CONNECTIONS SUMMIT

City of Durham
Smart Building Analytics

ELECTRICITIES of NORTH CAROLINA, INC.

Strategic Alignment

Strategic Plan

- Goal: Sustainable, Natural, and Built Environment
  - Key Initiative: Reduce energy consumption and enhance life cycle of buildings with building automation systems, sensors, and analytics.

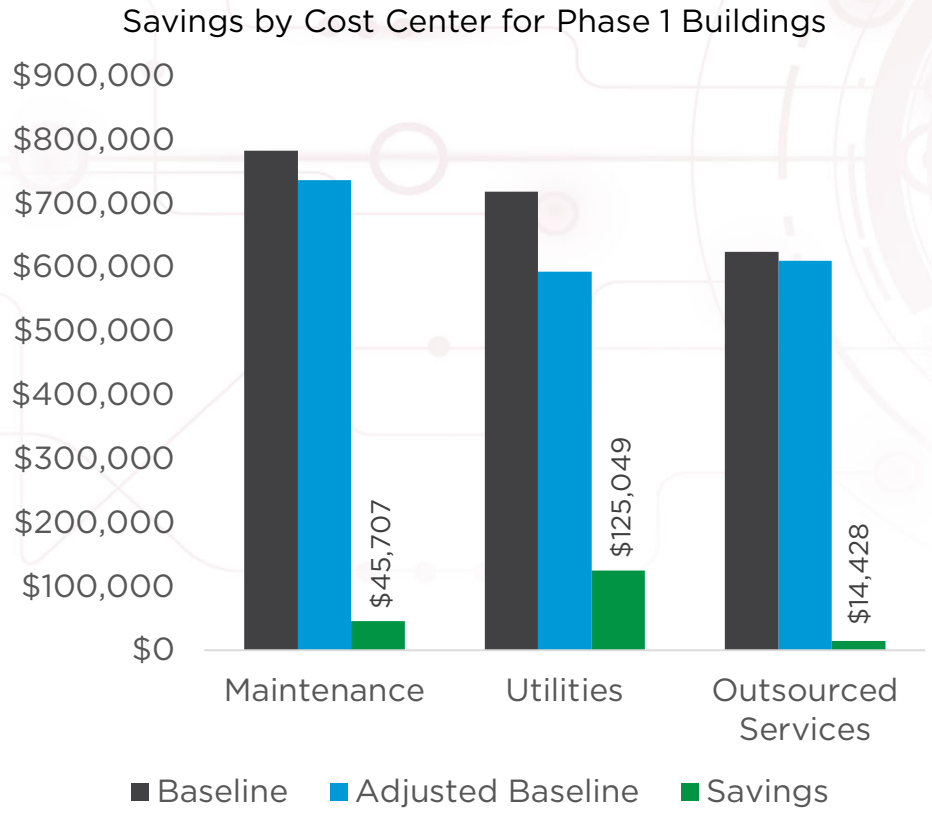
Sustainability Program and Roadmap

Smart Building Analytics

- Real-time monitoring of sensors from an array of devices
- Modeling “normal” behavior and highlighting potential deviations
- Recommending maintenance based on changes in system performance
- Intelligent Alerting designed to mimic a technician’s approach
- Optimizing settings using Artificial Intelligence
- Real-time building performance visualization with Smart Building dashboards

Phase I Expansion

- City Hall
- Police HQ
- General Services



General Services Overview

Discoveries

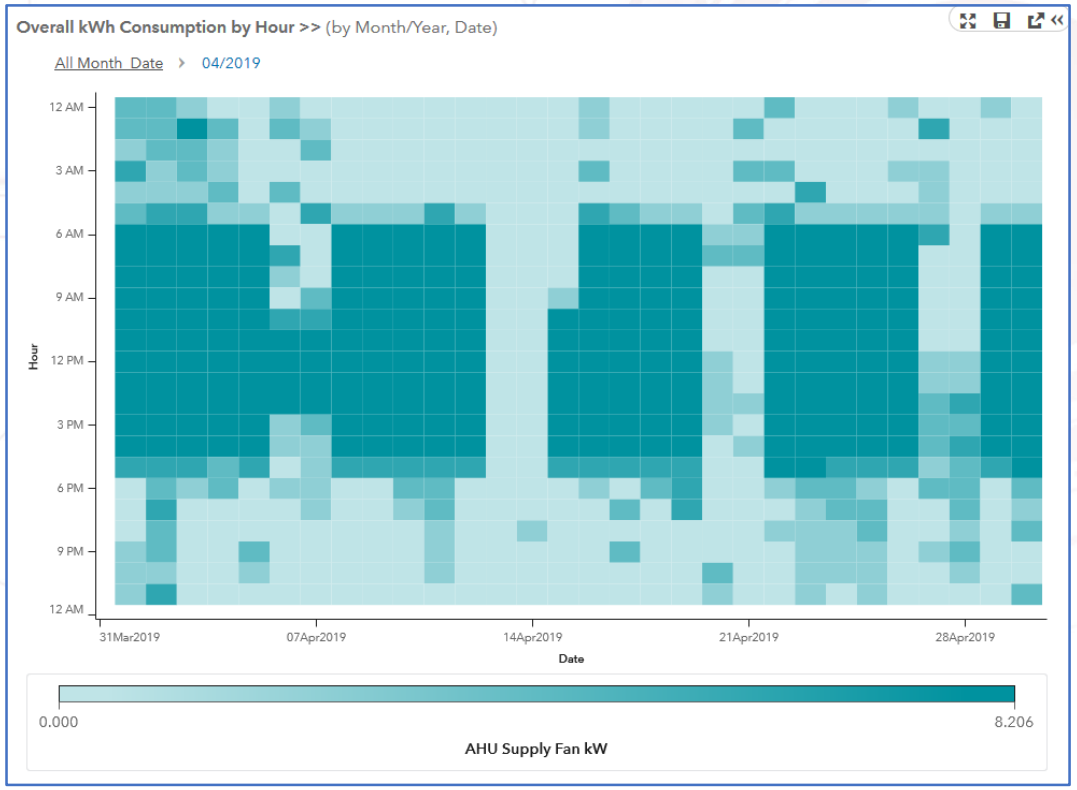
- Systems were not being set back on weekends
- Unit heaters were running 24/7
- VFDs were not operating as intended on AHUs

Results

- $4,500 savings in annual utility cost
- $3,750 in avoided capital expenditure due to prolonged equipment life
- Mobile based alerts for facilities staff to find root-causes

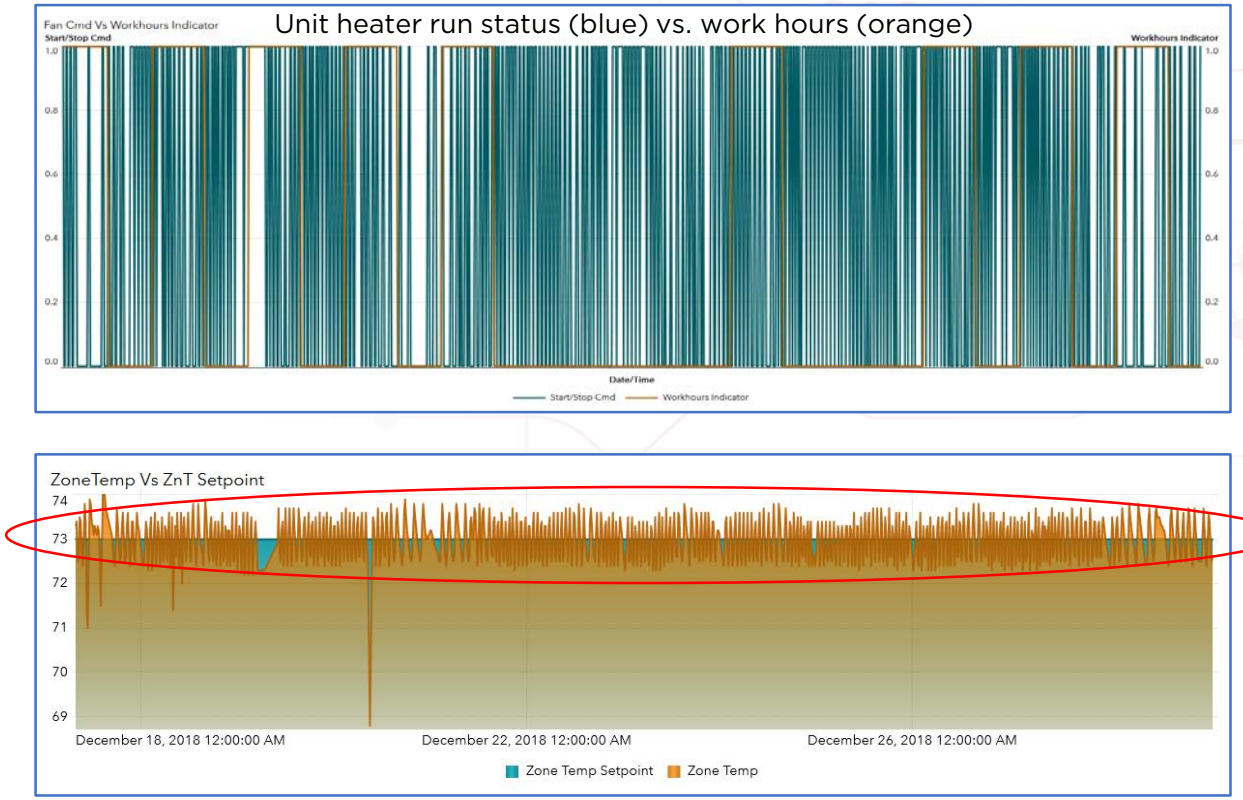
Equipment Operating Hours

Before



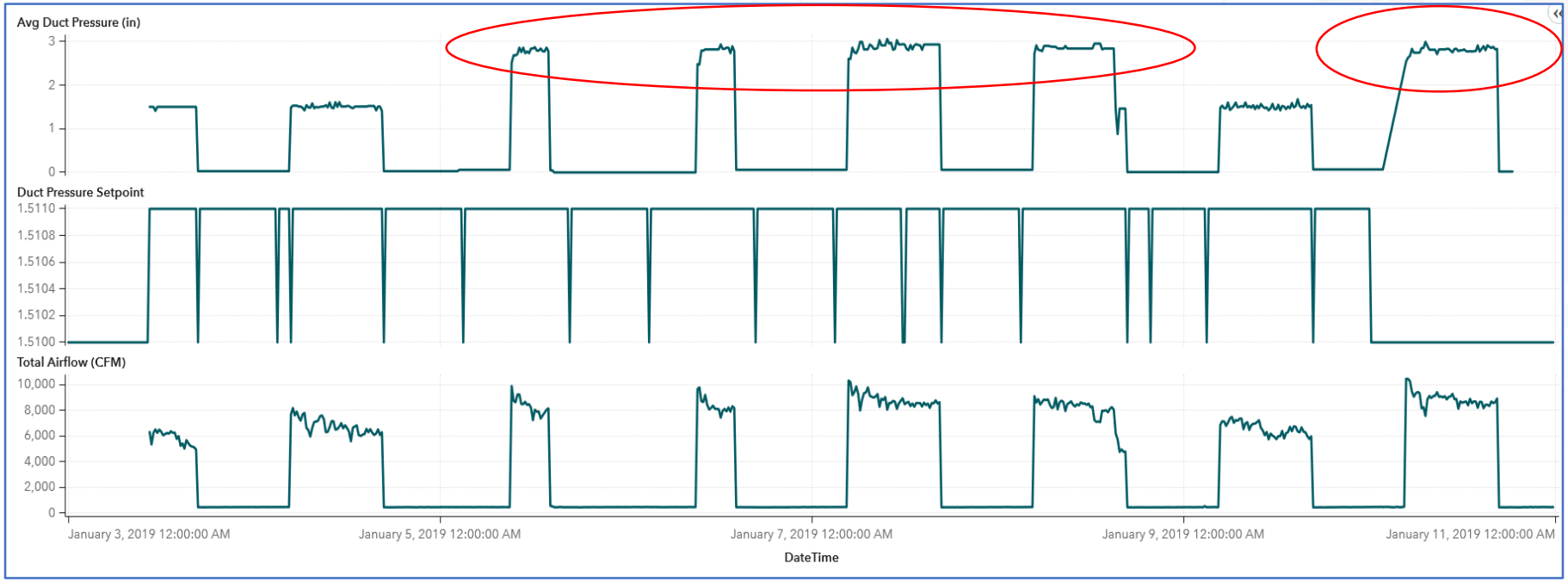
After

Unit Heater Operation



Unit heater control: Zone Temperature vs. Setpoint

VFD Operation



VFD Operation: Static Pressure vs. Setpoint

CITY OF DURHAM

General Services Building

Year of Construction: 2002

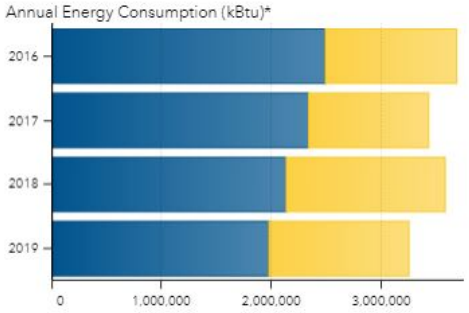
Total Building Area: 41,604 sqft

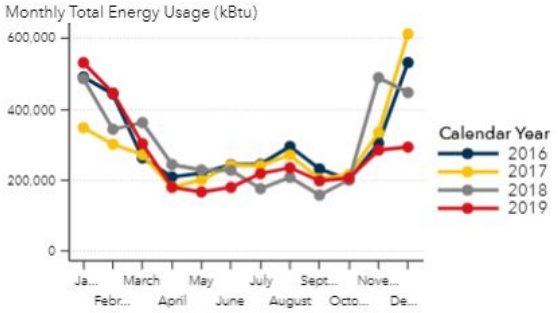
Floors: Ground, 1st

Energy Trends

* Subset Charts to Period Parallel to YTD?

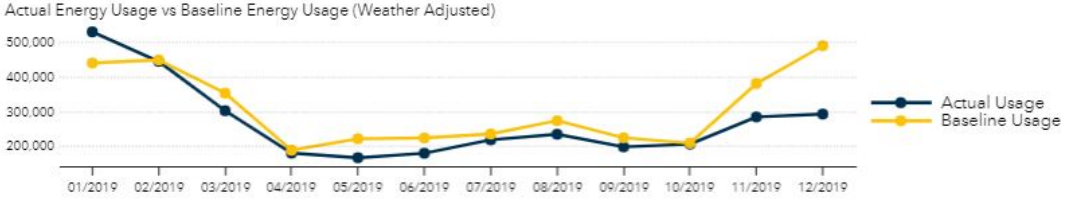
☐ Yes





Building Performance

Electricity | Gas | Total Energy



YTD, we've saved this much energy (kBtu):

451,284

Our estimated dollars saved is:

$10,977

We've saved this many tons of CO2 emissions:

111.1

The annual emissions of this many homes:

10.8

Sustainability Goals

5% Annual Energy Reduction

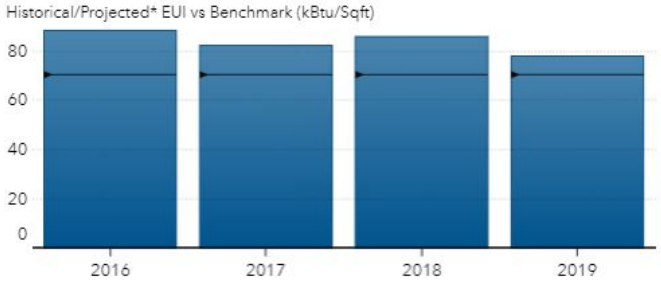
Compared to this period (YTD) last year, we've reduced our energy consumption by:

9.2%

30% Reduction in Energy Use Intensity (EUI) by 2030

Select Benchmark:

City of Durham 2030 Goal | US Average for Similarly Sized Building



*EUI is projected for current year, based on the building's current performance.

Electricity Savings Simulator

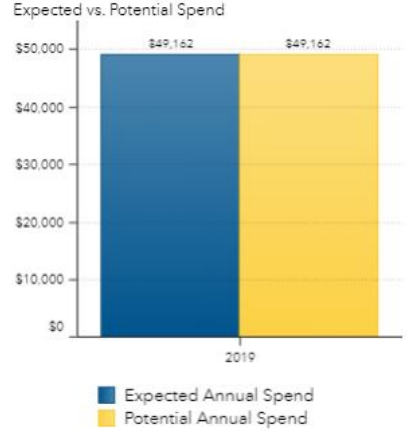
Select Electricity Reduction Goal:

5%

0% 50%

With this goal implemented for the remainder of this year, we could save:

2019 $0



CITY OF DURHAM

General Services Building

Year of Construction: 2002
Building Area: 41,604 sqft

Durham has a goal of 5% energy reduction each year.

How You Can Help

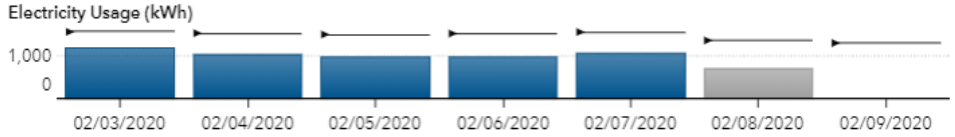
1. Turn off lights when they are not needed.
2. Use task lighting in place of multiple over-head lighting fixtures.
3. Run non-essential equipment:
   in the AM- summer
   in the PM- winter
4. When using small appliances, turn them off as soon as their work is done (such as coffee/tea pots).
5. Do not use portable heaters. Dress in layers.
6. Use the stairs instead of elevators if possible.

DURHAM WEATHER — 59°F Overcast

Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
63°F 54°F	70°F 43°F	52°F 46°F	64°F 32°F	45°F 18°F	43°F 25°F	55°F 37°F

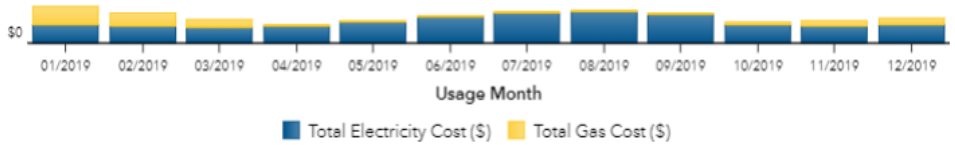
Energy Usage

Electricity Usage in Past 7 Days (kWh)*

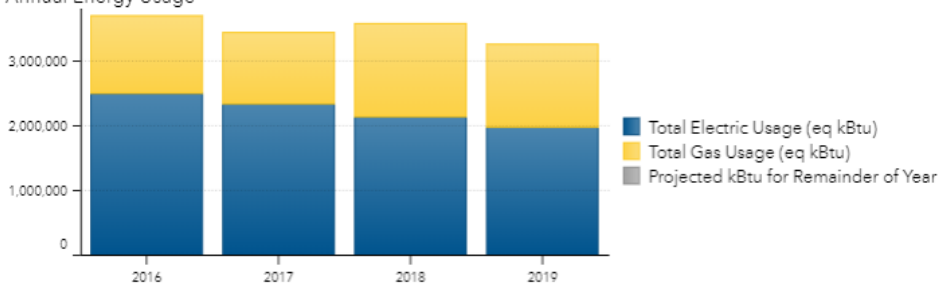


*Red shading indicates that electricity usage was greater than expected. Gray shading indicates weekend.

Monthly Expenses

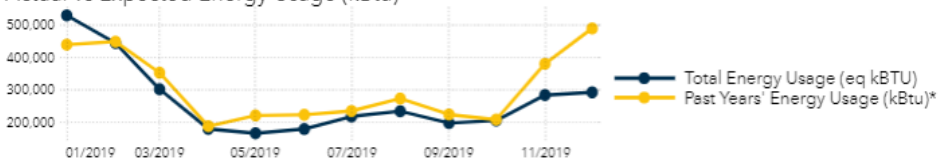


Annual Energy Usage



Sustainability Performance

Actual vs Expected Energy Usage (kBtu) **



** After weather adjustment. Reference period of 2016-2017.

Year to date, we've saved this much energy (kBtu):

451,284

Carbon emissions saved by avoided energy use (tons):

111.1

Our estimated dollars saved for this year is:

$10,977

Homes' annual carbon emissions prevented:

10.8

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The energy behind public power

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