



**a place of mind**  
THE UNIVERSITY OF BRITISH COLUMBIA

Facilities Management  
The University of British Columbia |  
Okanagan Campus  
1138 Alumni Avenue | Kelowna BC | V1V 1V7 Canada  
Phone 250.807.9272  
[facilities.ok@ubc.ca](mailto:facilities.ok@ubc.ca)

**UBC Okanagan Campus  
Energy Operations  
Quarterly Report  
April 2020 – June 2020**

**Report Date: 2019-09-18**



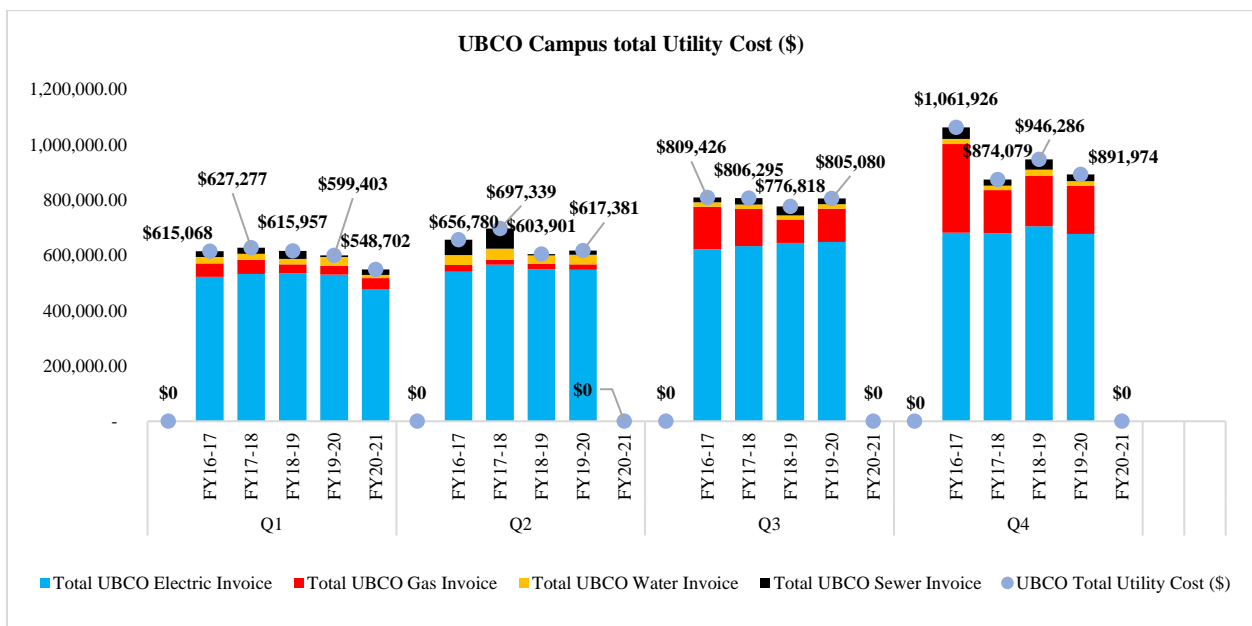
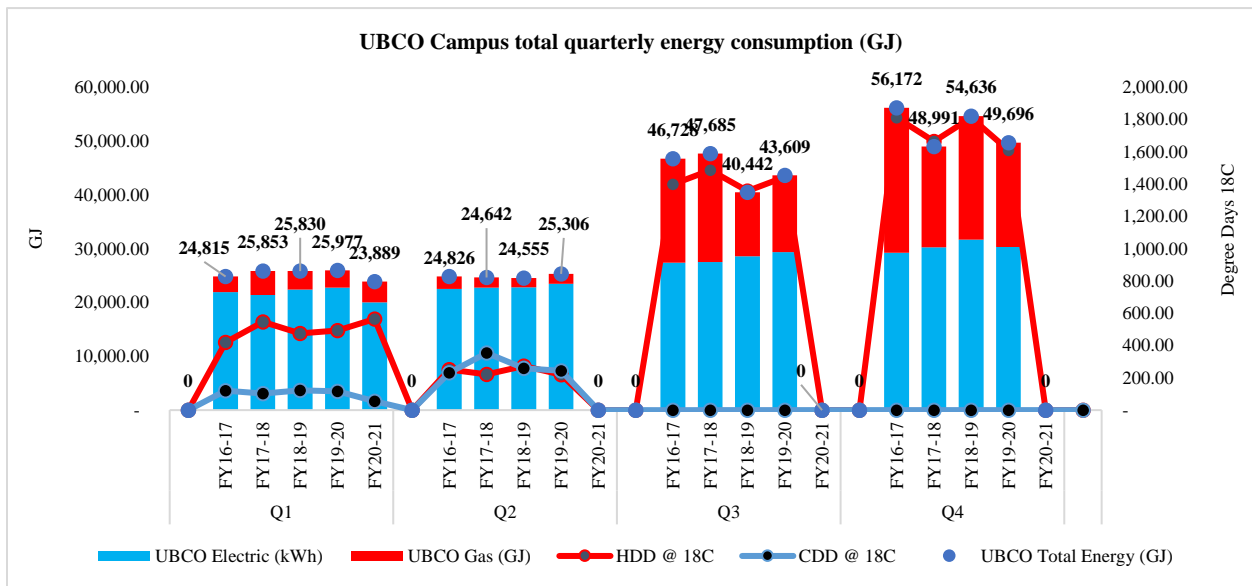
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# 1. Overview of the First Quarter of FY2020-2021

UBCO Campus total energy consumption over the past quarter (Q1 2020) was 23,884 GJ compared to 26,426 GJ for Q1 last year (Q1 2019), a 9.62% year over year reduction leading to an 8.46% reduction in total campus utility cost. This total energy consumption includes a 12.07% reduction in campus Electricity consumption i.e. from 6,318 MWh in Q1 2019 to 5,556 in Q1 2020 and a 10.74% reduction in campus Natural Gas consumption i.e. from 4,350 GJ in Q1 2019 to 3,882.70 GJ in Q1 2020. This reduction in campus energy consumption can be primarily attributed to SARS-CoV-2 (Covid-19) and a few energy conservation measures implemented in Q2 to Q4 of FY 19-20.





## 2. Policy Development

Appropriate policies and guidelines assist in meeting campus energy goals and as such are championed by Energy Operations. Significant developments in energy-related campus guidelines and policies that occurred in the past quarter are described below.

### 2.1. Strategic Energy Management Plan (SEMP) 2020

Energy Operations engaged with SES Consulting in February 2020 to revise and update the five-year Strategic Energy Management Plan (SEMP). The primary objective of this SEMP edition is to explore potential Demand Side Management scenarios towards achieving the GHG emissions target of 80% below 2013 levels by 2030 based on the gross GHG values. A list of demand-side management (DSM) projects were analyzed and grouped into five bundles to represent annual implementation plans starting with the present fiscal period of FY2021, and proceeding through FY2025. The five-year SEM plan highlighted three key actions for UBCO Energy Operations as follows to meet the proposed 2030 GHG emissions target:

- Potential demand-side management projects to be pursued in the near future to reduce energy consumption on campus
- The need to combine DSM projects along with some degree of fuel-shifting on the supply-side and explore the cost effectiveness between demand side and supply side measures
- The need to maintain the annual energy spending budget at the current levels at least for the next 5 years

### 2.2. High-Level Net-Zero Carbon District Energy (DE) Strategy

The main campus is expected to grow with the addition of Innovation Precinct. This has motivated further analysis and consideration of district energy strategy with a view of modernization, renewal, and growth to serve both existing and new loads. The purpose of this District Energy Strategy is to develop high-level options to reach a future state anticipating Campus growth consistent with UBC Okanagan goals and aspirations.

A list of following potential options with quantitative and qualitative results were presented to the UBC steering committee:

- Alternative 1: Reference case – Packaged equipment
- Alternative 2: Central Plant scale heat pumps generating hot and chilled water for 4-pipe distribution to all new buildings
- Alternative 3: LDES connection to each new building with building scale heat pumps
- Alternative 4 – Hybrid approach between alternative 2 and 3. Distributed Zone Plant scale heat pumps generating hot and chilled water for 4-pipe distribution to new buildings within the associated building cluster. LDES connection between the distributed plants

A decision was made by the UBC steering committee to proceed with district energy utility services where district scale water source heat pumps provide hot and cold water to the buildings. With the distribution and energy transfer station strategy set, the focus turns to definition and decarbonization, as well as strategy for service to the new ICI building on the main campus. The ICI building may serve as a new main campus interface between the existing LDES system and a new four-pipe DES service to multiple new and existing buildings on the Main Campus. Preliminary design of this system is currently being undertaken as part of phase 3 where the main deliverables are as follows:

- Advance/ create concept design



- Explore potential strategies to decarbonize District Energy heat sources
- Present business case for District Energy systems

### 2.3. Energy Monitoring and Data Management Platform

Energy data for the campus is obtained from a number of sources including utility bills, manual meter readings and building digital control systems. UBCO Energy Operations has engaged with the UBCO School of Engineering to develop a custom data management system for the campus. This project aims to develop an intelligent data driven energy monitoring and management system for micro communities using statistical and advanced data analysis methods.

### 2.4. Future Campus Construction

In order to ensure that future campus energy goals and targets are met, it is important that new buildings constructed on campus are designed and built to be consistent with the Whole Systems Infrastructure plan as well as other campus plans and goals. As such, Energy Operations has been involved in providing technical reviews and setting goals, targets and strategies as early as possible for future campus expansions.

### 2.5. Technical Guidelines

Technical Guidelines are intended to provide minimum standards for campus projects. There are a large number of guidelines that cover both UBC as a whole and some that are specific to the Okanagan campus. Energy Operations has been working to update several that are specific to energy performance and monitoring.

## 3. Energy Conservation Projects

Due to SARS-CoV-2 (Covid-19), funding has been suspended for energy improvement projects. However, following projects have been completed/ are in progress over the last quarter.

### 3.1. UBCO Wi-Fi Occupancy Upgrade: Chipkin CAS move

WIFI-enabled device counting, using Sensible Building Science technology to measure the human occupancy via the monitoring of WIFI-enabled devices has been implemented on campus. The Chipkin CAS Json to bacNET converter passes Wifi occupancy zone counts from the bridge to the BAS (Building Automation System). The BAS system takes occupancy information and utilizing the existing programming, responds to changes in occupancy by adjusting air handling equipment operation.

### 3.2. Recommissioning of UCH Building

FortisBC funded recommissioning (RCx) study for Upper Campus Health (MWO) Building was completed by Prism Engineering in March 2019. This study identified deficiencies in the operation of the buildings that were wasting energy, increasing equipment wear and tear or decreasing occupant comfort. Kimco Controls Ltd. was contracted to implement the RCx recommendations as per the study which included the reprogramming and onsite testing. The RCx measures implemented will be reviewed and monitored in the heating season of this year.



### 3.3. Monitoring improvements

A few monitoring improvements were implemented by UBCO energy Operations which included updating the programming for cooling tower energy tracking at 15-min intervals as well as LDES heat consumption/ rejection for the UNC and CCS buildings. Energy Operations also provided inputs to reduce energy consumption for the following routine capital projects:

- Science building coil upgrade to enable more LDES usage and decrease dependence on the MDES system
- ASC building coil replacement

## 4. New Construction Projects

Energy Operations is involved in the design and construction process for new construction on campus. Energy Operations goal is to ensure that the design and construction of new buildings on campus are consistent with the campus Whole Systems Infrastructure Plan in terms of energy targets and sources. Energy Operations also co-ordinates the pursuit of energy efficiency incentives from FortisBC. The two new major buildings Skeena and Nechako residence buildings have already been discussed in the Annual FY 19-20 report. A total of \$324K have been approved by FortisBC towards the construction of these two residence buildings.

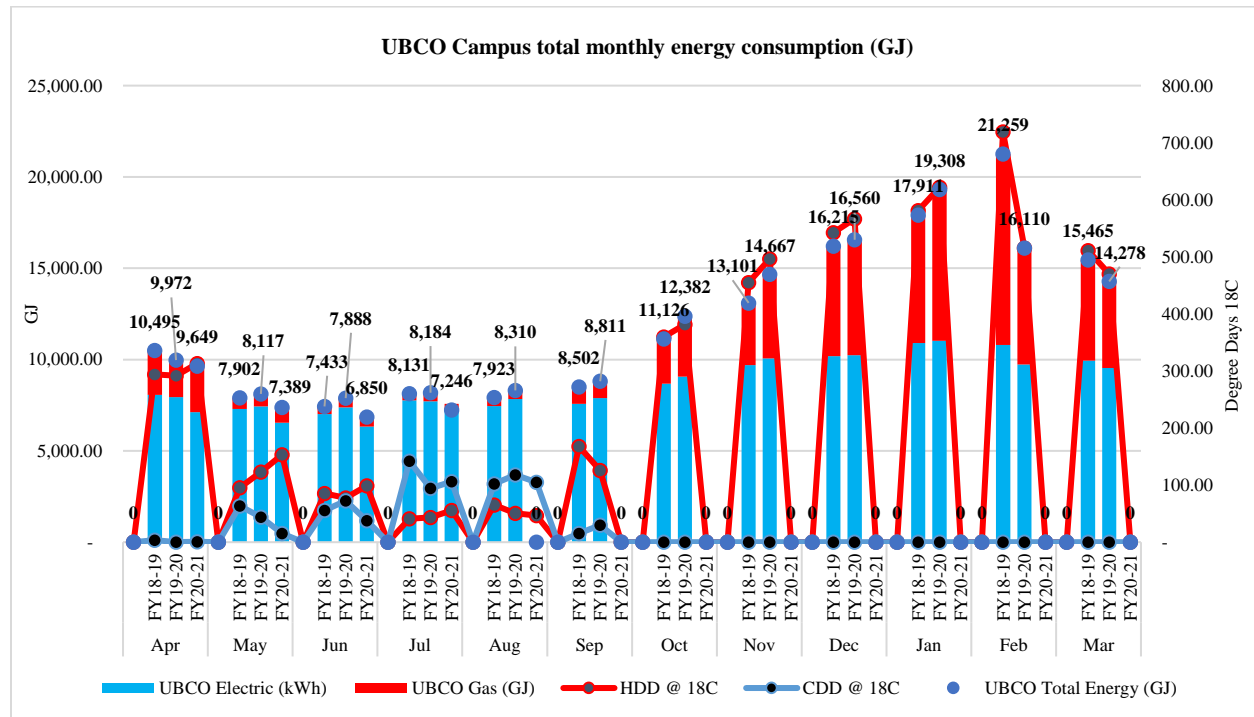
### 4.1. Interdisciplinary Collaboration and Innovation (ICI)

The UBC Okanagan Campus (UBCO) is proposing a new building to facilitate world-leading, interdisciplinary/ transdisciplinary research and academic programming, and to advance its mandate as a partner in regional development. Tentatively titled the Interdisciplinary Collaboration and Innovation (ICI) building is expected to be up to 13,364 gross square meters. Energy Operations has been involved in advancing the Owner's Project Requirements (OPR) for the ICI building and providing inputs on the energy related standards/ benchmarks.

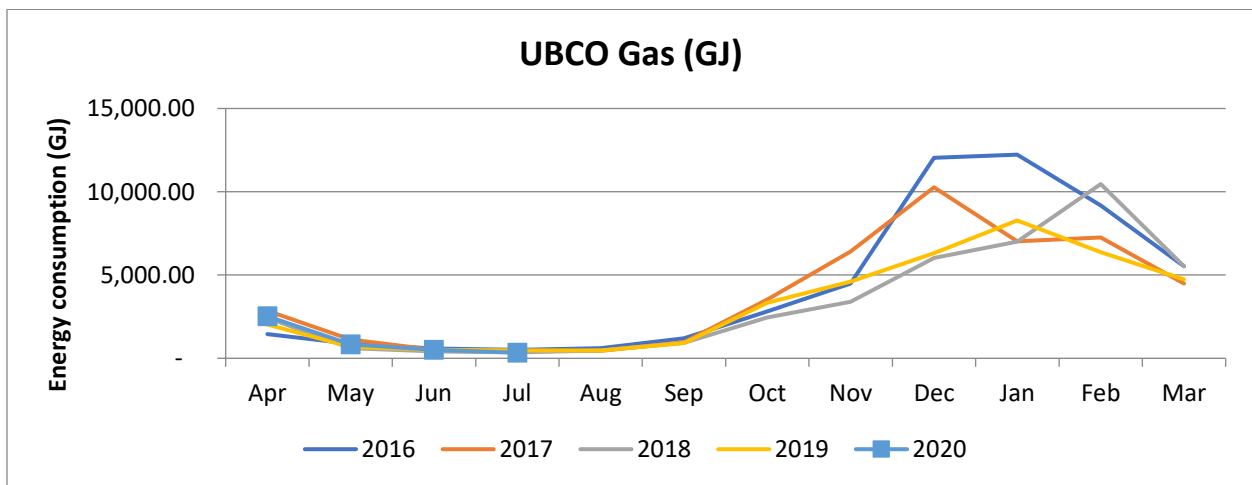
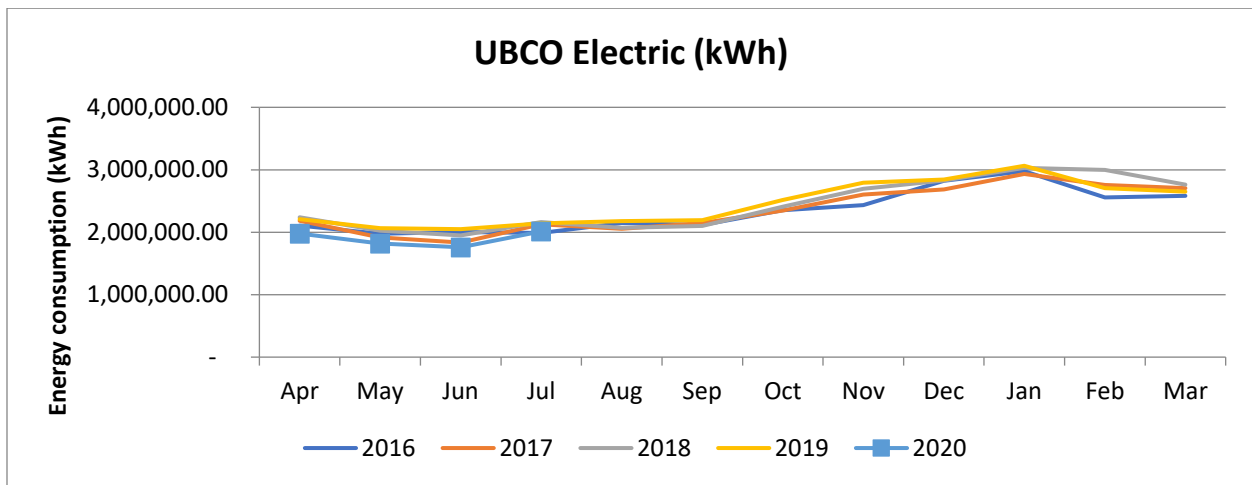
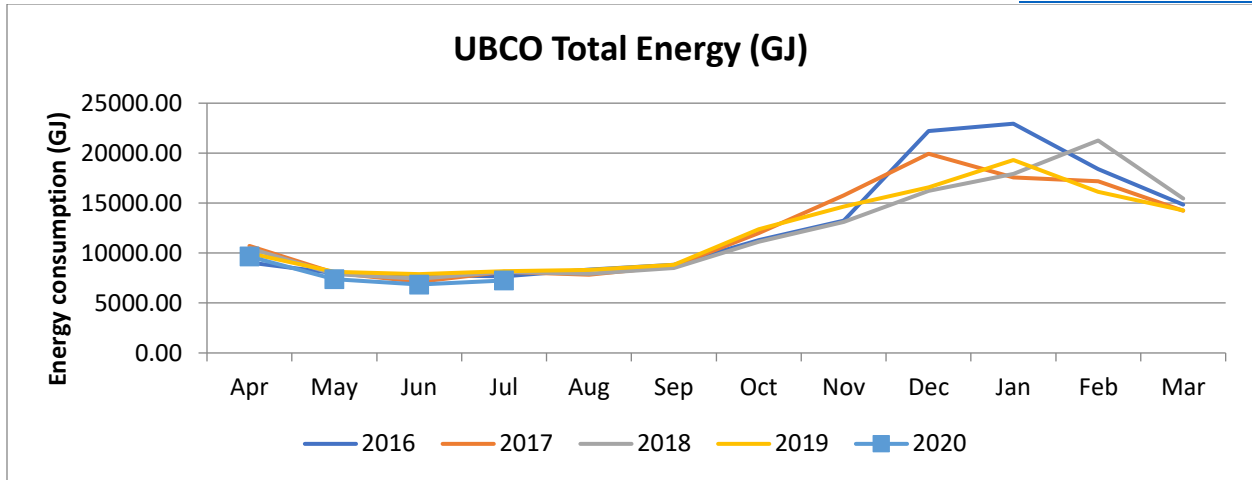


## 5. Monthly Energy Performance Graphs

This section presents various figures which shows and compares the month over month energy consumption from FY 17-18 to FY 20-21<sup>1</sup>.

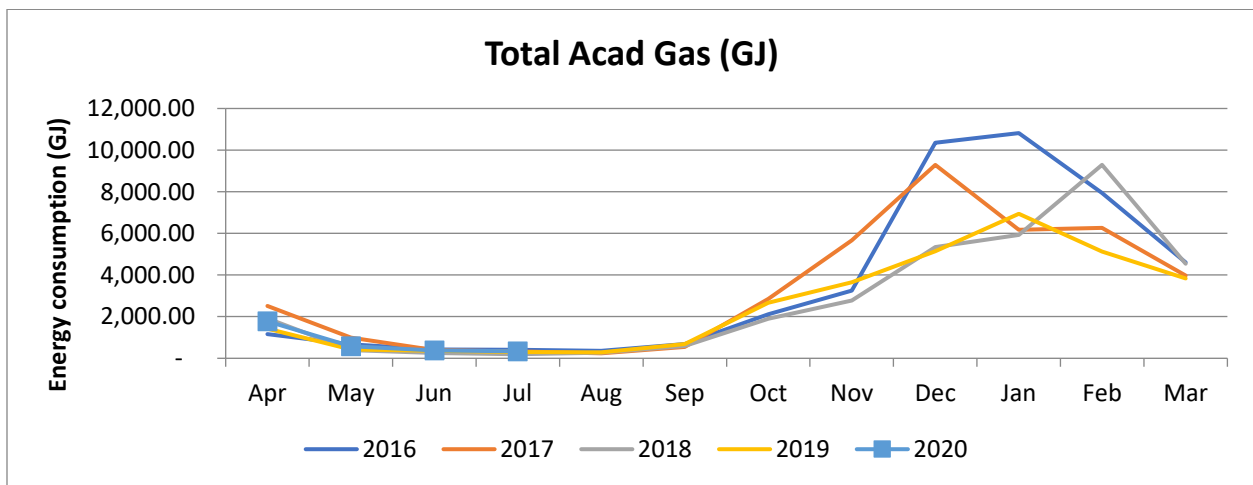
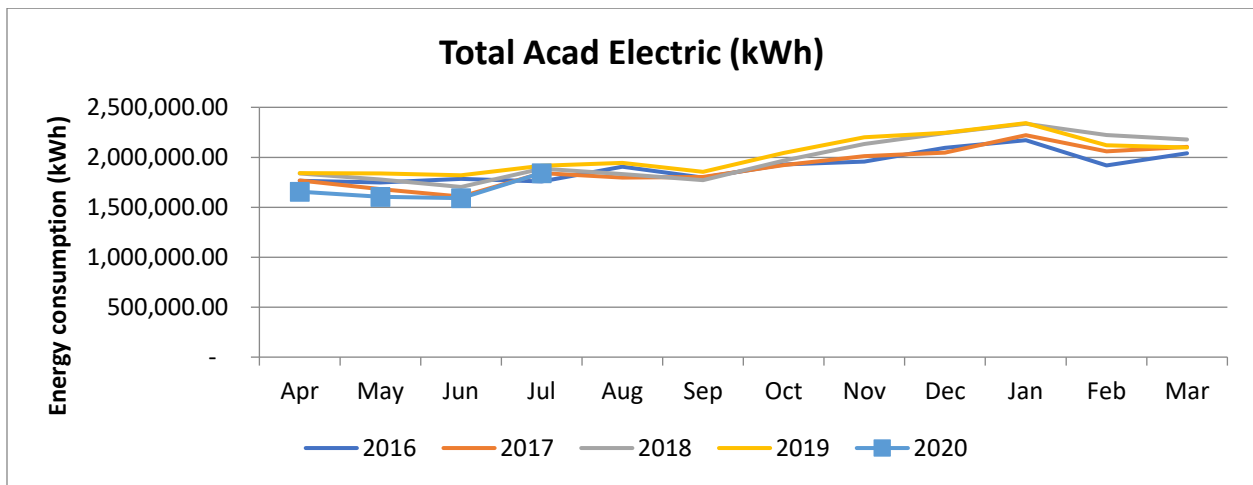
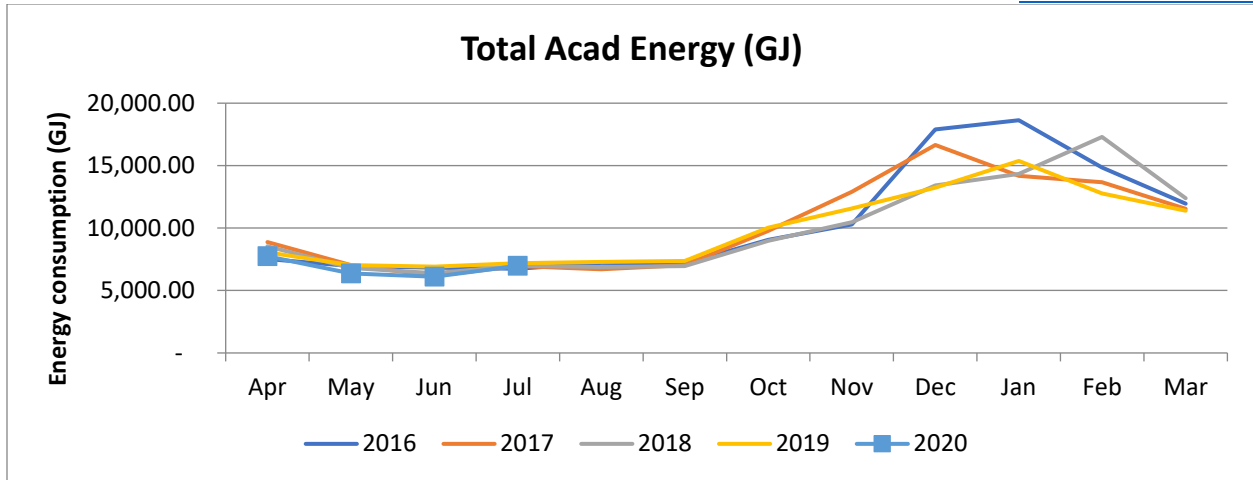


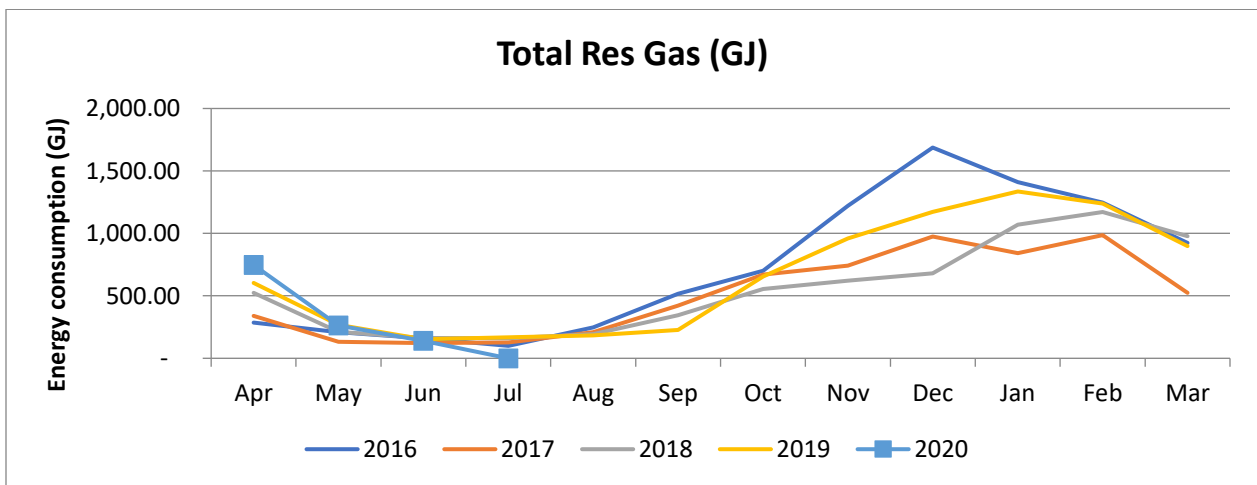
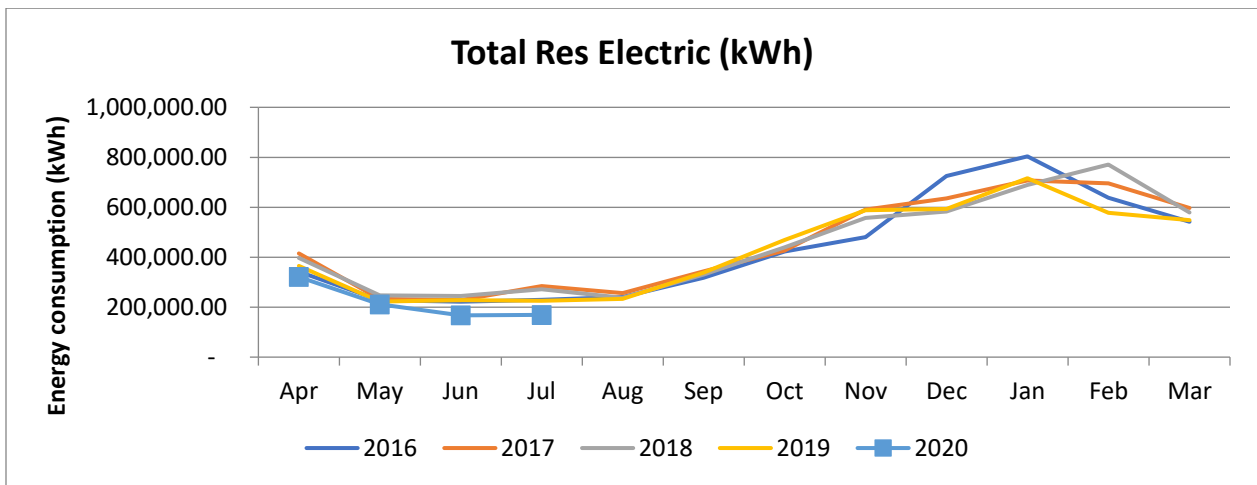
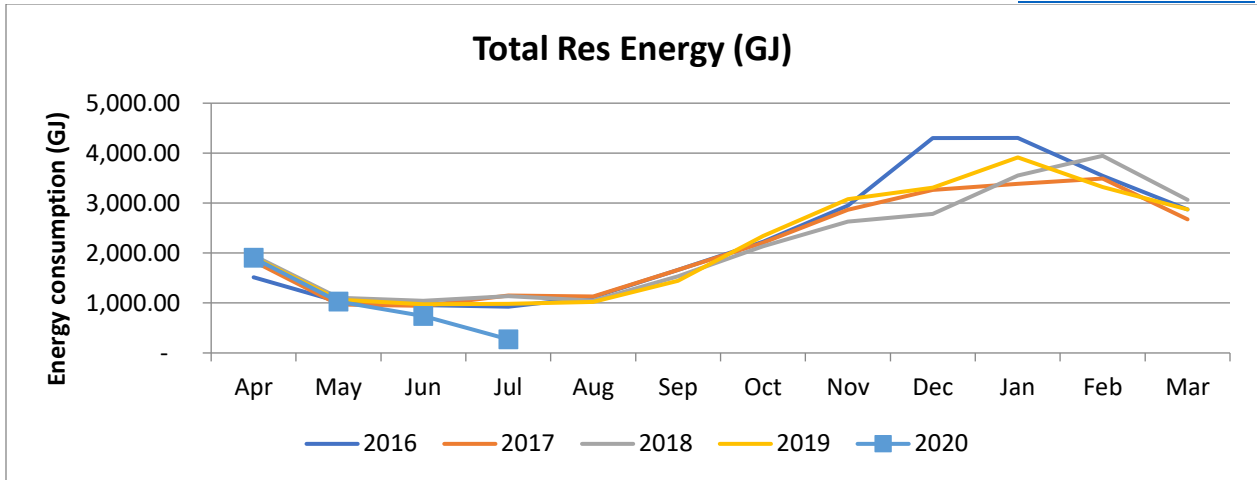
<sup>1</sup> For section 6, any year listed in the graph is start of the fiscal year.

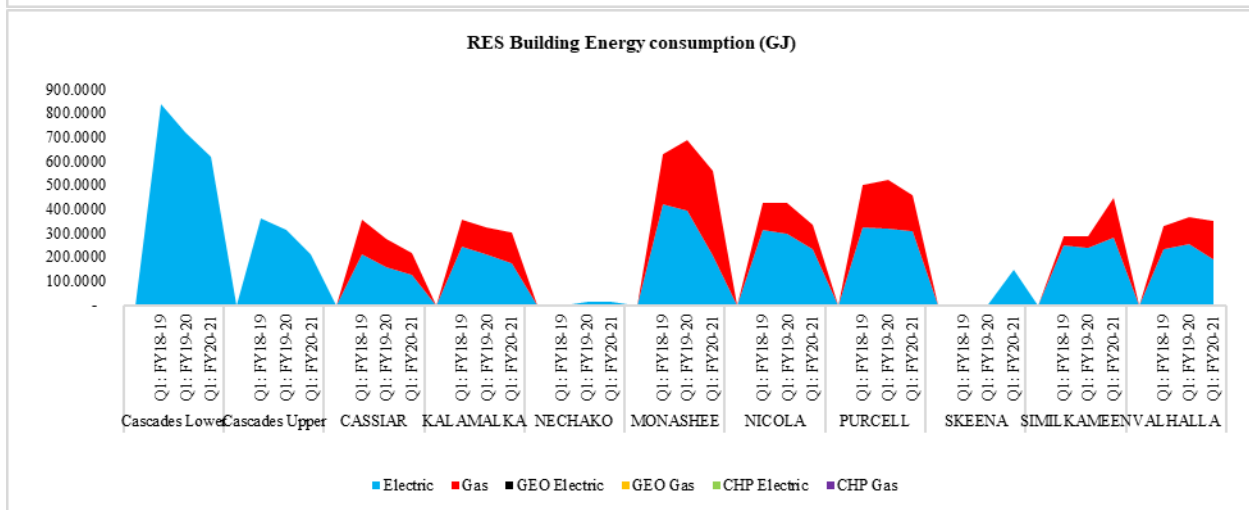
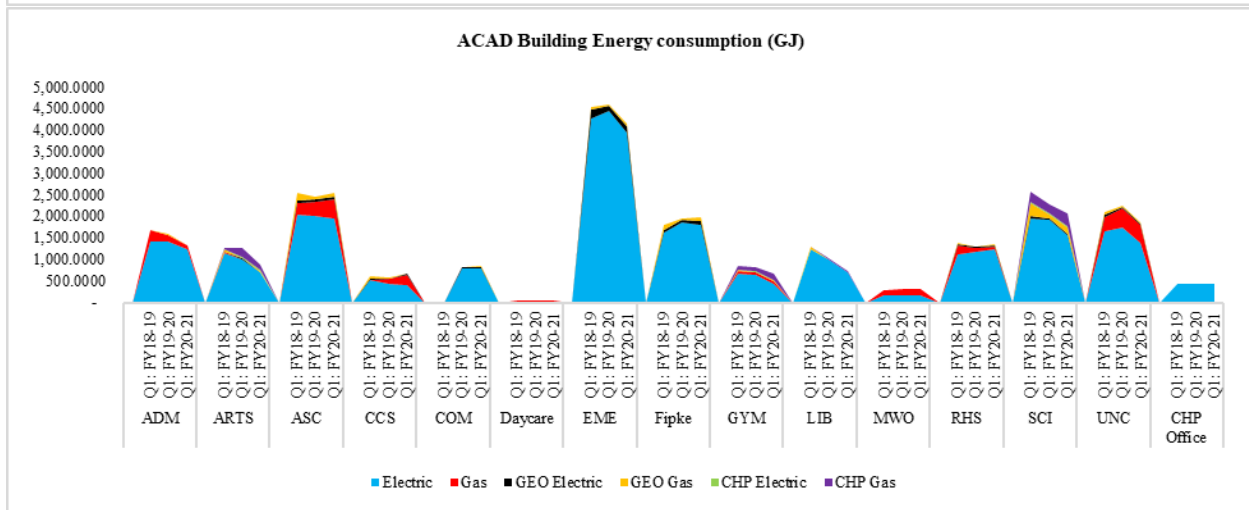
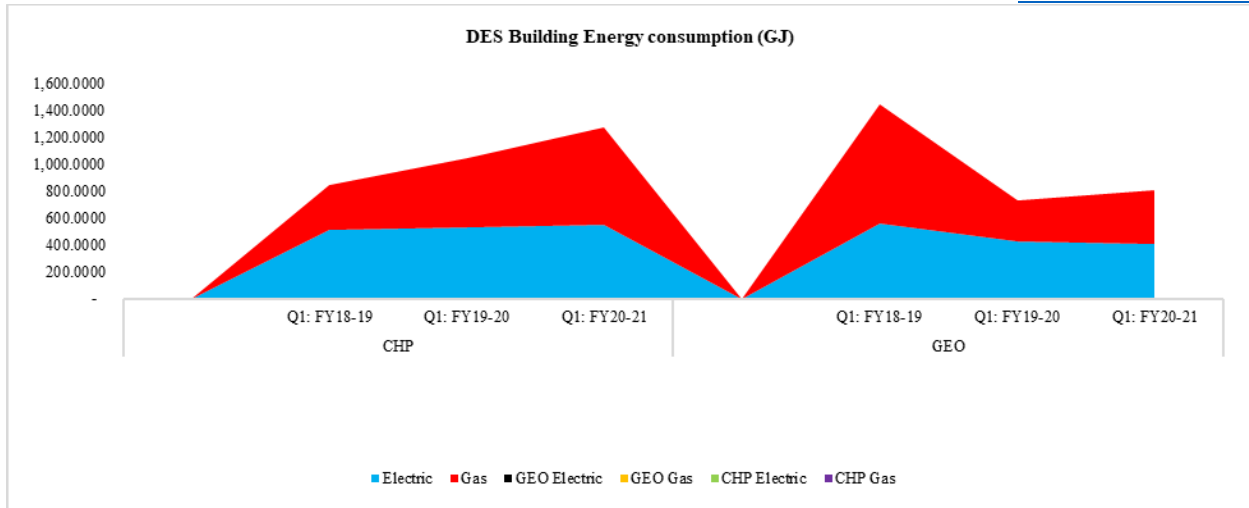


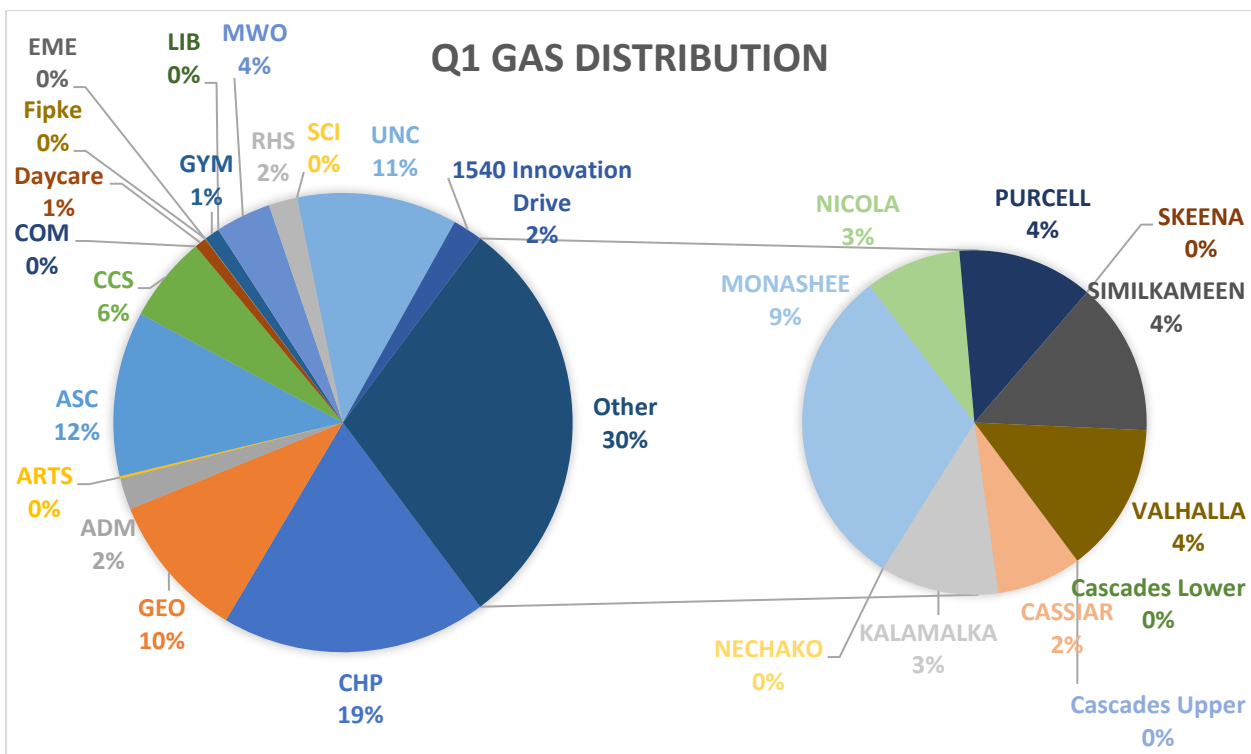
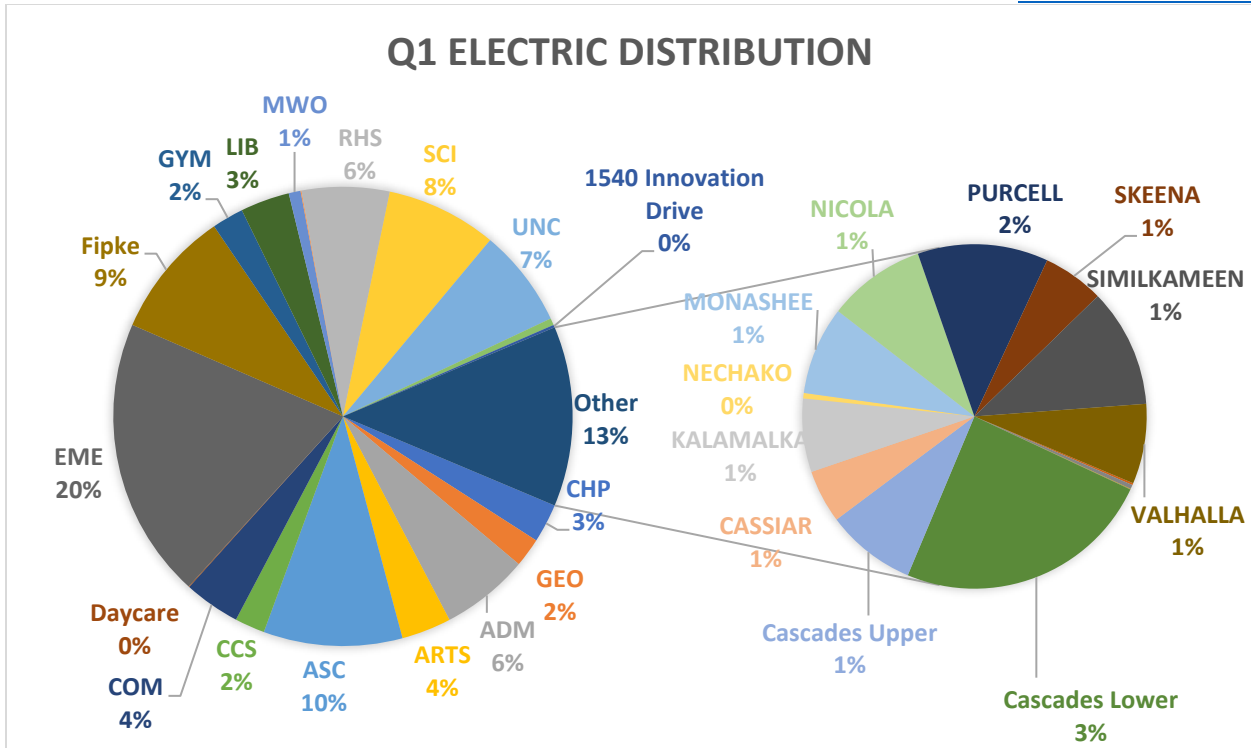




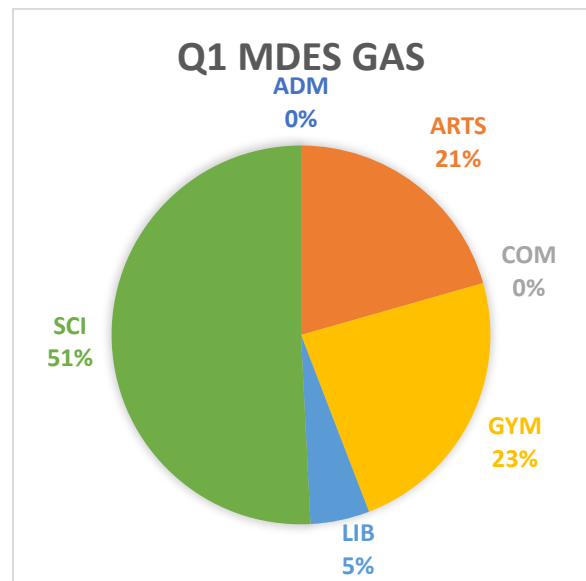
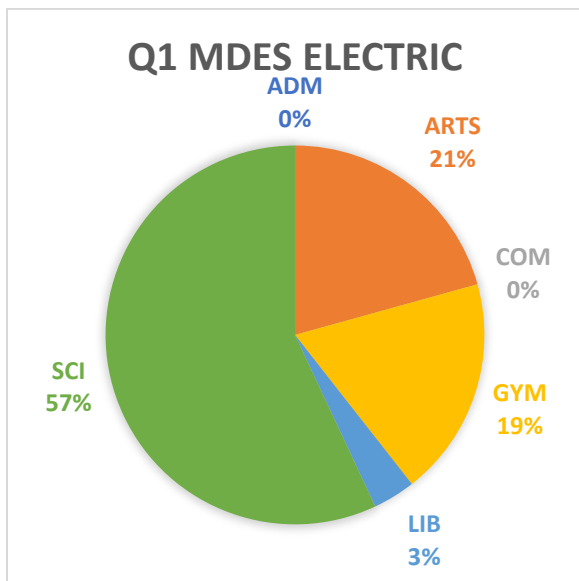
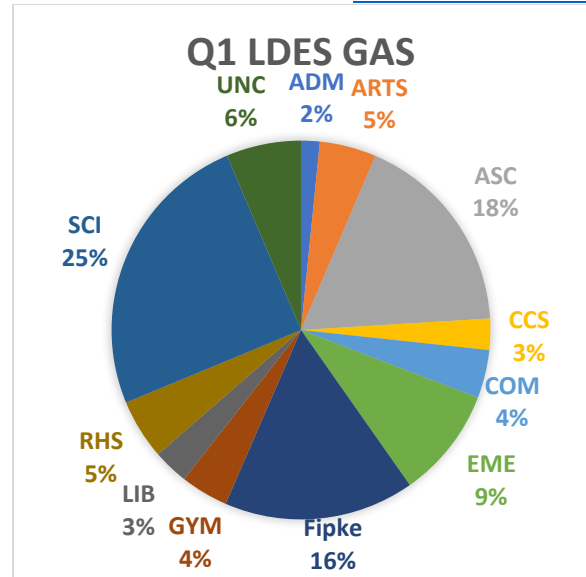
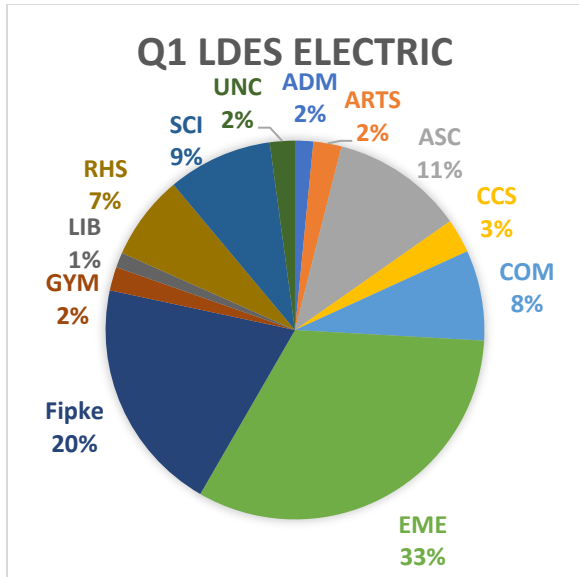


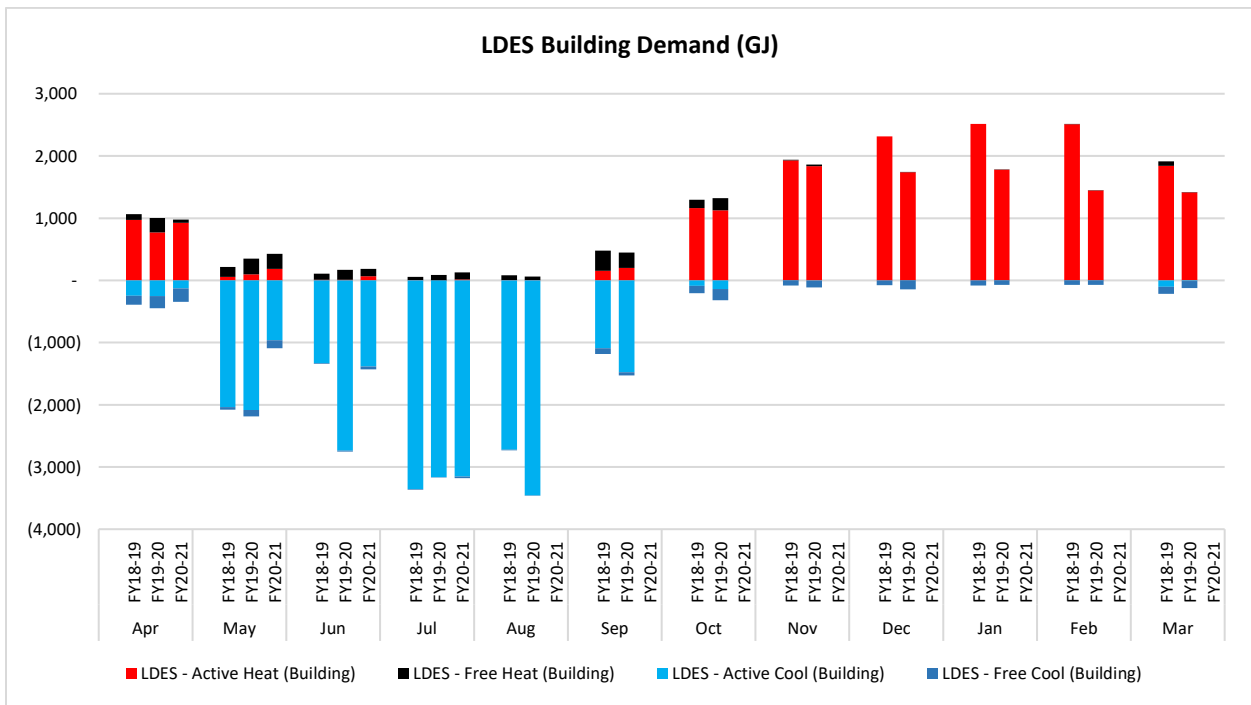
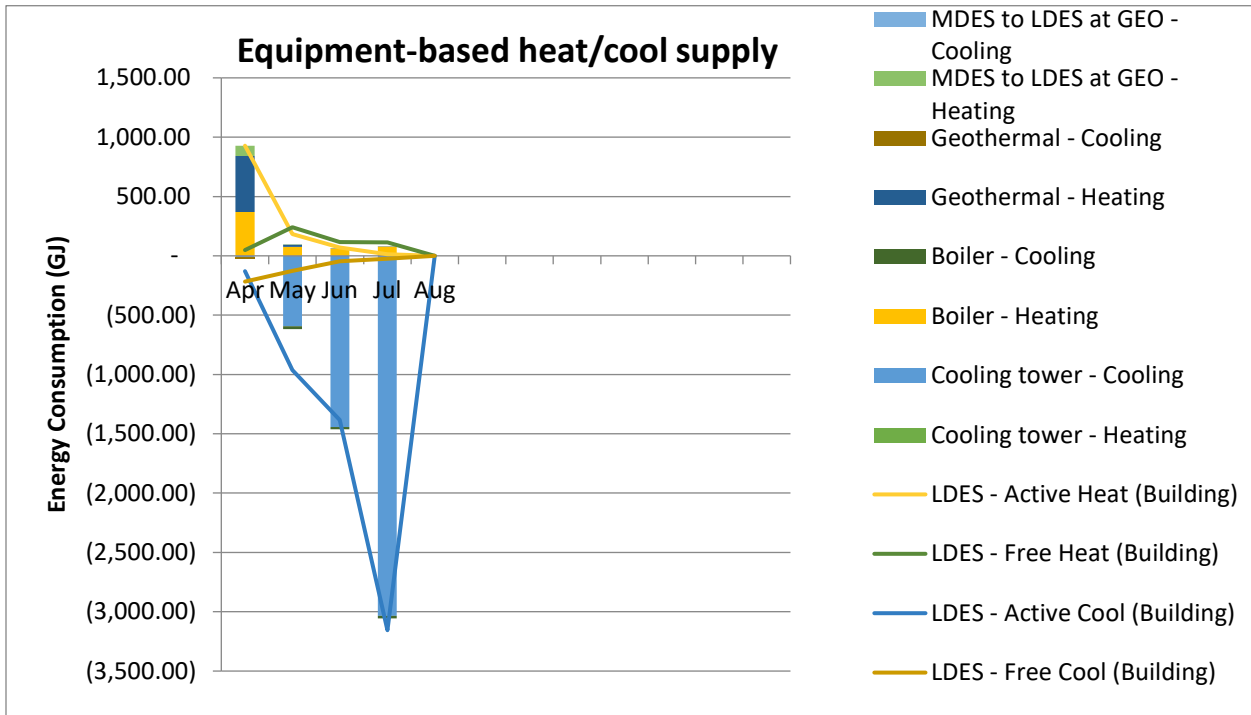






Note: Building electricity and gas consumption values shown are for consumption within the building. Indirect gas consumption via MDES & LDES is not included.





Note: MDES data not shown for Q1 due to minimal use during this season.