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Title of meeting:	Cabinet Member for Climate Change and Green Recovery
Subject:	Carbon Emissions from the Council's Non-domestic Building Portfolio
Date of meeting:	24 th November 2021
Report by:	James Hill - Director of Housing, Neighbourhood and Building Services
Authored by:	Andrew Waggott - Energy Services Team Manager
Wards affected:	All

1. Requested by: the Leader of the Council, the Cabinet Member for Community Safety & Environment and the Cabinet Member for Climate Change and the Green Recovery

2. Purpose

2.1. To establish a historical baseline of carbon emissions from energy consumption for the Council's non-domestic building portfolio and identify those buildings with the highest emissions.

2.2. To detail and quantify key energy efficiency and renewable energy interventions which have had an impact on overall emissions during this period.

2.3. To detail and quantify ongoing or upcoming interventions within the five highest-emitting buildings and create a projection of emissions to 2030.

2.4 The Energy Service team will work with the newly appointed Principal Climate Advisor to ensure the work in this report forms part of the City Council's response to the climate emergency declared in March 2019.

3. Information Requested

3.1. Background

3.1.1. In March 2019 the Council declared a Climate Emergency and committed to reach net zero carbon across all scope 1, 2 and 3 greenhouse gas (GHG) emissions by 2030. 20.8% of all UK emissions came from buildings in 2020.

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3.1.2. Energy use in buildings in Portsmouth is typically either through gas combustion (scope 1 emissions) or through the use of grid supplied electricity (majority scope 2 emissions). GHG emissions for electricity and gas consumption can be quantified using carbon factors published annually by the Department for Business Energy and Industrial Strategy (BEIS¹).

3.1.3. The carbon factor of electricity has fallen significantly in recent years as power generation has become cleaner. Almost all coal-fired power plants have been closed in the past ten years and wind generation now has the second largest generating capacity of any one type of technology (behind gas-fired power stations). Grid-delivered electricity is projected to become net zero carbon by 2035.

3.1.4. Natural gas is the major source of scope 1 emissions from within the Council's buildings. It is unlikely that gas will decarbonise in a similar way to electricity; and it is therefore assumed that the electrification of heat will be required to be made in order that this can become net zero carbon in line with electricity.

3.1.5. The Council owns approximately 17,900 properties across Portsmouth and Havant. Of those properties, 17,000 are social housing and leasehold dwellings and 450 are non-domestic buildings leased to a third party. The Council directly manages the energy supply contracts of 380 non-domestic buildings.

3.1.6. This report considers only the carbon emissions associated with the energy use of the non-domestic buildings with which the Council has currently electricity and gas supply contracts. The rationale for doing so is that these emissions, largely scope 1 and 2, are directly within the Council's control and can be accurately quantified.

3.1.7. There are other strands of work ongoing to tackle and quantify domestic buildings' emissions. The details of which can be found in the background list of documents.

3.2. Council Non-domestic Buildings' Emissions

3.2.1. The Council's total annual emissions from its operational, non-domestic building portfolio is 8,723 tonnes of carbon dioxide equivalent (tCO₂e), as per the last financial year 2020/21. Of this, 3,488 tCO₂e is Scope 1 from gas consumption, 4,820 tCO₂e is scope 2 from electricity consumption and 414 tCO₂e is scope 3 from transmission and distribution associated with electricity consumption. The 2020/21 emissions calculations use the 2020 BEIS² carbon conversion factors, meanwhile the previous years use the equivalent document published in each applicable reporting year.

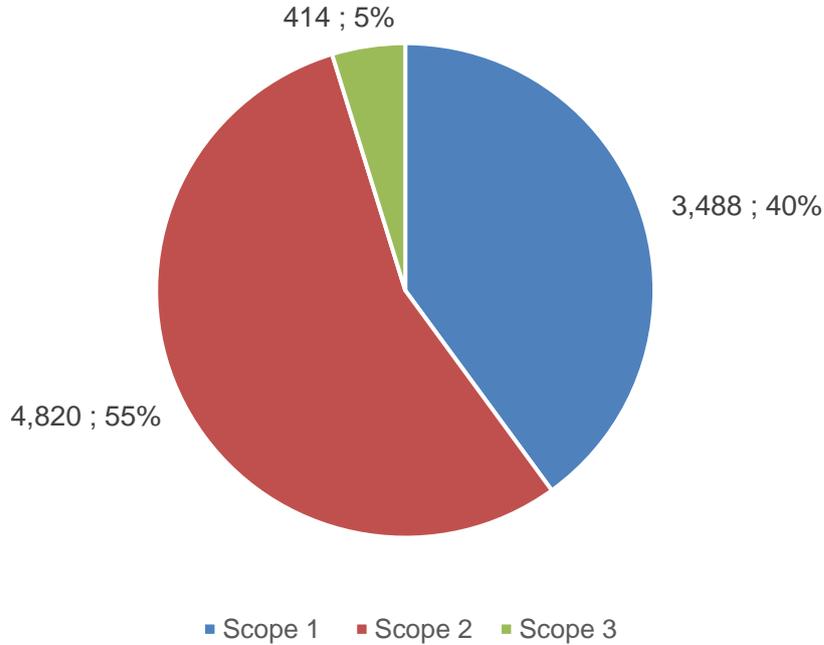
¹ [Government conversion factors for company reporting of greenhouse gas emissions - GOV.UK \(www.gov.uk\)](https://www.gov.uk/government/publications/government-conversion-factors-for-company-reporting-of-greenhouse-gas-emissions)

² [Greenhouse gas reporting: conversion factors 2020 - GOV.UK \(www.gov.uk\)](https://www.gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-2020)

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2020/21 Non-Domestic Emissions by Scope (tCO₂e)



3.2.2. The financial year 2010/11 has been chosen as the baseline against which to compare emissions as this is the first year where the Council has good data; having implemented an energy management system and rolled out automatic meter readers (AMR) across its estate.

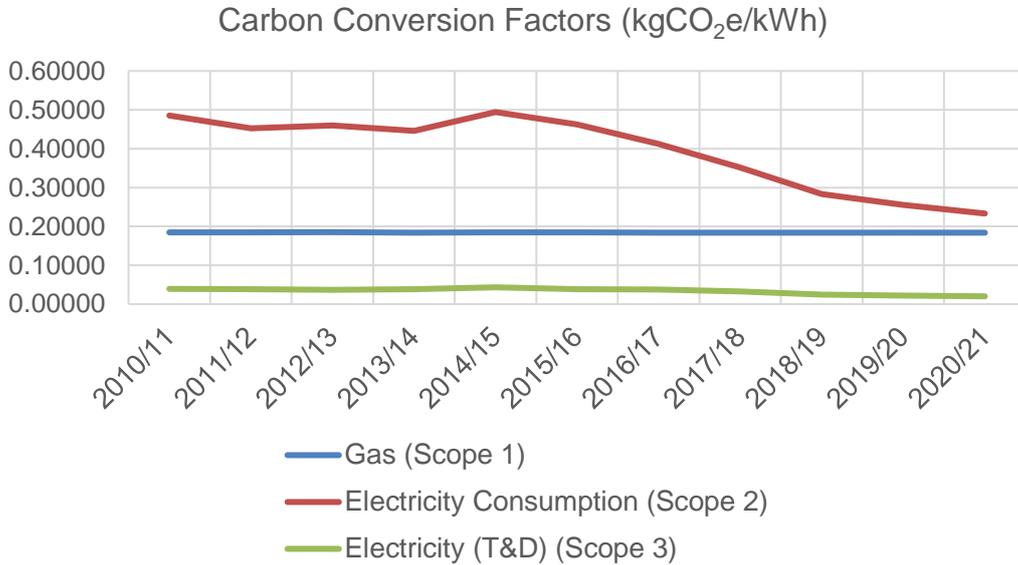
3.2.3. The Council's emissions since 2010/11 have reduced steadily due to both ongoing energy efficiency and renewable energy installations, and the general trend downwards in the carbon factor of electricity. Overall, this reduction in 2020/21 against the baseline is 51% or 8,980 tCO₂e.

3.2.4. Of the overall reduction, the majority has been seen in electricity; which fell 62% or 8,664 tCO₂e; whereas gas fell by 8% or 316 tCO₂e.

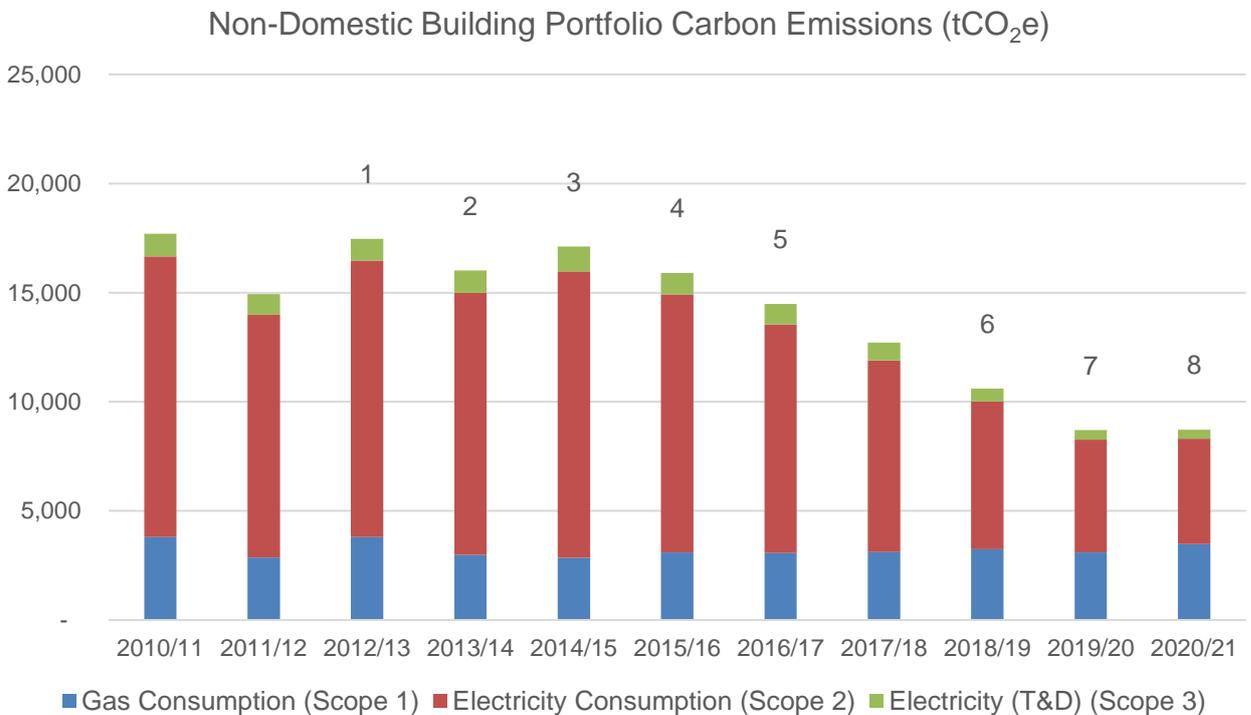
3.2.5. Much of the carbon reduction in electricity, 62% or 8,664 tCO₂e, was due to the digression in electricity conversion factors, as visualised in the below graph. The scope 2 element fell from 0.48531 kgCO₂e/kWh in 2010/11, to 0.23314 kgCO₂e/kWh in 2020/21, while the scope 3 element fell from 0.03908 kgCO₂e/kWh in 2010/11, to 0.02005 kgCO₂e/kWh in 2020/21. It can be seen in the graph below that the electricity factor increased in 2014/15, which is due to an increase in the portion of national grid electricity being generated by coal in that period. Gas conversion factors have remained relatively constant throughout the period.

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3.2.6. The graph and table below show the general downward trend of carbon emissions across the non-domestic building portfolio, alongside a number of key projects and interventions. Notably the rise in emissions in 2014/15 can be attributed to the increase in electricity carbon factor, as mentioned in 3.2.5.



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1	Programme of building energy investments begin - including building fabric and plant room insulation, boiler upgrades, and LED lighting upgrades
2	Solar PV Investment Programme begins
3	First MWp of Solar PV installed, equating to approximately 950,000 kWh of annual generation capability in total
4	Second MWp of Solar PV installed, equating to approximately 1,900,00 kWh of annual generation capability in total
5	Third and fourth MWp of Solar PV installed, equating to approximately 3,800,000 kWh of annual generation capability in total
6	Streetlighting Upgrade Phase 1; approximately 1GWh grid electricity reduction Fifth MWp of Solar PV installed, equating to approximately 4,700,00 kWh of annual generation capability in total
7	Streetlighting Upgrade Phase 2; additional 3GWh grid electricity reduction
8	Streetlighting Upgrade Phase 3; additional 1GWh grid electricity reduction Sixth MWp of Solar PV installed, equating to approximately 5,600,000 kWh of annual generation capability in total

3.2.7. The above graph and data quantify emissions from the Council portfolio as it stands today but does not reflect buildings which have been disposed of during that time, either through demolition or novation of schools to academies.

3.2.8. The largest single uplift in carbon emissions occurred as a result of purchasing the Lakeside North Harbour site in 2019, as this single site is expected to account for 31% of overall non-domestic building emissions. It should be noted that its contribution to the 2020/21 total emissions was lower than 31%, as responsibility for the electricity and gas supplies only passed to the Council in Autumn 2020, therefore only 6 months of the usage falls within this reporting period. Despite this large percentage of 'new' emissions being added to the portfolio, overall emissions still fell by 51% or 8,980 tCO₂e from the baseline. Lakeside North Harbour is a large premium business park with 85 tenants and approximately 54,200 m² of tenanted space; its energy use is not particularly high for a site of this type, but rather it reflects its large size.

3.3 The Five Priority Emitters

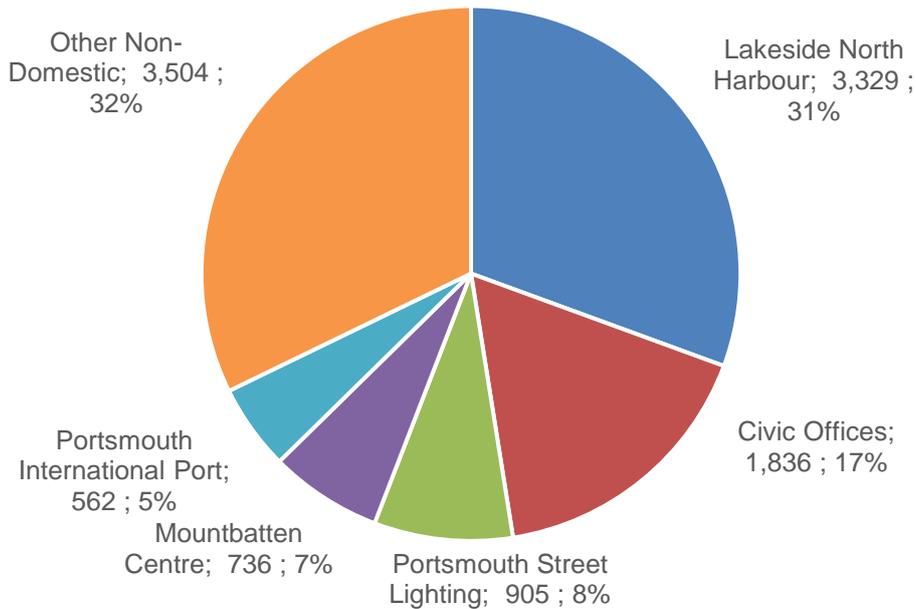
3.3.1. 68% of the carbon from the Council's operational, non-domestic portfolio can be attributed to five main emitters. None of the sites are particularly high emitters in terms of carbon per metre squared, but rather reflect the aggregate emissions and the activities that they support. In order of emissions contribution, these are:

- Lakeside North Harbour (estimated contribution)
- Civic Offices
- Portsmouth Street Lighting
- The Mountbatten Centre (Operated by a third party)
- Portsmouth International Port

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5 Priority Non-Domestic Sites' Carbon Emissions (tCO₂e)



3.3.2. Significant capital projects and other energy efficiency and renewable energy interventions have been made across all five of the sites and services; except for Lakeside North Harbour, which was only acquired in late-summer 2019 (see section 3.4.3 for planned capital investments at this site). The following are examples of the key projects which have been implemented at each site.

3.3.3. Portsmouth International Port:

- Extensive upgrades to LED lamps, particularly focussing on the floodlighting requirement
- 50kWp solar PV array
- Total reduction in electricity consumption between 2010/11 to 2020/21 is 7%

3.3.4. The Mountbatten Centre:

- Upgrades from the existing internal and external fluorescent lighting to LED lamps
- 30kWp solar PV array
- Total reduction in electricity consumption between 2010/11 to 2020/21 is 51%

3.3.5. The Civic Offices:

- Upgrades from the existing fluorescent lighting to LED lamps
- 100kWp solar PV array
- Replaced the old high-voltage transformers on this site with super low loss equivalents

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- Total reduction in electricity consumption between 2010/11 to 2020/21 is 45%

3.3.6. Portsmouth Street lighting:

- City-wide upgrades to LED lamps
- Total reduction in electricity consumption between 2010/11 to 2020/21 is 58%

3.3.7. Overall, the annual reduction of usage across these four areas, attributable to a reduction in demand from the national grid largely arising from these projects, stands at 8,695,579 kWh/a electricity and 704,429 kWh/a gas against the 2010/11 baseline consumption. Using the 2020/21 conversion factors, this equates to a carbon saving in that period of 2,331 tCO_{2e}.

3.3.8. It is important to reflect that many of the opportunities detailed above represent those projects which represented the best value for money and the shortest paybacks for spend-to-save projects. Future opportunities identified are unlikely to offer the same opportunities for a quick simple-payback, and others may not offer a financial return at all.

3.4. Future Projects and Work

3.4.1. Significant future programmes of work are anticipated in some of the buildings within these 5 priority emitters.

3.4.2. Portsmouth International Port is to receive a solar PV and battery installation in 2022. The 1.2MW of solar PV will be installed on roofs and canopies across the Port. The 1.5MWh battery, which will complement a 150kWh battery installed in 2021, will ensure that the maximum amount of solar generation possible is captured; as well as having the potential to enable more cost-effective electricity-fed heating to be installed in future. The Port has a number of other plans for other energy and carbon reduction improvements, including a hydrogen electrolyser. Further details can be found in the *Carbon Reduction and Port Air Quality Strategy*, a link to which can be found in section 100D of this report.

3.4.3. Lakeside Northharbour is also to receive solar PV and battery storage in 2022, although the installation is still in design, so final details are not known. At the time of writing, it is proposed that this system could be up to 5MW in capacity with 2.5MWh of storage; though this is subject to technical and financial feasibility. As well as the solar PV and storage, a number of electric vehicle charge points will also be installed as part of this project. This is subject to demand from the site's tenants, as well as projected future EV uptake.

3.4.4. A heat decarbonisation plan is being drawn up for a number of buildings across the city, including the Mountbatten Centre, from the 5 largest emitters. As identified in this report in section 3.2.5, heat and hot water is one of the most challenging elements to decarbonise in buildings, because of the almost zero digression in gas carbon factors. Heat decarbonisation plans are a requirement of the Public Sector Decarbonisation Scheme, the details of which can be found in the *Public Sector Decarbonisation Scheme -*

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Report to the Member for Climate Change and the Green Recover 24th November 2021 in section 100D of this report.

3.5.1. Having identified the five priority emitters within the energy portfolio it is essential that the ways in which the energy is consumed, and the emissions generated, are understood on a more granular level.

3.5.2. This understanding can be gained through desktop and onsite audit work. It is through this understanding that opportunities for decarbonisation can be identified, and plans drawn up to cut emissions through further interventions.

3.5.3. It is considered sensible to focus on the five priority emitters initially, because of their significant impact, with an understanding that this does not preclude officers from undertaking work to understand, or make improvements to, the rest of the non-domestic buildings portfolio; either through incremental change or funding opportunities, such as future rounds of PSDS.

3.4.4. Funding and resource will be identified to undertake the necessary audits on the five priority buildings identified. These audits will help to inform proposals to decarbonise these buildings and will include details of the carbon-reduction measures required; as well as the capital and operational costs required to make such interventions.

3.4.5. Upon the completion of audits on the five priority emitters, audit work will be undertaken on 6-10 on the priority list, and so on. This work will be undertaken in parallel to the delivery of installations, identified in the first round of audits, should measures which are technical and financially viable be identified.

3.4.6 The audits, and subsequent interventions which the enable and initiate, will be fed into the Council's overall carbon reduction strategy and reporting, which will be developed in parallel to this piece of work.

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Signed by James Hill - Director of Housing, Neighbourhood and Building Services

Appendices:

Background list of documents: Section 100D of the Local Government Act 1972

The following documents disclose facts or matters, which have been relied upon to a material extent by the author in preparing this report:

Title of document	Location
Public Sector Decarbonisation Scheme - Report to the Member for	<i>To follow - being presented at same meeting</i>

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Climate Change and the Green Recover 24 th November 2021	
Portsmouth City Council Climate Strategy	https://democracy.portsmouth.gov.uk/documents/s25687/Response%20to%20Climate%20Emergency%20Strategy%20appendix%20A.pdf
The Energy and Water at Home Strategy (2020-25); March 2020	https://democracy.portsmouth.gov.uk/documents/s26302/Energy%20and%20Water%20at%20Home%20Strategy%20report%20with%20appendices.pdf
Carbon Reduction and Port Air Quality Strategy	https://www.portsmouth-port.co.uk/uploads/downloads/Portsmouth_Port_PAQS.pdf