% between both reporting years.

Reporting Year	Number of FTE Commuters	Commuting GHG Emissions per FTE (tCO ₂ e)	Extrapolated Commuting Emissions (tCO ₂ e)
2020-21	1,092	1.19	1,297.83
2019-20	2,092	1.53	3,208.57
Year-on-Year Comparison (%)	-47.8%	-22.2%	-59.5%

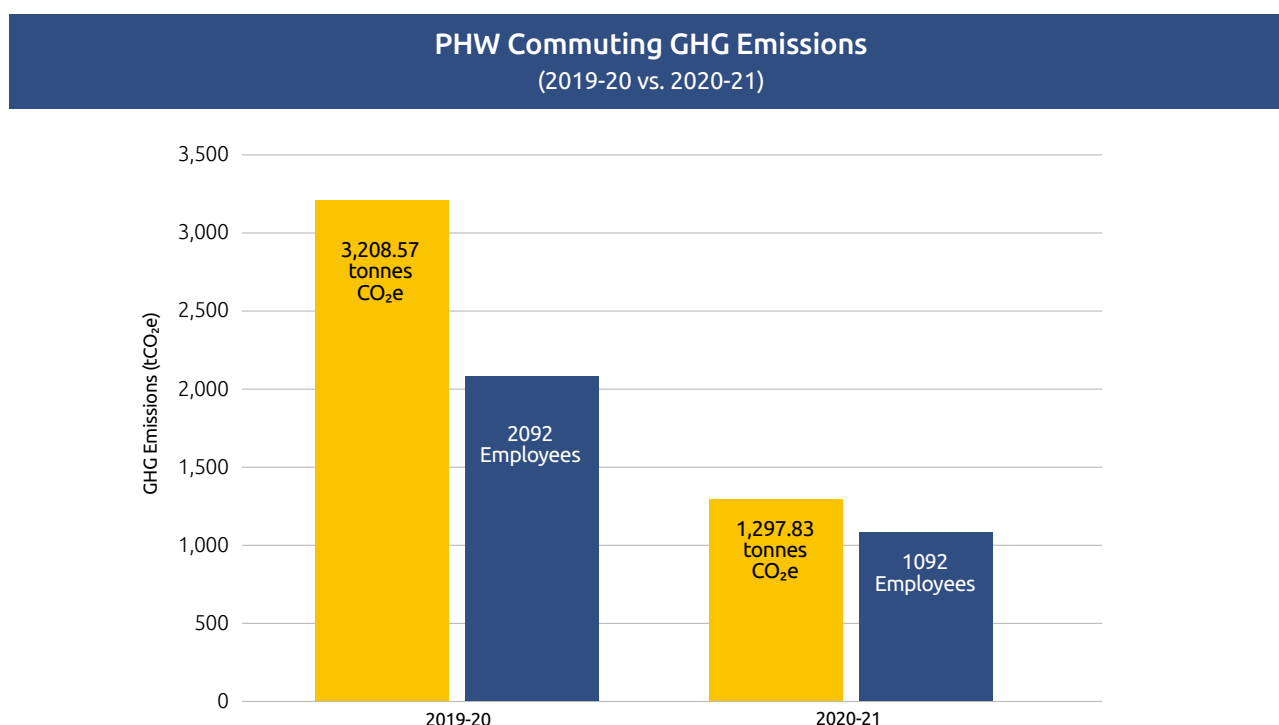


Figure 11: Comparison of GHG emissions and staff numbers associated with commuting for both reporting years.

4.2.4. Split of Commuting Transport Modes

Outlined below is an overview of the most common transport mode used by staff on their commute, based on the results from 95 respondents to the commuting survey. The table below represents the split of transport modes for the 2020-21 reporting year which has been subsequently used as a proxy model for the 2019-20 reporting year. As many use multiple transport modes for their commute, this analysis focuses only on the mode which accounts for the greatest proportion of an individual journey.

Transport Mode	Percentage Share of Commute	Average Commute Distance per Annum (km)
Personal Car (Single Passenger)	99.77%	6,831 km
Active Travel (Cycling, Walking)	0.08%	1,341 km
Personal Car (Car Share)	0.06%	2,798 km
Local Bus/Coach	0.06%	3,506 km
National Rail	0.02%	21 km
Personal Motorbike	0.01%	8 km

When reviewing the associated split of GHG emissions, the use of Private Cars (single passenger and car share) accounts for 98.2% of total modelled GHG emissions for the 2020-21 reporting year; the overwhelming majority of emissions from single passenger journeys. By contrast public transport use (bus, coach, national rail) use accounted for only 1.9% of commuting GHG emissions.

Transport Mode	Modelled GHG Emissions (tonnes CO ₂ e)	Percentage split of GHG Emissions (%)
Personal Car (Single Passenger)	3,050.18	95.1%
Personal Car (Car Share)	4.46	3.1%
Local Bus/Coach	2.73	1.9%
National Rail	0.09	<1%
Personal Motorbike	0.02	<1%

Public Health Wales Commuting GHG Emissions (% split per transport mode)

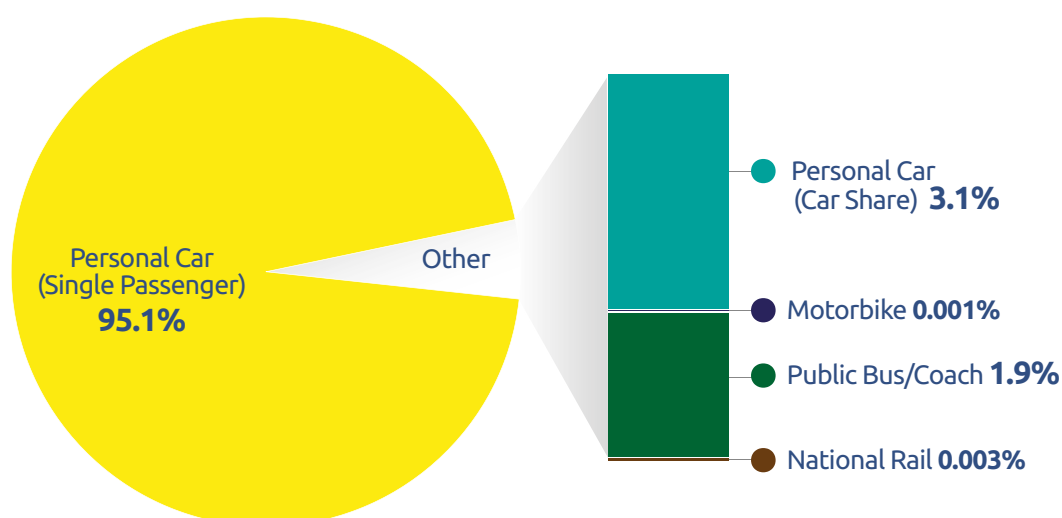


Figure 12 - Split of commuting GHG emissions by transport mode for the 2020-21 reporting year based on 95 respondents to commuting survey (extrapolated to the 2019-20 reporting period)

4.3. Reduction in Commuting Emissions vs Operational Emissions

The reduction in staff commuting GHG emissions between 2019-20 and 2020-21 significantly outweighed equivalent operational emissions for the 2019-20 and 2020-21 reporting years; highlighting how a change in staff behaviours surrounding commuting, as well as imposed workplace restrictions helped to reduce the organisation's emissions footprint.

As shown in the table and chart below between 2019-20 and 2020-21, commuting emissions decreased by 1,911 tonnes CO₂e (59.5%). Operational emissions (including homeworking) for 2019-20 and 2020-21 totalled 1,344 tonnes CO₂e and 1,069 tonnes, respectively. Year-on-year this equates to a 20.4% reduction in operational GHG emissions.

Operational emissions include GHG emissions arising from site utilities consumption (electricity, natural gas, gas oil, water), operation of PHW's vehicle fleet, waste disposal, staff homeworking emissions, and business travel. Analysis excludes GHG emissions from procurement activities.

Reporting Year	Commuting GHG Emissions (tCO ₂ e)	Operational GHG Emissions (tCO ₂ e)	Combined GHG Emissions (tCO ₂ e)
2019-20	3,208.57	1,343.82	4,552.39
2020-21	1,297.83	1,068.83	2,366.65
Total Reduction (tCO₂e) (2019-20 vs 2020-21)	1,910.74	274.99	-

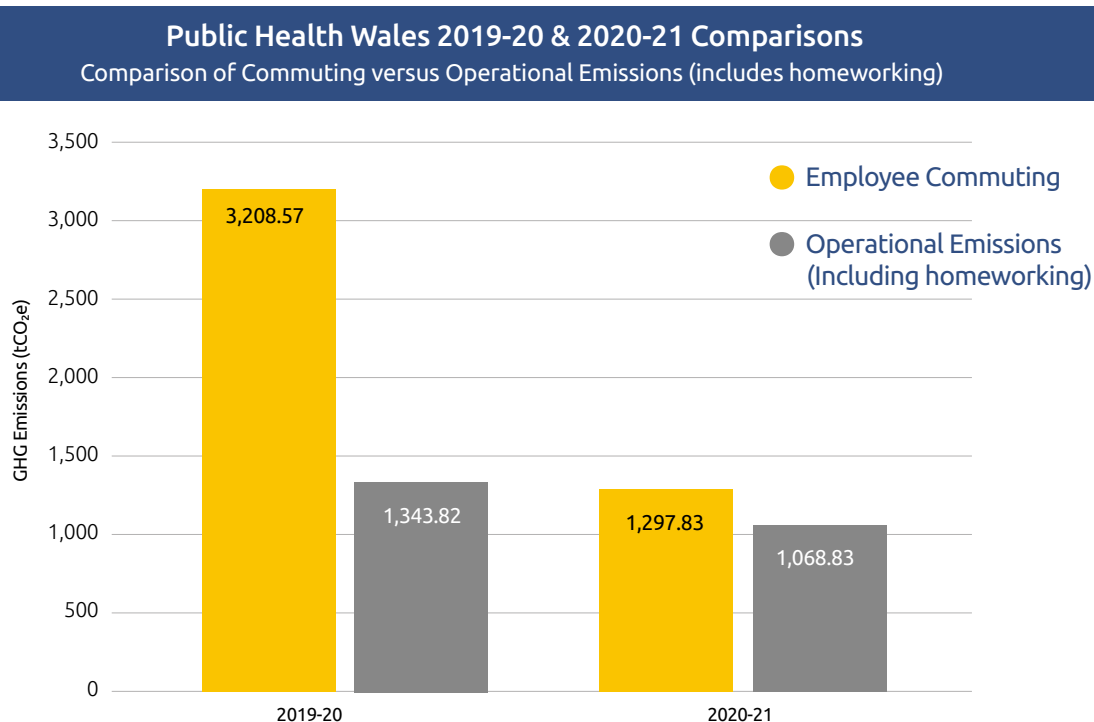


Figure 13: Comparison of staff commuting emissions and operational emissions for both reporting years.

5. Insights and Recommendations

The following section summarises all key findings and recommendations from the study which have been summarised in their own individual sub-sections. All GHG emissions totals and accompanying percentages reflect the proportion of each category to overall GHG emissions excluding procurement.

5.1. Staff Commuting – Insights & Recommendations

GHG emissions from staff commuting accounted 70.4% (3,208.57 tCO₂e) and 54.8% (122.34 tCO₂e) of PHW's GHG emissions footprint for 2019-20 and 2020-21 respectively. Key insights and recommendations from the results of the staff commuting survey are presented below:

Key Insights

- ✓ The reduction in staff commuting emissions between the two years significantly outweighed the reduction in operational emissions for the two years.
- ✓ Personal cars are by far the most preferred method for staff to commute to/from work which perhaps reflects the diverse geographical spread of PHW staff between home and to their respective offices/site locations.
- ✓ The use of personal cars (particularly for the 2020-21 reporting year) is also likely to reflect a temporary enforced and/or conscious shift away from public transport use as a result of the Covid-19 Pandemic. As PHW moves back to pre-pandemic operational levels car sharing and public transport options may once again become more favourable.
- ✓ On average respondents commuted into work 3 days per week during the 2020-21 assessment period, with an average commute of 42.3km. The longest commuting distance recorded was 106km (65 miles) with the shortest commuting distance being 0.3km (less than 1 mile).
- ✓ 68% of respondents were not aware of PHW's Healthy Travel Charter Commitments and 31% of respondents would be interested in hearing about the environmental impact of their commuting choices.
- ✓ Staff commuting GHG emissions for both reporting years have been calculated based on the answers provided by a sample size of 95 respondents which was then extrapolated for all staff members in PHW. This means that commuting behaviours and insights gained in this study can only be used as a starting point to identify opportunities to support staff to make informed commuting choices and begin to address barriers to active travel and public transport use.
- ✓ Common barriers identified to using public transport and active travel to commute include (not an exhaustive list):
 - Safety and health security during and following the Pandemic
 - Price and the lack of availability of public transport options (particularly in rural locations)
 - Distance too great to use active travel/transport
 - Existing public transport timetables not being aligned with working hours
 - Convenience of using own vehicle and limitations with childcare options

Key Recommendations

- ✓ **PHW must consider opportunities to encourage and support staff (where feasible) to adopt flexible working practices, to reduce GHG emissions from staff commuting.** Home/agile working has been found to have a lower emissions footprint when compared against a combination of commuting and office GHG emissions. PHW should take this into account when reviewing ways of working going forward, as part of the Work How it Works Best initiative, being mindful that home/agile working may not be suitable for all staff or meet certain organisational requirements.
- ✓ **PHW should promote the organisation's Healthy Travel Charter to staff.** These commitments should be promoted more widely to staff to ensure that they are aware of support that is available to encourage the transition to active travel and public travel commuting options.
- ✓ **To better understand commuting behaviours across the whole organisation PHW should conduct further research and data collection to increase the representative sample size.** This data can then be used to support further development of initiatives to reduce staff commuting GHG emissions.

5.2. Site Operations – Insights & Recommendations

Site operational GHG emissions accounted for 14.9% (677.47 tCO₂e) and 22.3% (528.27 tCO₂e) of PHW's GHG emissions footprint for 2019-20 and 2020-21 respectively. Key insights and recommendations from the assessment of PHW's operational GHG emissions include are presented below.

Key Insights

- ✓ Overall a 28.6% reduction in operational emissions was identified between the two years.
- ✓ The most significant emissions reductions were PHW's gas oil consumption (-62.2%) and the operation of PHW's vehicle fleet (+67.2%).
- ✓ Natural gas (mains network) consumption increased by 9.9% in 2020/21. This is probably due to increased heating requirements in the buildings that remained open during the pandemic.
- ✓ Grid electricity consumption only decreased by 1.4% in 2020/21. This could be due to increased consumption at sites which stayed open during the pandemic.
- ✓ PHW continues to source a significant proportion of their energy from green/renewable tariffs and should where possible look to increase this proportion.

Key Recommendations

- ✓ **PHW should revise existing building management system (BMS) and lighting schedules to reduce the amount of unnecessary energy consumption associated with offices/clinics/laboratories on reduced occupancy.**
- ✓ **PHW should look improve the understanding of how energy is used within buildings and sites to improve energy management and increase energy efficiency across the portfolio.**
- ✓ **PHW should look to increase the proportion of their energy sourced from green/renewable tariffs.**
- ✓ **It is recommended that PHW works closely with waste contractors and building landlords (where offices are co-located in shared sites) to improve the amount of waste collection data which is recorded.**

5.3. Staff Homeworking – Insights & Recommendations

GHG emissions from staff homeworking accounted for 16.1% (380.60 tCO₂e) of PHW's GHG emissions footprint for the 2020-21 reporting year. Key insights and recommendations from the results of the staff commuting survey are presented below.

Key Insights

- ✓ During the assessment period respondents worked an average of 4 days per week from home equating to an average of 1,335 home working hours across all respondents.
- ✓ The use of domestic heating accounts for the majority of energy use for staff working from home. Gas central heating is the most common fuel type.
- ✓ 39% of respondents declared they were currently on green energy tariffs for the electricity supply.
- ✓ Waste disposal is also a significant source of homeworking emissions.
- ✓ Home/ agile working has been found to have a lower emission footprint when compared against a combination of commuting and office GHG emissions.

Key Recommendations

- ✓ **PHW should look to provide guidance to staff on improving energy efficiency in their home, as well as providing further information on green/renewable energy tariffs.**
This presents an opportunity for PHW to educate and raise awareness of switching energy supplies to renewable/green tariffs and highlight the importance of improving energy efficiency within their staff base, to help reduce homeworking emissions.
- ✓ **PHW should follow up/ explore the suggestions made by staff to reduce home working emissions and their request for support and guidance.**
- ✓ **PHW should take into account home/ agile working results in lower emissions than commuting/ office emissions when reviewing ways of working going forward,** being mindful that home/ agile working may not be suitable for all staff.

5.4. Business Travel GHG Emissions – Insights & Recommendations

Business Travel GHG emissions accounted for 12.2% (556.51 tCO₂e) and 5.2% (122.34 tCO₂e) of PHW's GHG emissions footprint for 2019-20 and 2020-21 respectively. Key insights and recommendations from the assessment of PHW's business travel GHG emissions are presented below.

Key Insights

- ✓ The majority of PHW's business travel GHG emissions (77%) for both reporting years is associated with staff using their own vehicles (Grey Fleet) for business travel. When considered alongside the use of hire vehicles, it is clear that more sustainable methods (public transport) of business travel are least preferred/utilised by staff.
- ✓ Business travel GHG emissions for both reporting years do not include travel by other public transport modes and air travel. It is understood that this information is recorded within PHW's expenses system however this is recorded as a financial cost rather than detailed journey details.
- ✓ Total distance travelled for the 2020-21 reporting year was 607,288 km compared to 2,584,123 km in 2019-20. Restrictions to non-essential travel as well as the cancellation of non-essential services had a significant impact upon emissions from business travel. With a return to pre-pandemic levels of service during the subsequent reporting year (2021-22) overall business travel distance is likely to increase.

Key Recommendations

- ✓ **Where possible PHW should look to reduce unnecessary travel and optimise use of teleconferencing facilities.** With the transition to more agile working, PHW may wish to utilise local area hubs to hold meetings, to reduce the need for extensive travel.
- ✓ **If travel is required then PHW should (where practical) encourage staff to utilise car sharing, public transport, and active travel to reduce GHG emissions.**
- ✓ **PHW should include emissions from the use of other public transport modes (rail travel, ferry travel) as well as air travel within future reporting.** This will provide a more holistic overview of the use of public transport and air travel (likely to be a significant source of business travel GHG emissions) and allow PHW to develop strategies to reduce GHG emissions from business travel moving forwards.
- ✓ **PHW should look to revise their internal Travel Policies** to reduce unnecessary business travel and encourage staff to consider more sustainable options (public transport/ car share/ active travel) for necessary business travel.
- ✓ **PHW should develop an understanding of emissions related to air travel.**

5.5. Procurement GHG Emissions – Insights & Recommendations

GHG emissions from Procurement totalled 11,458.71 tCO₂e and 39,445.08 tCO₂e for the 2019-20 and 2020-21 reporting years respectively. Key insights and recommendations from PHW's procurement GHG emissions results are presented below.

Key Insights

- ✓ Procurement and supply chain emissions are by far PHW's most significant source of indirect GHG emissions. This is in common with many public sector organisations and represents a significant decarbonisation challenge.
- ✓ Expenditure on the procurement of goods and services during 2020-21 totalled £94,113,330 compared to £31,106,388 for the 2019-20 reporting year. The main identified cause of this increase was due to the additional equipment, PPE and consumables which had to be procured by PHW through NHS Wales to support their response to the pandemic.
- ✓ Procurement emissions have been calculated using the current best available methodology (cost-based assessment) to model GHG emissions from procurement. However, this methodology does not currently reflect choices made by the reporting organisation to improve the sustainability of their supply chain.

Key Recommendations

- ✓ **PHW should continue to engage with their supply chain and wider NHS partners to identify ways of capturing supplier and product emissions, instead of using cost data, to support reporting requirements and to identify opportunities to reduce procurement emissions.**

6. References & Further Guidance

Outlined in this section are links to informed guidance and reference materials used during the research project. Readers should be aware that this report is provided with the following of accompanying detailed calculation and reporting resources which can be consulted for further detail:

- ✓ **PHW Carbon Emissions Calculations FINAL** – main calculation spreadsheet which outlines in detail the data used, conversion factors applied, and overall results for both reporting years.
- ✓ **PHW Survey Calculations FINAL** – details homeworking calculations completed based upon details provided by respondents.
- ✓ **PHW Commuting Carbon Emissions Calculations FINAL** – calculation spreadsheet used to develop commuting emissions models for FY 2019-20 and FY 2020-21.
- ✓ **Public Health Wales 2020-21 Annual Report** – accessed via <https://phw.nhs.wales/about-us/annual-report/>
- ✓ **PHW's carbon footprint was assessed in 2018-19** by the Carbon Trust <https://gov.wales/nhs-wales-carbon-footprint-2018-2019>

6.1. References

The following documents/databases were used to support this project:

- **Welsh Public Sector Net Zero Reporting Guide (v2.0 – June 2022)**
<https://gov.wales/public-sector-net-zero-reporting-guide>
- **Greenhouse Gas Protocol Corporate Reporting Standard**
<https://ghgprotocol.org/corporate-standard>
- **EcoAct Homeworking Emissions Whitepaper (2020)**
<https://info.eco-act.com/en/homeworking-emissions-whitepaper-2020>
- **Defra/BEIS - UK Government Conversion Factors for Company Reporting (v1.0 July 2019)**
<https://www.gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-2019>
- **Defra/BEIS - UK Government Conversion Factors for Company Reporting (v1.0 June 2020)**
<https://www.gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-2020>

Appendix 1: About GEP Environmental

GEP Environmental (GEPEnv) is a leading provider of environmental and energy consultancy services to clients across the United Kingdom & Ireland. We support organisations to identify, implement and maintain environmental, energy and training solutions. Our highly qualified project teams consist of environmental consultants, energy engineers and trainers with expertise in carbon management, ISO management systems, sustainable resource and waste management, energy efficiency, building surveying, low carbon building design and renewables.

Further information is available from <http://www.gepenv.co.uk/>

Our Technical Capabilities

We pride ourselves on our ability to deliver practical long-term solutions that create financial benefits and add value to our clients' services, buildings, portfolios and credentials. Our project, technical and surveying capabilities include:

- Net Zero Carbon (Climate Response), Strategy, Trajectory Analysis Reporting and Action Planning.
- Environmental / Sustainability Project Design & Management.
- Sustainability Advisory for Built Environment.
- Carbon Footprinting and Reporting.
- Building Utility Efficiency / Decarbonisation Audits and Feasibility Studies.
- Technical Design for M&E, Building Surveying, QS Services across the Built Environment.
- Energy and Thermal Modelling.
- Energy Performance Certificates (EPCs) & Display Energy Certificates (DECs).
- Streamlined Energy and Carbon Reporting (SECR).
- Measurement and Verification (M&V).
- ISO 14001 Environmental Management Systems and ISO 50001 Energy Management Systems.
- Climate Response & Sustainability Training.

Our teams maintain membership with professional bodies including the Institute of Environmental Management and Assessment (IEMA), the Institute of Environmental Sciences (IES), Chartered Institute of Building Services Engineers (CIBSE) the Energy Institute (EI), the Institute of Engineering and Technology (IET) and the Royal Institute of Chartered Surveyors (RICS).

Our Certifications

We are committed to service excellence and developing first class client relationships. Our quality and environmental standards are underpinned by our ISO 9001:2015 (QMS) and ISO 14001:2015 (EMS) certification. We are proud to hold the Cyber Essentials Certificate of Assurance, illustrating our dedication to cybersecurity.



Appendix 2: Detailed GHG Emissions Results

Outlined below are detailed GHG emissions results tables for the 2019-20 and 2020-21 reporting years which also highlight PHW's market based GHG emissions footprint. Additional graphs and summary charts have also been provided for reference.

2019-20 & 2020-21 Location Based GHG Emissions

GHG Reporting Scope	GHG Emissions Source	GHG Emissions (tonnes CO ₂ e)		Year-on-Year Comparison (%)
		2019-20 (Baseline)	2020-21 (Year 1)	
Scope 1 (Direct GHG Emissions)	Site Fuels	144.19	54.56	-62.2%
	Owned Vehicle Fleet	92.19	30.13	-67.3%
	Natural Gas	83.72	92.89	+11.0%
	Fugitive Emissions (Refrigerants)	7.31	0.00	-100.0%
	Total Scope 1 GHG Emissions (tCO ₂ e)	327.41	177.58	-45.8%
Scope 2 (Energy Indirect GHG Emissions)	Grid Electricity (Location Based)	298.13	268.18	-10.0%
	Total Scope 2 GHG Emissions (tCO ₂ e)	298.13	268.18	-10.0%
Scope 3 (Other Indirect GHG Emissions)	Staff Commuting	3,208.57	1,297.83	-59.6%
	Business Travel – Grey Fleet	422.26	95.21	-77.5%
	Well-to-Tank GHG Emissions	233.38	97.11	-56.5%
	Grid Electricity Transmission & Distribution	25.31	23.06	-8.9%
	Waste	23.17	20.44	-11.8%
	Staff Homeworking	0.00	380.60	+100.0%
	Business Travel – Hire Cars	12.70	0.94	-92.6%
	Water Supply & Treatment	6.58	4.36	-33.8%
	Business Travel - Other ⁷	4.89	1.34	-72.5%
	Total Scope 3 GHG Emissions (tCO ₂ e)	3,926.86	1,920.89	-51.1%
Total GHG Emissions (tonnes CO₂e)		4,552.39	2,366.65	-48.0%
GHG Emissions per Employee (tonnes CO₂e)		2.18	1.13	-48.0%

2019-20 & 2020-21 Market Based GHG Emissions

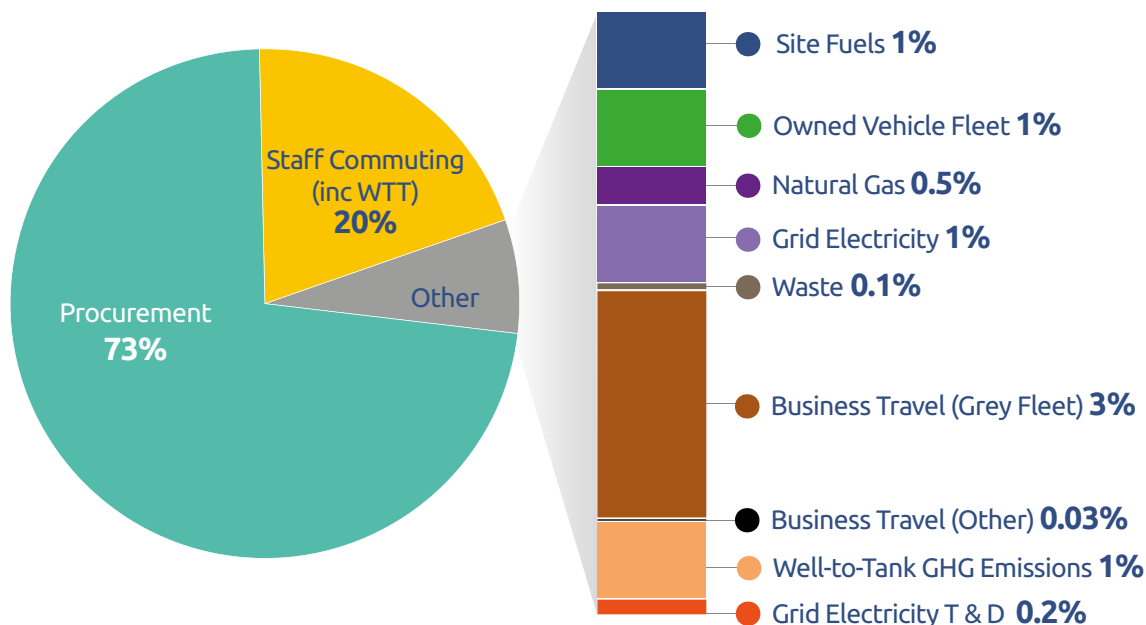
GHG Reporting Scope	GHG Emissions Source	GHG Emissions (tonnes CO ₂ e)		Year-on-Year Comparison (%)
		2019-20 (Baseline)	2020-21 (Year 1)	
Scope 1 (Direct GHG Emissions)	Site Fuels	144.19	54.56	-62.2%
	Owned Vehicle Fleet	92.19	30.13	-67.3%
	Natural Gas	83.72	92.89	+11.0%
	Fugitive Emissions (Refrigerants)	7.31	0.00	-100.0%
	Total Scope 1 GHG Emissions (tCO₂e)	327.41	177.58	-45.8%
Scope 2 (Energy Indirect GHG Emissions)	Grid Electricity (Market Based)	106.83	95.08	-11.0%
	Total Scope 2 GHG Emissions (tCO₂e)	106.83	95.08	-11.0%
Scope 3 (Other Indirect GHG Emissions)	Procurement	11,458.71	39,445.08	+244.2%
	Staff Commuting	3,208.57	1,297.83	-59.6%
	Business Travel – Grey Fleet	422.26	95.21	-77.5%
	Well-to-Tank GHG Emissions	196.70	73.23	-62.8%
	Grid Electricity Transmission & Distribution	25.31	23.06	-8.9%
	Waste	23.17	20.44	-11.8%
	Staff Homeworking	0.00	360.46	+100.0%
	Business Travel – Hire Cars	12.70	0.94	-92.6%
	Water Supply & Treatment	6.58	4.36	-33.8%
	Business Travel - Other	4.89	1.34	-72.5%
	Total Scope 3 GHG Emissions (tCO₂e)	15,358.88	41,321.95	+169.0%
Total GHG Emissions (tonnes CO₂e)		15,793.12	41,594.62	+163.4%
GHG Emissions per Employees (tonnes CO₂e)		7.55	19.88	+163.4%

PHW's market-based emissions footprint demonstrates the relative carbon emissions savings achieved through the purchase of green/renewable energy tariffs across the organisation's sites. Homeworking emissions also factor in staff choices for green/renewable energy tariffs for their own domestic energy use.

2019-20 & 2020-21 Market Based GHG Emissions Summary Charts

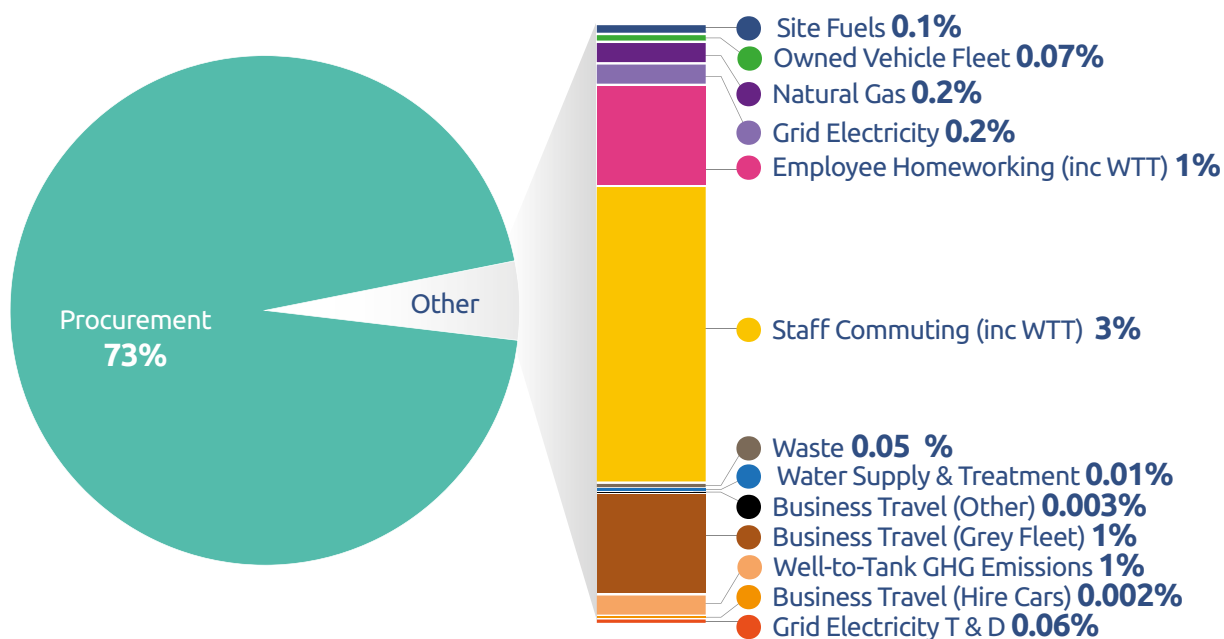
Public Health Wales 2019-20 Market Based GHG Emissions

(% split by source)



Public Health Wales 2020-21 MarketBased GHG Emissions

(% split by source)



Appendix 3: Supporting Sustainable Travel & Flexible Working

Respondents to the Homeworking & Commuting survey also provided further insights and suggestions on how PHW can support them to utilise sustainable travel options and reduce their commuting emissions footprint. For ease of reference all suggestions have been grouped based on their common theme.

Theme	Suggestions
Active Travel	<p>Provide bike storage and changing facilities (showers/locker rooms/drying rooms) across all PHW sites/facilities.</p> <p>Introduce flexible workdays to allow more time for staff to be able to commute safely using active travel (cycling, walking).</p> <p>Lobby Welsh Government to improve cycle routes and pathways to encourage uptake and improve connectivity; particularly outside of Cardiff and larger towns/cities.</p> <p>Introduce and promote a Cycle to Work Scheme for staff. Support staff with costs of safety, waterproof and cycling equipment.</p> <p>As stakeholders within the environmental planning process, PHW should be a bit more vocal when contributing to environmental health impact assessments and challenging poor planning decisions which hinder active travel uptake.</p> <p>Consider using electric pool bikes (where infrastructure allows) to encourage uptake of active travel.</p>
Public Transport & Car Sharing	<p>Support staff by providing a discount on public transport fares through Transport for Wales and Traws Cymru and allow flexibility for staff to work from PHW base/hub which is closer to home.</p> <p>Work with Local authorities to make public transport or walking/cycling an easier choice. Also help to promote the importance of this with Leaders. Use this appropriate time to change behaviours.</p> <p>Encourage the use of bus travel for staff between hospitals with pick up areas along the route and work with bus companies to improve services to hospitals.</p> <p>Set up a car sharing page whereby people can identify who is near them and to share the ride and contribute towards fuel/ maintenance costs.</p>
Flexible Working	<p>A clear policy (if one does not exist) of flexibility of commute. For example, if train arrives at 9:05 a policy ensures a universal understanding that a 9:10/9:15 start is acceptable and does not need formal agreement.</p> <p>All for flexible start/finish times and working hours for staff and make greater provision to allow for flexible working from home/other venues as required. Explore alternative schemes/initiatives for staff for flexible working.</p> <p>PHW should honour its flexible working arrangements with staff, so parents can work flexibly around their specific childcare requirements. PHW should also but also take a whole system approach, to try to influence current providers to bring childcare facilities into communities where people live.</p>
Office Locations	<p>Give consideration when locating offices/hubs to how accessible each site is for public transport and local active travel (walking/cycling) routes. Avoid the use of out-of-town industrial estates where possible.</p>
Electric Vehicles	<p>Provide electric vehicles at a discount cost for staff via a salary sacrifice scheme to support the transition to EVs.</p> <p>Work with NHS Trusts to increase the amount of charging infrastructure available across these sites.</p>



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