2022 PIKHS Carbon Audit and Climate Action

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Prepared for:
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1. Introduction and Background

1.1 Background

The Pitquhirnikkut Ilihautiniq / Kitikmeot Heritage Society (PI/KHS), in its continued effort to reduce its impact on the environment, contracted Blue Sky Energy Engineering & Consulting Inc. (Blue Sky) to conduct a carbon audit and assist with the development of a climate action plan. This report summarizes the results of the carbon audit and the approach for the PI/KHS climate action strategy.

The work for this project was divided into four tasks, namely:

Task 1	Background document review including information provided by the client, as well as research and assessment of applicable arctic and indigenous climate mitigation plans.
Task 2	Energy data collection and assessment for both the existing facility and PI/KHS programs.
Task 3	Interviews with staff, directors, and local contractors through PIKHS contacts.
Task 4	Development of the Climate Action Strategy.

Blue Sky worked with members of the PIKHS staff, Elders, and local suppliers to complete the four tasks and the resulting plan is detailed in the following report.

1.2 Project Objectives

The objective of this project was to quantify PI/KHS's current carbon footprint and to help to shape a long-term vision and strategy to reduce environmental impact and combat climate change. This climate action strategy is in step with plans completed by the Municipality of Cambridge Bay and the Inuit Tapiriit Kanatami (ITK) and meshes with the strategic priorities of the PI/KHS, (as set out in the 2019-2024 Strategic Plan). In addition, the plan includes key priorities determined through the concurrent Green Technology Feasibility Study.

The deliverables for this project include:

- A review of energy use at the Heritage Society facility including an assessment of historical consumption analysis (depending on extent of data available), facility benchmarking and an existing technology energy assessment. The compiled data will be summarized in the final report but will also be delivered in a database for future use (excel).
- Determination of the carbon footprint of the current facility and PI/KHS programs using standard protocols.

- Development of a vision, goal and strategies for climate mitigation and the reduction of green house gas emissions.
- Completion of a final report summarizing energy analysis and the climate change action plan in straightforward language using Microsoft Word such that it can be used by the PI/KHS in other communication mediums

2. Historical Performance

2.1 Current PIKHS Facility Carbon Footprint

Energy consumption data was obtained from several sources including the Qulliq Energy Corporation (QEC) which provided electricity consumption data from January 2015 to April 2021. The PI/KHS resides within the Kiilinik High School facility and shares a single electricity meter.

Diesel fuel consumption was provided by Qillaq Innovations from the Petroleum Product Division for 2020 only. It should be noted that future tracking and measurement work will require regular access to energy consumption data and would benefit from a streamlined process for obtaining this information. Primary hydronic heating, delivered by diesel boilers, is provided not only to the high school but to the adjacent Kullik Ilihakvik Elementary School through a common system. The diesel delivery data provided by the energy company is therefore reflective of diesel fuel consumed at both schools (which includes the PI/KHS spaces).

There are several factors influencing energy use in each space, and submetering is not practical therefore, a simple division based on building footprint was used to determine the fraction of measured energy consumption attributable to the PI/KHS. Table 2.1 below illustrates the approximate footprint of both schools and the PI/KHS facility, and the relative percentages used to determine the appropriate energy consumption.

Table 2.1: Footprint of PIKHS Facility vs. Schools

Facility	Approximate Footprint (m^2)
Kiilinik High School:	3,548
Kullik Ilihakvik Elementary School:	3,378
PIKHS Space:	337
PIKHS % of High School Building:	**9.50%**
PIKHS % of Both Schools:	**4.9%**

Please note that the areas listed above are approximate as the exact footprint from architectural specifications was not available.

As noted above, QEC provided electricity consumption data from the Kiilinik school meter from January 2015 to April 2021. Figure 2.1 below illustrates the monthly consumption by year for the Kiilinik High School which houses the PI/KHS. Using the percentage footprint of the PI/KHS as indicated in Table 2.1 above, the PI/KHS portion of this energy use is approximately 9.5%.

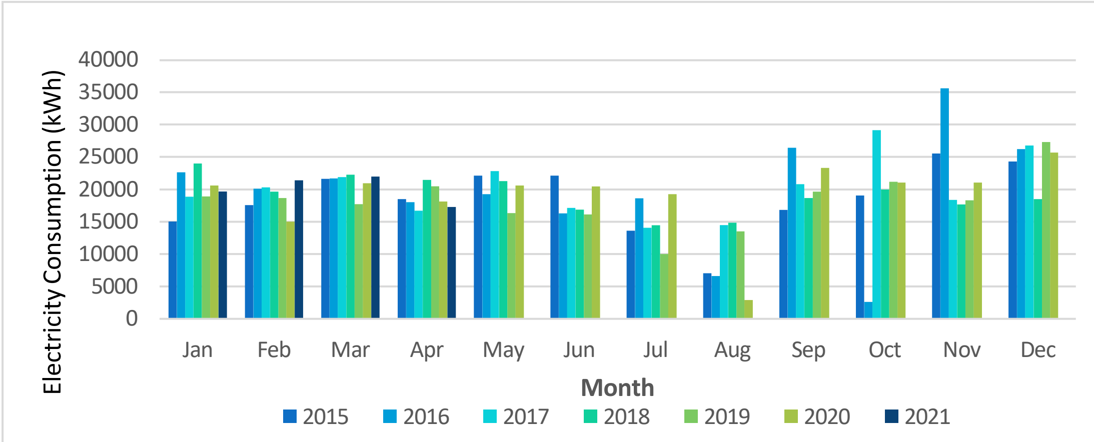

Figure 2.1: Electricity Consumption for Kiilnik High School

Reviewing Figure 2.1 above, the energy consumption lowers beginning in July and through August. This may be indicative of a lower activity level in the school or PI/KHS during the summer period. It was noted that programs at PI/KHS often move from indoors to outdoors on the land in the summer months.

Higher electricity consumption is shown in December which usually could be caused by additional electric heating loads however upon further review, this increase is not carried through the following winter months and is likely due to other unknown factors.

Figure 2.2 below illustrates the volume of diesel fuel delivered by month to the common holding tank for the Kiilnik High School and Kullik Ilihakvik Elementary School. The PI/KHS portion, determined by percentage footprint is approximately 4.9%.

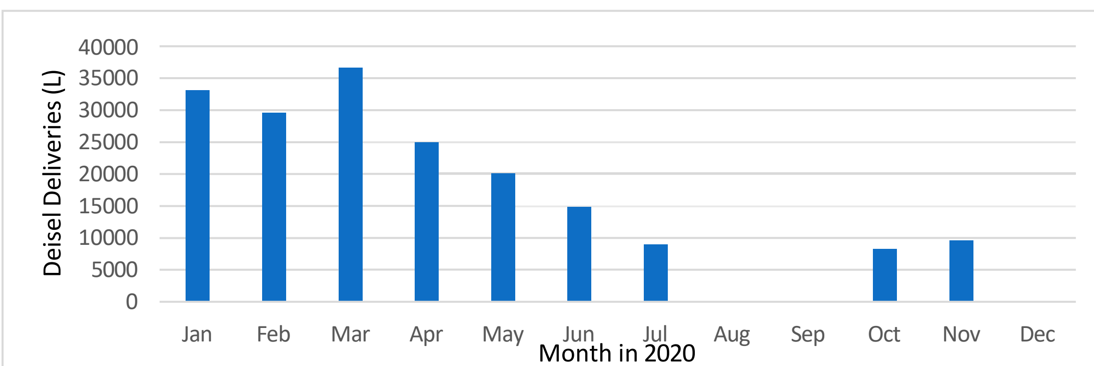

Figure 2.2: 2020 Diesel Deliveries for Kiilinik High School and Kullik Ilihakvik Elementary School

The data represented by Figure 2.2 was provided by the Petroleum Product Division and upon review, it is likely that the December data was inadvertently excluded as the volume of diesel should be similar to other winter months. It is recommended that further diesel consumption data be obtained over a longer period, to verify the consumption trends shown in Figure 2.2.

The total energy consumption and resulting GHG emissions in kg CO_2 for PI/KHS in 2020 are shown in Table 2.2 below.

Table 2.2: Total Energy Consumption PIKHS 2020

Energy Type	Diesel Consumption (L)	Electricity Consumption (kWh)	Cost $	GHG Emissions (kg eCO_2)	Method
Diesel (Heating)	9,056.31		$9,350	24,452	Total Diesel Deliveries x 4.9%
Electricity		21,725	$14,590	16,293	Total Electricity Consumption x 9.5%
Total:	**9,056.31**	**21,725**	**$23,940**	**40,745**	

The table illustrate that the activities at the PI/KHS resulted in 40.7 tonnes of eCO_2 in 2020. Figure 2.3 below, shows the breakdown of GHG emissions and overall cost between the two energy sources.

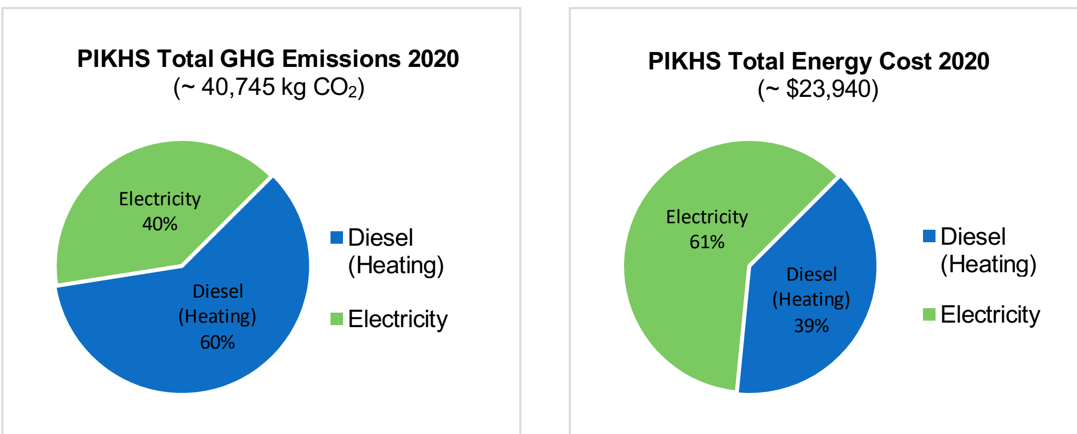

Figure 2.3: Breakdown of GHG Emissions and Cost by Energy Type

Although diesel fuel consumed for space heating is only 40% of the overall cost of energy, it is responsible for 60% of the building's GHG emissions. As noted previously, it is believed that the Diesel fuel consumption data may be underrepresented and therefore the contribution of diesel fuel to overall costs and emissions is likely conservative.

2.2 Energy Use Breakdown

A full electrical equipment inventory was completed with the assistance of PI/KHS staff to provide a breakdown of how energy is used in the facility. Figure 2.4 below, illustrates the breakdown for electricity. A full breakdown of specific equipment and technical assumptions was provided to PI/KHS in excel format.

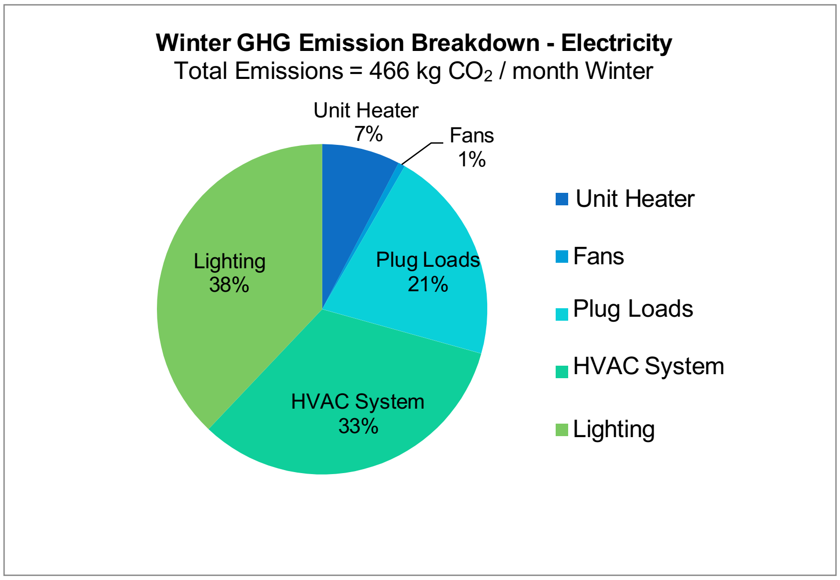

Figure 2.4: Electricity Emissions Breakdown for PIKHS – Winter

Please note that the breakdown shown above is typical of winter months when heating supply fans and hydronic pumps will be in operation. This chart illustrates that lighting, HVAC systems and plug loads are the largest electricity consumers

Figure 2.5 below illustrates the breakdown of emissions from all energy sources including diesel. Please note that the average diesel monthly consumption for January to March 2020 was used for this graph.

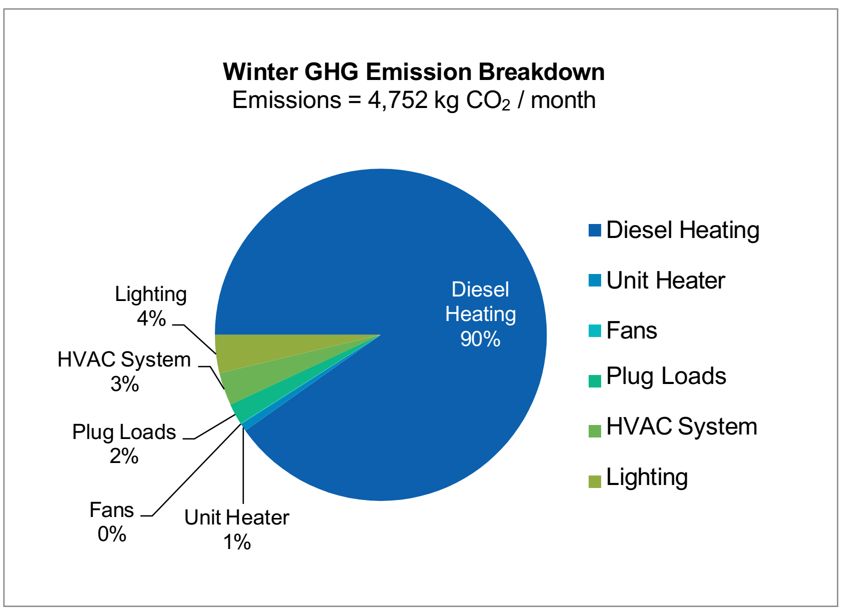

Figure 2.5: Winter GHG Emissions Breakdown for PIKHS

Figure 2.5 clearly indicates that diesel fuel used for heating is the larges contributor to greenhouse gas emissions for the Society during the winter. Any actions to improve heating efficiency will have the largest impact. It is worth noting that diesel for heating is not used during the short summer months and the breakdown for the summer would look similar to Figure 2.4 with lower HVAC system electrical loads.

2.3 PIKHS Carbon Emissions from Travel

In addition to energy consumed within the facility, the PIKHS staff uses energy to travel to various locations through-out the year. GHG emissions from transportation, tabulated from one fiscal year (April 1, 2019 – March 31, 2020), is broken down by travel type in Figure 2.6 below.

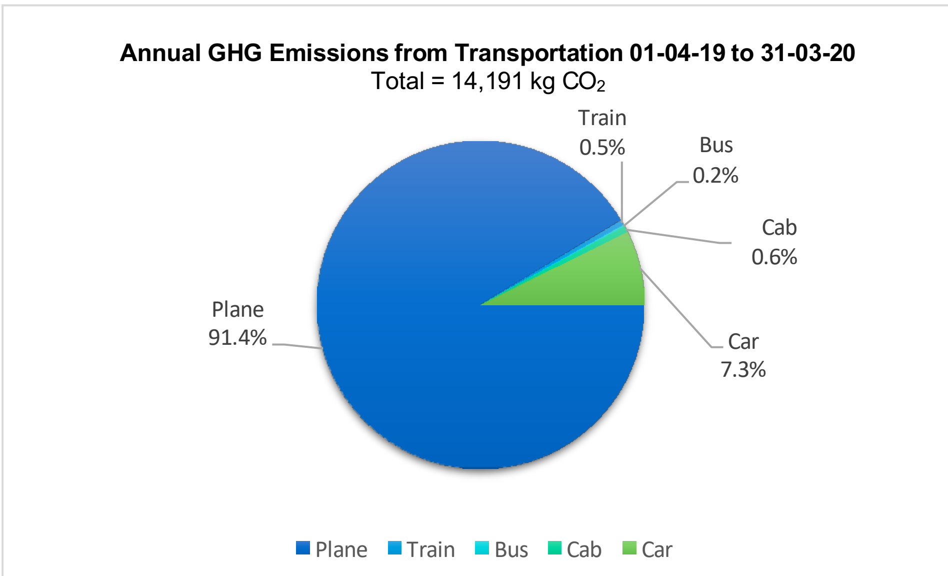

Figure 2.6: Annual Emissions Breakdown for Travel (01-04-19 to 31-03-20)

This graph illustrates that over 90% of travel emissions are the result of air travel. Any changes to protocol to help reduce air travel will result in the largest positive impact to this category.

In order to better observe categories other than air travel, Figure 2.7 below shows the breakdown with air transportation removed.

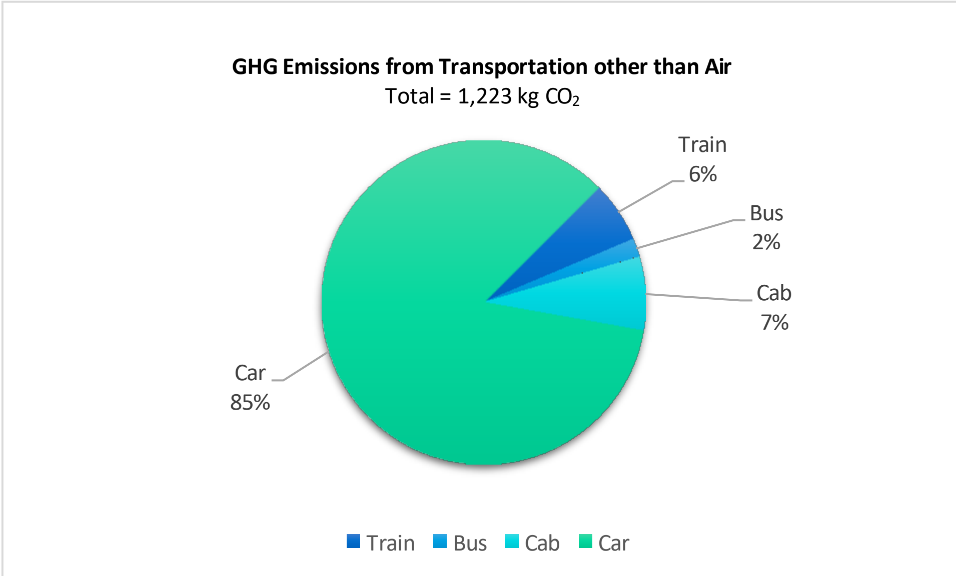

Figure 2.7: Annual Emissions Breakdown for Travel Excluding Air (01-04-19 to 31-03-20)

Baseline data with assumptions for this breakdown have been provided in an excel spreadsheet to the PI/KHS for future comparison.