



Report

Report to: **Climate Change and Sustainability Committee**
Date of Meeting: **31 August 2022**
Report by: **Executive Director (Housing and Technical Resources)**

Subject: **Carbon Emissions - Non-Domestic Buildings**

1. Purpose of Report

1.1. The purpose of this report is to:-

- ◆ advise on the baseline carbon emissions for the Council's non-domestic operational property portfolio
- ◆ advise on the progress in the reduction of carbon emissions from non-domestic properties to date and advise what actions are required to achieve the Scottish Government target for public sector buildings to be Zero emissions by 2038

2. Recommendations

2.1. The Committee is asked to approve the following recommendation(s):-

- (1) that the current carbon emissions baseline in relation to the operational non-domestic property portfolio be noted; and
- (2) that the actions that will be required to meet the Scottish Government target of Zero carbon emissions for Public Sector buildings in Scotland by 2038 be noted.

3. Background

- 3.1. The Scottish Government has set out emission reduction targets in legislation with the intention for Scotland to become Net Zero by 2045. This means the amount of greenhouse gas emissions we put into the atmosphere and the amount we're able to take out will add up to zero.
- 3.2. However, for Public Sector non-domestic buildings the target for emissions is more challenging with emissions from heating being reduced to zero emissions from heat by 2038. This would mean that no council building falling into this category would be able to generate heat from the burning of fossil fuels after this date as offsetting is not an option.
- 3.3. The UK Government has set a target for the Electricity grid to be Net Zero by 2035. Assuming this Government target is achieved by phasing out the use of fossil fuels as a source of heat in our council buildings and replacing by electrically powered heating systems then the 2038 target becomes achievable. However, the investment required is very significant in terms of both capital and revenue.

- 3.4. It is anticipated that as fossil fuels are replaced by electrically powered solutions for heating and transport that the demand on the electricity grid is likely to double which has implications in terms of stability of supply.

4. Carbon Emissions Baseline

- 4.1. Based on financial year 2019/2020 consumption figures – the Carbon emissions from the Council’s non-domestic buildings were approximately 38,200 tonnes of Carbon Dioxide equivalent (tCO₂). Approximately 24,000 tCO₂ (63%) of those emissions were due to the burning of fossil fuels for heating and cooking.

4.2. Carbon Emissions breakdown of by Building category

Category	Total Emissions tonnes CO ₂ e	Percentage emissions
Primary Estate	12,830	34%
Secondary Estate	6,773	18%
Wet Leisure Centres	5,450	14%
Corporate Buildings	2,722	7%
Social Work - all	2,507	7%
Halls	2,219	6%
Data Centre	648	2%
Town Halls	566	1%
Fleet Sites	478	1%
Libraries	384	1%
Pavilions	320	1%
Dry Leisure Centres	319	1%
Nurseries	282	1%
Business Units	209	1%
Universal Connections	208	1%
Crematorium	204	1%
Ice Rink	198	1%
Roads Depots	196	1%
Country Parks	193	1%
Museum	147	<1%
Car Parks	48	<1%
Other	1,291	3%
Grand Total	38,192	100%

Table 1 – Breakdown of Total Emissions by Building Category using energy consumption figures for 2019/2020

4.3. Carbon Emissions from Electricity consumption

- 4.3.1. Carbon emissions from Grid Electricity have halved in the last decade which has been the primary driver of the Council’s emissions reductions in respect to non-domestic buildings. The effect of this reduction in the Greenhouse Gas (GHG) emissions factor for grid electricity has resulted in the Council’s emissions figures being cut by circa1,000+ tCO₂/ pa over the last few years.

- 4.3.2. Delivery of various projects such as the installation of voltage optimisers and solar Photovoltaic (PV) systems and upgrading lighting with LEDs via the Central Energy Efficiency Fund (CEEF) programme have previously contributed to the reduction in emissions from electricity, however, as the grid has progressed towards the 2035 net zero target the carbon savings per measure have reduced in line e.g., installing a large 50kWp PV system on a primary school roof would have saved 21 tCO₂ in 2011 compared to just 10 tCO₂ today.

4.4. Carbon Emissions from Gas Consumption

- 4.4.1. Carbon emissions from natural gas depend on two factors – the amount of gas consumed which is related to outside temperature, and the GHG emission factor used to multiple the gas consumption figure. The GHG figure hasn't varied much over the last decade since the hydrocarbon composition of Natural Gas varies little from year to year.
- 4.4.2. Investment via the CEEF programme over the years by installing insulation measures, upgrading heating controls and installing more efficient gas boilers has assisted in reducing the amount of gas consumed on such sites where measures have been installed. However, unlike electricity the ability to decarbonise the gas grid is currently limited. Since 2012 the grid gas emissions factor has reduced by just 1.1%

4.5. Carbon Emissions from changes in the council non-domestic portfolio

- 4.5.1. Since 2019/2020, the Council's largest consumer of grid electricity, the Caird Data Centre has been winding down and has now been disposed of. However, the addition of 8 new nurseries during the same period with gas heating systems has offset the benefits of this disposal in terms of carbon emissions by around a third.

4.6. Other factors affecting Carbon Emissions

- 4.6.1 The ventilation control measures introduced due to covid have increased carbon emission as the additional demand for heat has led to an increase in gas consumption.
- 4.6.2 The Green House Gas emission factor which is calculated for grid electricity is expected to temporarily reverse its downward trend in the coming periods due to lower renewable energy production in 2021. This will reduce the benefits to the Council of year on year of carbon savings attributed to grid improvements.

5. **Action to Reduce Carbon Emissions from Non-Domestic Properties to Zero by 2038**

- 5.1. To meet the zero emissions target for public sector buildings by 2038, the Council requires to eliminate c. 38,200 tCO₂ of carbon emissions based on financial year 2019/2020 emissions.
- 5.2. Assuming the electricity grid decarbonises by 2035 as set by the UK Government then the Council needs to prioritise the elimination of fossil fuels for heating and cooking purposes. That is the elimination of c 24,000 tCO₂ of emissions at a rate of c. 1,500 tCO₂ per year.
- 5.3. Currently the Council has 261 non housing properties heated by gas or gas hybrid systems and a further 29 heated by oil or oil hybrid systems. Assuming all these buildings are to be retained for future service delivery, then all 290 buildings would require heating system replacements and fabric upgrade works

carried out by 2038 - approximately 19 buildings per year. The table below lists the top 4 Building Categories based on emissions from burning a fossil fuel on site.

Building Category	Average carbon emissions from burning fossil fuel per building tCO ₂	No of properties heated by fossil fuel
Wet Leisure sites	549	9
High Schools	248	17
Corporate Buildings	170	7
Primary Schools	85	109

Table: Carbon Emissions from burning fossil fuels for heat or cooking by building type

- 5.4. Due to the scale of investment required it is essential that before embarking upon investment there is a thorough assessment of service requirements to identify properties that are unlikely to be required in future and what carbon reductions can be achieved through repurposing, demolition or disposal.
- 5.5. Option appraisal work will require to be carried out on a site-by-site basis as it is unlikely that a single heating/ fabric solution will be feasible at each site. For example, a ground source heat pump solution while being one of the most efficient means of supplying heat requires a sufficiently large area of land to sink boreholes and the correct type of ground conditions to maximise performance.
- 5.6. It is essential that before such heating systems are replaced that fabric and ventilation improvements are carried out at these buildings in advance. Fabric improvements will also be required at the c. 125 buildings that are currently already heated by non-fossil fuel systems.
- 5.7. The route map towards an investment plan would be:-

2022/2023 –

- ◆ realign existing programmes to fabric first
- ◆ undertake 3 feasibility studies and report on recommendations
- ◆ commence area-based asset review
- ◆ identify a funding stream for options appraisals to be carried out on a building-by-building basis
- ◆ assessment of the skills and resource required to deliver and implement the investment plan

2023/2024

- ◆ complete area-based asset review
- ◆ develop first 3-year programme
- ◆ development of Local Heat and Energy Strategies (LHEES) and implementation plan

6. Financial Implications

- 6.1. Significant investment will be required to transition our non-domestic property portfolio to zero carbon heating systems. At present it is extremely difficult to estimate the figures as there are so many market variables, one solution will not meet the criteria for all properties and technology is moving quickly. There is no budget currently identified in the capital programme for these works. There is only limited general capital grant funding currently available to the Council and

further external funding would need to be sought/provided for these works to be affordable.

- 6.2. Funding for 3 feasibility studies has been awarded by the Climate Emergency Fund to assist in the early assessment of the budgets that will be required between now and 2038 to upgrade building fabric and replace heating systems. Options for funding will be considered as part of this feasibility work.
- 6.3. During the transition from gas to electricity for heat there is likely to be an increase in revenue utility costs in the short to medium term due to the unit cost differential between the two fuel sources. Currently the kilowatt rate for electricity is four times more expensive than the rate for gas, however, each site will present different outcomes depending on works carried out. -The level of impact on Council's revenue budgets will need to be ascertained through the feasibility works above.

7. Climate Change, Sustainability and Environmental Implications

- 7.1. Failure to meet sustainable development and climate change objectives is one of the Council's top risks. Decarbonising heat and increasing the energy efficiency within Council properties will help meet these objectives.

8. Other Implications

- 8.1. The decarbonisation of heat from the Council's non-Domestic property portfolio is essential for the Council to meet the Emissions Reduction Targets set in regulation by the Scottish Government.
- 8.2. The shape and nature of the Council's property portfolio has been driven by the requirements of individual services, however, prior to embarking on the required programme of investment, a fundamental review of service and area need should be undertaken to identify opportunities to reduce the property estate and to maximise the service benefits from the investment in the remaining assets.

9. Equality Impact Assessment and Consultation Arrangements

- 9.1. The Sustainable Development and Climate Change Strategy has undertaken a public consultation, an equalities impact assessment, and a fairer Scotland assessment.

Daniel Lowe
Executive Director (Housing and Technical Resources)

23 August 2022

Link(s) to Council Values/Priorities/Outcomes

Values

- ◆ Accountable, effective, efficient and transparent
- ◆ Fair, open and sustainable

Priorities

- ◆ We will work towards a sustainable future in sustainable places

Outcomes

- ◆ Good quality, suitable and sustainable places to live
- ◆ Caring, connected, sustainable communities
- ◆ People live the healthiest lives possible

Previous References

- ◆ None

List of Background Papers

- ◆ None

Contact for Further Information

If you would like to inspect background papers or want further information, please contact:-

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