

Agenda Item	4.
Report No	CCC/2/23

The Highland Council

Committee: Climate Change Committee

Date: 16 March 2023

Report Title: Energy Benchmarking of Property Estate

Report By: Interim Chief Executive

1 Purpose/Executive Summary

- 1.1 The purpose of this paper is to inform Members of the work undertaken to date in relation to energy performance benchmarking of the Council's non-domestic estate.

2 Recommendations

- 2.1 Members are asked to:
- I. Note the resultant analysis and assessment;
 - II. Approve the continuation of the exercise and update with 2022/23 data; and
 - III. Approve the distribution/awareness of the associated information deliverables, including the public facing Council website.

3 Implications

- 3.1 Resource – there are no ongoing resource implications, delivery of future work will be met from existing resources.
- 3.2 Legal – there are no legal implications arising from this report
- 3.3 Community (Equality, Poverty and Rural) – There are no direct implications arising from this report.
- 3.4 Climate Change/Carbon CLEVER – the project deliverables directly support and inform decisions with regard to achieving net zero, investment in buildings

(to improve Energy/Net Zero performance) and asset rationalisation considerations.

3.5 Risk – There is no risk directly relating to this paper.

3.6 Gaelic – There are no Gaelic implications arising from this project.

4 Background

4.1 Utilising the [Scottish Public Sector Energy Benchmarking Tool](#), an evaluation of energy and water performance for all main properties within Highland Council property estate has been undertaken.

4.2 The evaluation compared relative energy and water performances to Scotland-specific energy benchmarks for public sector buildings.

4.3 Benchmarking energy performance is a process that either compares the energy use of a building with other similar structures or looks at how energy use varies from a baseline. It informs organisations about how and where they use energy and what factors drive their energy use. Benchmarking enables energy, building and asset managers to determine the key metrics for assessing performance, to establish baselines, and to set performance goals. It also helps to identify building upgrade opportunities that can reduce expenditure by lowering energy and operating costs, and it facilitates continuous improvement by providing diagnostic measures to evaluate performance over time, e.g., effectiveness of implemented projects.

4.4 It should be noted that benchmarking in itself does not directly reduce energy consumption, but rather provides the informed basis for justification of either behaviour change or investment in remedial works to realise savings in carbon, cost, and energy.

5 Data and Site Validation

5.1 To undertake meaningful analysis, data requires to be both complete and accurate with regard to site information, consumption data, function, and floor area. Validation of all key information was undertaken where possible to safeguard against inclusion of erroneous data or information. Some sites were discounted due to their function (no suitable benchmark available) or lack of appropriate key information.

5.2 For some building function types, although relative performance was not able to be undertaken, i.e., by floor area, reporting of absolute values has been included for reference purposes.

5.3 Energy and water invoicing information from 2021-22 was utilised as the primary source of consumption information. Where required, checks on outlying

values were undertaken against historical trends, and adjustments applied if appropriate. It should be noted that the Covid related lockdowns and changes to operating practises may have had an impact on consumptions and emissions over the past 3 years.

5.4 Many performance assessment values were found to be significantly out with reasonable expectations, e.g., 70% less than benchmark. Although some of these sites may be considered efficient, the extent of good performance is such that it is likely other factors, such as erroneous site data, estimated consumption information, operating patterns etc, is a significant contributing factor.

6 THC Property Portfolio

6.1 The following image graphically demonstrates the ratio of total floor area against individual property type categories.

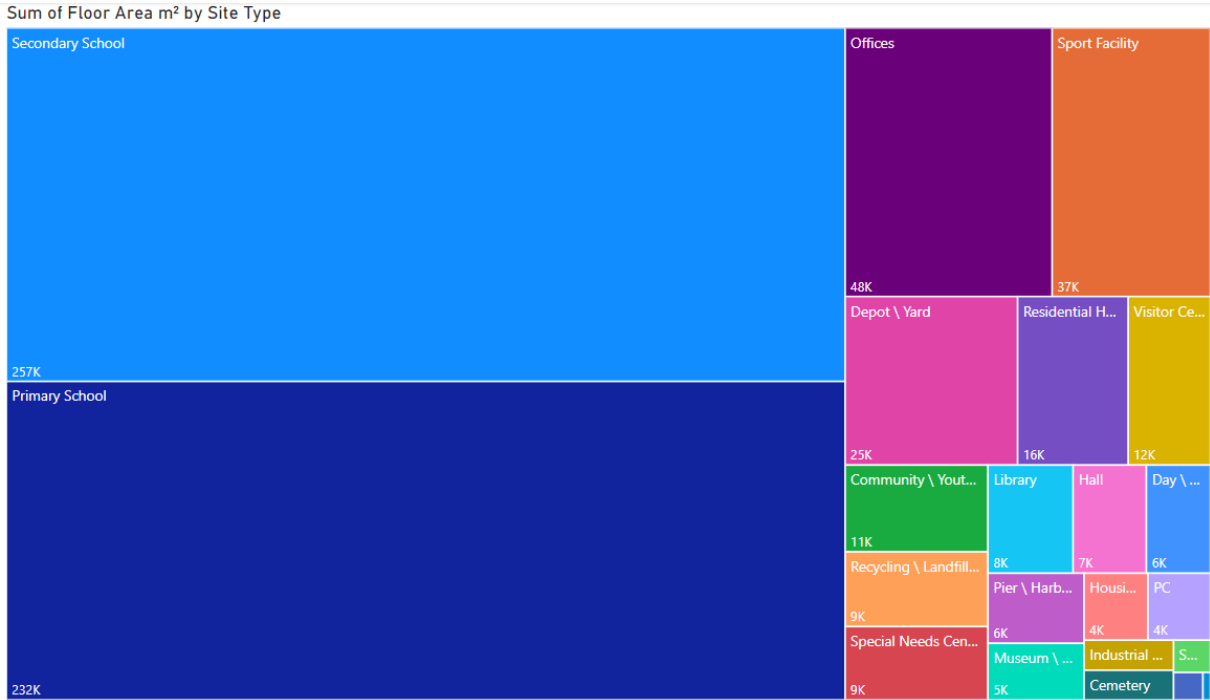


Figure 1 - Apportionment of property types by Floor Area

6.2 With respect to the non-domestic estate, there are approximately 1,029 sites with active utility supplies. Across these sites there are approximately a combined 2,323 individual utility supplies, broken down by utility as follows

Biomass	Electricity	Gas	Oil	Propane	Water
93	1,169	85	66	10	900

6.3 Following review and validation of available data, 554 sites were taken forward as part of the benchmarking analysis. The number of sites against which analysis was undertaken comprised the following

Property Type ¹	No of Properties	Properties Benchmarked
Secondary School	32 ²	32
Primary School	171 ³	171
Sport & Leisure	35	35
Offices	64	51
Depot \ Yard	52	39
Residential Home ⁴	21	21
Other		
- Cemetery	49	4
- Changing Room / Pavilion	2	2
- Community \ Youth Centre	14	13
- Day \ Resource Centre	15	13
- Hall	11	8
- Housing \ Accommodation	50	12
- Industrial Type Activities	25	14
- Library	17	16
- Museum \ Art Gallery	3	2
- Nursery	4	2
- Public Convenience (PC)	81	80
- Pier \ Harbour	21	6
- Recycling \ Landfill Centre	20	17
- Shop	6	4
- Special Needs Centre	4	4
- Visitor Centre	8	8

Table 1 - Benchmarked Properties

- 6.4 With respect to property types, is it evident that the majority (+80%) of energy consumption, cost and carbon is associated with 6 property types. Accordingly, more detailed analysis and graphical information has been provided against these property types. Reference within graphics and tables to “others” reflect the collective of the remaining smaller contributing property types.
- 6.5 Where possible information and commentary has been included for all property types, however, due to limitations in available data and site related factors, further work, including site liaison, is required to complete for all.

7 Benchmarking Methodology

¹ Number of properties per type may vary from Educational provision totals, due to utility supply arrangements, e.g. shared and site type definition

² Includes special schools, shared and closed facilities

³ Includes shared and closed facilities

⁴ Property type includes care homes, residential homes in relation to both adult and child.

7.1 Relative benchmarks have been applied as per the following, and subsequently compared to the respective typical value for that building type.

- Carbon kgCO_{2e}/m²
- Electricity⁵ kWh/m²
- Heating kWh/m² (inclusive of gas, oil, biomass, LPG)
- Water m³/m²
- Cost £/m²

7.2 To facilitate consistency, the primary approach for performance reporting is based upon the percentage variance from what a typical building of that type should consume, e.g., a figure of 17% would indicate the property consumes 17% more than a typical property of that type. A negative value would indicate it consumes less.

7.3 Due to the large size of the estate and the complexity of the resultant analysis, the full analysis and report is contained with a dedicated document (see Appendix 1). A summary of key findings is contained in the following sections.

7.4 Insights and key take-away messages have been included to aid interpretation of the data. This has been partially completed as not all information and input has been available within the available timeframe. However, it is the intention to develop this aspect more fully.

8 Carbon

8.1 Carbon emissions are a common denominator and is the recommended method for assessing a buildings' environmental impact, directly relatable to the targets and aspirations of the Net Zero Strategy.

8.2 For the financial year 2021-22 carbon emissions from the built estate amounted to 25,582 tCO_{2e}.

Utility	Carbon Emissions (tCO _{2e})	Carbon Emissions (%)
Electricity	10,699	42%
Gas	6,984	27%
Oil	6,072	24%
LPG	921	4%
Biomass	710	3%
Water	193	1%
Total	25,582	100%

Table 2 - Carbon emissions by Fuel

⁵ Properties that are electrically heated have dedicated benchmarks

8.3 It should be noted that utilities such as biomass and water have a significantly reduced impact due to being naturally lower in carbon intensity, when compared to other utilities.

8.4 The following graphic shows CO2 emissions attributable to key property types.

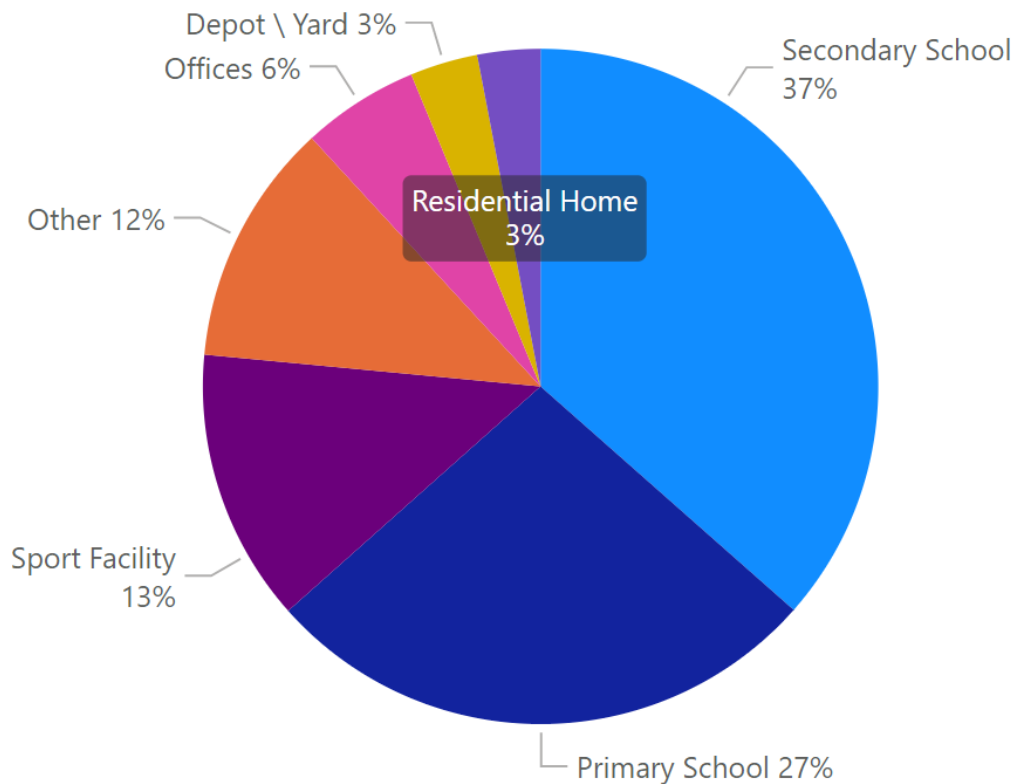


Figure 2 - Apportionment of carbon emissions to property types

8.5 Commentary

- 31% of buildings exceeded typical benchmark values
- Education accounts for 64% of total carbon emissions
 - Of the best 20 performing primary schools, 19 operated biomass-based heating systems
- The six largest contributing property types of cumulatively account for 88% of all building related carbon emissions.

8.6 Key Takeaway point

- Any meaningful reduction in carbon emissions requires focus on the school estate.

9 Electricity

9.1 The following graphic shows electricity consumption attributable to key property types.

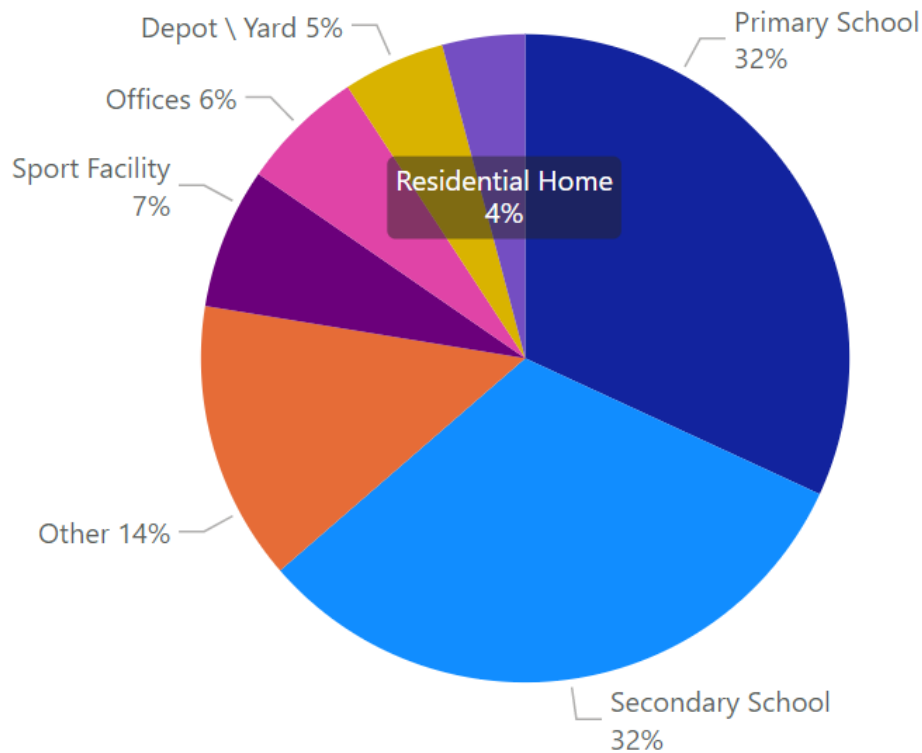


Figure 3 - Electricity Consumption by Property Type

9.2 How and to what extent electricity is consumed, varies across all properties. For some it may be limited to lighting and ICT equipment, whilst for others it may also be utilised for heating, air conditioning, catering, swimming pool hall ventilation etc.

9.3 Commentary

- THC properties collectively consume 46,293,127 kWh of electricity
- Primary & Secondary Schools account for 64% of all electrical consumption
- 46% of properties performed worse than the typical benchmark.
- 59% (247 of 418) buildings are thought to be electrically heated (based upon lack of alternative heating source). However, it has not been possible to definitively verify at this stage.

10 Heating

10.1 The following graphic shows electricity consumption attributable to key property types.

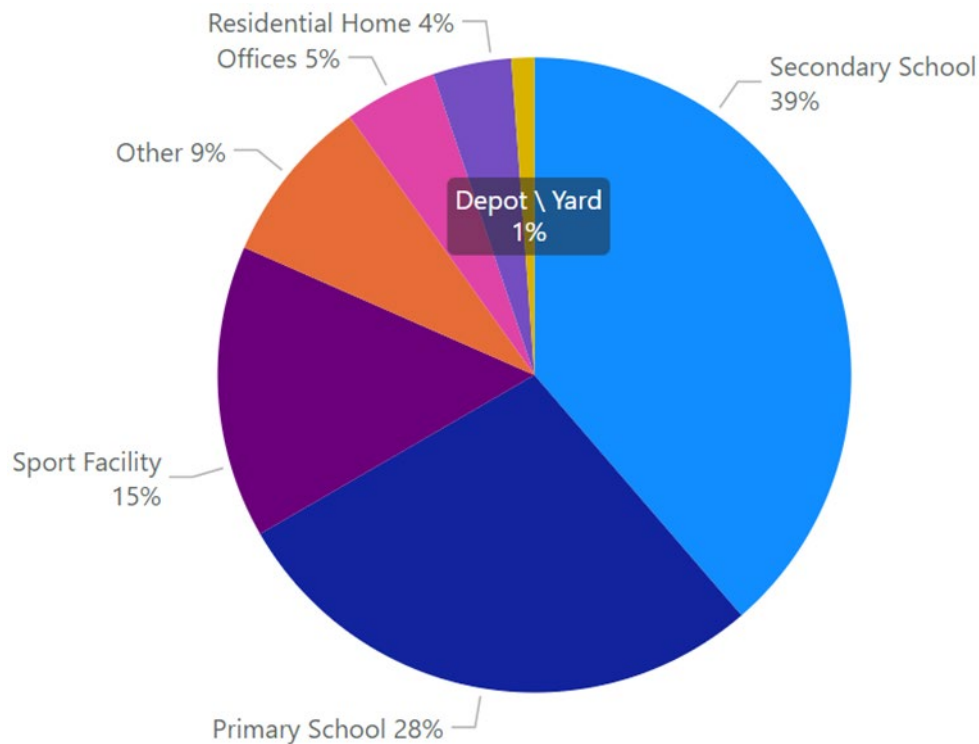


Figure 4 – Heating Consumption by Property Type

- The above pie chart reflects buildings that consume Gas, Oil, LPG & Biomass (Many other buildings utilise electrically based heated systems)
- The combined heat consumption amounts to 92,285,898 kWh annually
- Primary & Secondary Schools account for 67% of heating consumption
- 51% of properties performed worse than benchmark.

10.2 The following table breaks down site type and number which consume typical heating related fuels.

Property Type	Total No	Biomass	Oil	LPG	Gas
Cemetery	4			1	
Changing Room / Pavilion	2				
Community \ Youth Centre	13			1	4
Day \ Resource Centre	13				4
Depot \ Yard	39		1	2	3

Hall	8	1			4
Housing \ Accommodation	12	1	1		1
Industrial Type Activities	14				
Library	16	1	1		2
Museum \ Art Gallery	2	1			
Nursery	2				
Offices	51	4	2		10
PC	80				
Pier \ Harbour	6				
Primary School	171	48	33	1	23
Recycling \ Landfill Centre	17				
Residential Home	21	8			3
Secondary School	32	17	11	5	9
Shop	4				1
Special Needs Centre	4	1			2
Sport Facility	35	6	7		3
Visitor Centre	8	1	2		3
Total	554	89	58	10	72

Table 3: Breakdown and count of heating-based fuel consumption to property type

- Approximately 140 sites currently operate fossil fuel-based heating systems

10.3 Key Takeaway point

- As part of the transition to Net Zero, all fossil fuel-based heating systems will require conversion to a low carbon alternative.

11 Water

Figure 4 shows the water consumption allocation across key property types.

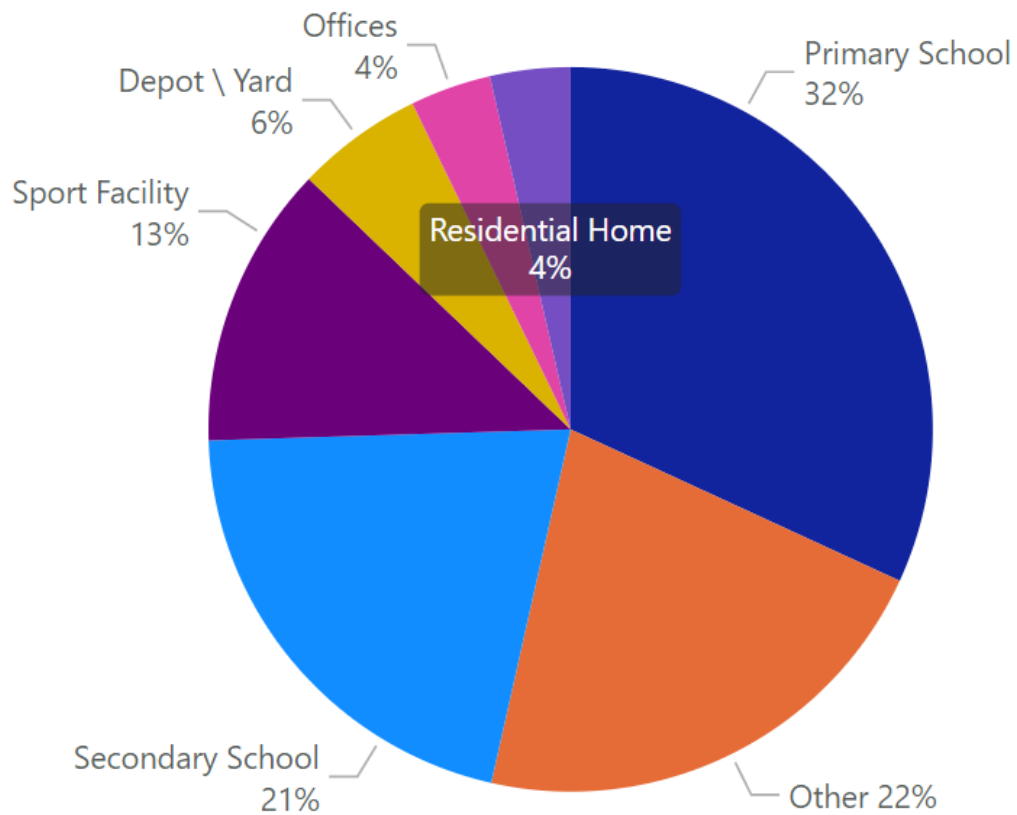


Figure 5 Water Consumption by Property Type

- THC properties consume a total of 460,188m³ of water
- Primary & Secondary Schools account for 53% of water consumption
- 30% perform worse than benchmark.
- 70% are perform better than benchmark.
- 7% of consumption is related to Public Conveniences
- 4% of consumption is related to Cemeteries

12 Annual Cost

12.1 The following graphic shows the cost allocation across key property types.

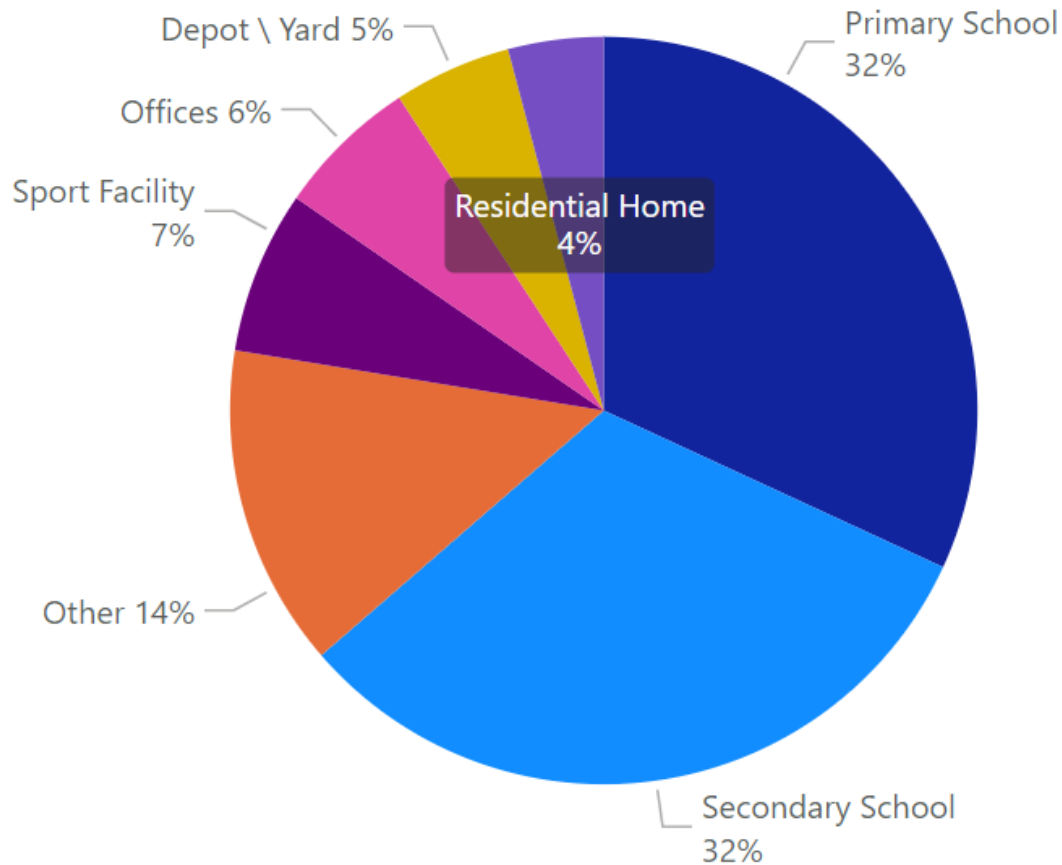


Figure 6 - Electricity Consumption by Property Type

12.2 How and to what extent electricity is consumed, varies across all properties. For some it may be limited to lighting and ICT equipment, whilst for others it may also be utilised for heating, air conditioning, catering, swimming pool hall ventilation etc.

12.3 Commentary

- Highland Council properties include within benchmarking analysis collectively cost £14.1 million annually.
- Primary & Secondary Schools account for 67% of costs
- Costs include both consumption and fixed charges

12.4 The following table details, in order, the annual running cost associated with all property types.

Property Type	Sum of Running Cost (£)
Secondary School	£4,952,523
Primary School	£4,446,650
Sport Facility	£1,218,401
Offices	£731,556
Residential Home	£566,608
Depot \ Yard	£497,083
Visitor Centre	£238,279
Special Needs Centre	£199,577
PC	£164,725
Library	£133,457
Recycling \ Landfill Centre	£131,778
Pier \ Harbour	£123,197
Community \ Youth Centre	£118,084
Day \ Resource Centre	£103,464
Cemetery	£100,858
Industrial Type Activities	£96,276
Museum \ Art Gallery	£90,151
Housing \ Accommodation	£86,015
Hall	£74,288
Shop	£7,398
Nursery	£7,017
Changing Room / Pavilion	£3,559
Total	£14,090,945

Table 4 - Ranking of property types by cost

12.5 For the most expensive property group, Secondary Schools, a breakdown of cost and relative cost for individual properties is shown in the figure below

Annual Cost (£)

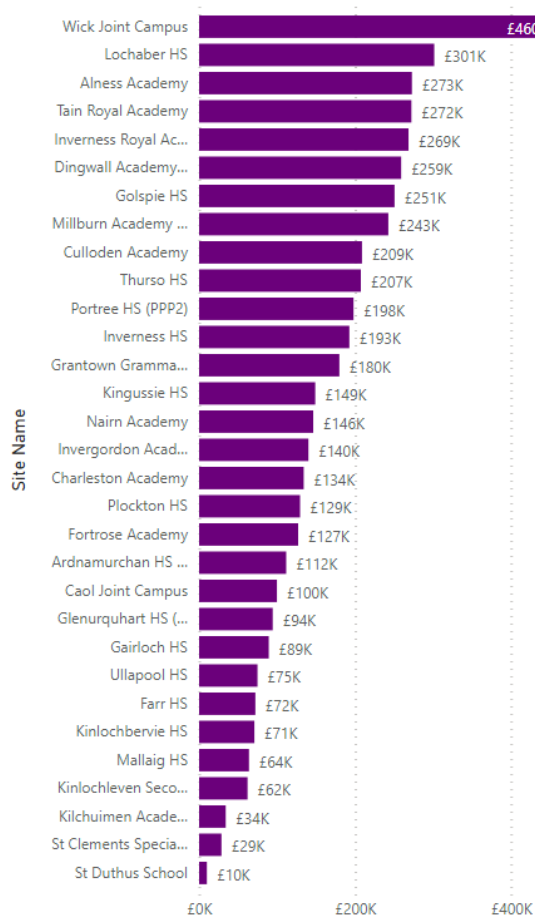


Figure 8 - Secondary school cost ranking (High to Low)

Relative Cost (£/m2)

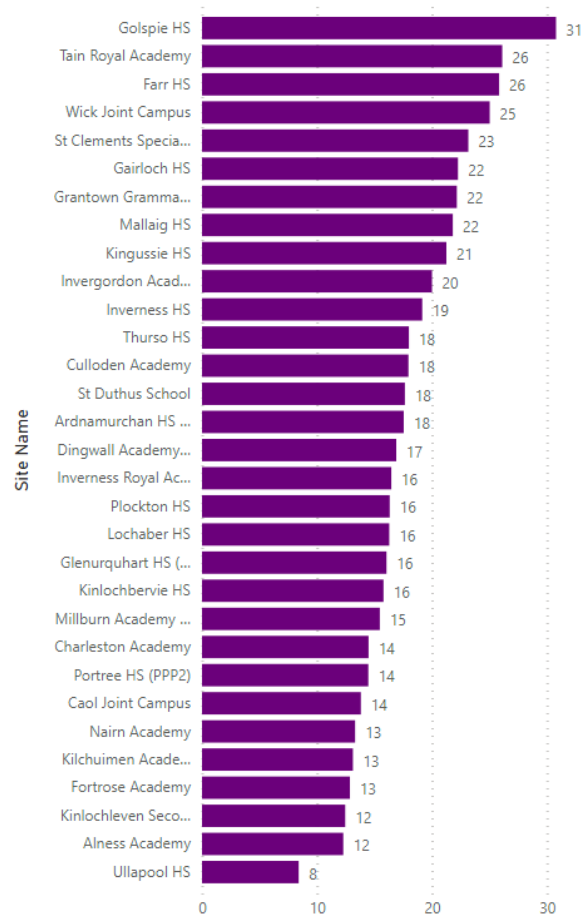


Figure 7 - Secondary school relative cost ranking (High to Low)

12.6 Relative Cost values are based upon a £/m² to allow a comparison of different size buildings of the same type. The following table shows the lowest and highest costing property, in relative terms, for each property type.

12.7 Direct comparisons are not accurate and factors such a heating system type, occupation, unknown usage, external contributing factors, all have a bearing on the assessment. However, for those properties at the higher end of the scale, site investigations are recommended.

Property Type	Lowest Relative Cost		Highest Relative Cost	
	Site Name	£/m ²	£/m ²	Site Name
Changing Room / Pavilion	Bignold Park Changing Pavilion	3.9	7.6	Naver Changing Pavilion
Community \ Youth Centre	Hilton Village	5.5	75.3	SIPS Community Centre
Day \ Resource Centre	Lybster Day Centre	3.3	26.8	Airdferry Res Centre
Depot \ Yard	Brora Depot Buildings	0.7	75.8	Ardelve Roads Depot
Hall	East Church Hall	2.4	23.5	Joss Street Hall
Housing \ Accommodation	23 Balnacraig Road	1.6	95.9	47 Balnacraig Road
Industrial Type Activities	Unit 8B5 River Wynd	0.9	190	Sconser Quarry
Library	Muir of Ord Library	0.2	42.2	Brora Library
Museum \ Art Gallery	Inverness Museum & Art Gallery	18.7	19.3	Highland Folk Museum
Nursery	Bualnaluib Nursery	24.6	54.5	Lochcarron Nursery
Offices	Dingwall Offenders Services Office	3.5	43.6	Tain Service Point
PC	Dunnet PC	1.8	218	Dingwall Athole Court PC
Pier \ Harbour	Gairloch Pier	2.4	35.8	Nairn Harbour
Primary School	Isle of Rum PS	1.7	92.2	Struan PS
Recycling \ Landfill Centre	Invergordon Transfer Station	2.7	349	Inverness Waste Recycling Centre
Residential Home	Arach	2.3	76.5	Caladh Sona Centre
Secondary School	Ullapool HS	8.4	30.8	Golspie HS
Shop	Inverness Market Hall & Arcade	4.8	20.4	14 Grant Street
Special Needs Centre	Caberfeidh Centre	5.7	23.3	Drummond School (PPP2)
Sport Facility	An-Aird Changing Pavilion	1.5	126	Nairn Swimming Pool
Visitor Centre	Bettyhill Visitor Centre	1.5	48.7	Ionad Nibheis Visitor Centre

Table 5 - Low and High relative cost per property type

13 Summary Energy Benchmarking Assessment

13.1 The following table details the percentage of each property type that performs better than a typical property of that type.

Property Type	Carbon	Electricity	Heating	Water
Cemeteries				
Changing Rooms				
Community Centres	78%	67%	80%	57%
Day / Resource Centres	80%	36%	50%	86%
Depots	52%	35%	40%	50%
Town Halls		83%	33%	100%
Housing/Accommodation	86%	38%	100%	
Industrial	60%	50%		29%
Libraries	83%	62%	50%	20%
Museum / Art Gallery	100%	50%	100%	100%
Nursery	50%	50%		100%
Offices	76%	66%	43%	69%
PC	62%	43%		
Pier / Harbour				
Primary School	74%	54%	48%	70%
Recycling/Landfill	38%			
Residential Home	81%	53%	50%	100%
Secondary School	60%	58%	46%	81%
Shop				
Special Needs Centres	67%	100%	67%	100%
Sport & Leisure	77%	75%	45%	75%
Visitor Centres	67%	50%	33%	67%
All	69%	54%	49%	70%

Table 6 - Summary overview of benchmarking performance

13.2 Commentary

- Figures highlighted in green denote more than 50% of that property type for that criteria perform better than a typical building of that type.
- Figures of 100% indicate that all buildings within that property type, for that criteria, perform better than typical.
- There is apprehension that the performance is simply too good to be fully accurate.
- Blank cells indicate benchmarking assessment not undertaken.

14 Commentary and Next Steps

14.1 The figures provide within this report and Appendix 1 are recommended to be considered as indicative only, due to the concerns detailed.

14.2 As the benchmarking process has developed it has become apparent that a greater than expected level of site input and information was required to provide full re-assurance in the stated performance assessments. (Not achievable to facilitate within the timeframe available).

14.3 It is therefore proposed to continue the exercise and to revert back to the Climate Change Committee in October 2023. To address the issue identified, the continuation would include:

- The initiation of a short life working group with representation from the Energy Team, Property, FM staff and HLH to facilitate the collation and understanding of the factors impacting on energy performance within the THC non-domestic estate.
- A refresh of energy data based upon the financial year 2022/23, which will reflect a more stable period and be a truer reflection of actual performances.

14.4 Finalisation of report and associated deliverables would be completed by October 2023.

Designation: Interim Chief Executive

Date: 6 March 2022

Author: Ronnie Macdonald, Energy Manager