Energy Conservation Strategies for eSC

Prof. C. Dunham, J. Reilly

Group 6:
Saman Langari , Aakanksha Sonawane, Wan-Hsin Hu, Sakshi Shinde

Contents

Introduction

- The Challenge:
  - Increasing temperatures and global warming trends pose a significant challenge to energy grids.
  - July's peak energy demand raises concerns for potential system strain and blackouts.
- Our Objective:
  - To understand the primary factors driving energy consumption.
  - To encourage energy-saving measures among customers, reducing the need for additional infrastructure.

Data Sets Used

Static House Data

Contains data on about 5,000 single-family homes that use eSC energy.

Meta Data

A data description file that describes the fields used in the various housing data files.

Energy Usage Data

Provides hourly energy consumption statistics for each residence in the Static residence Data.

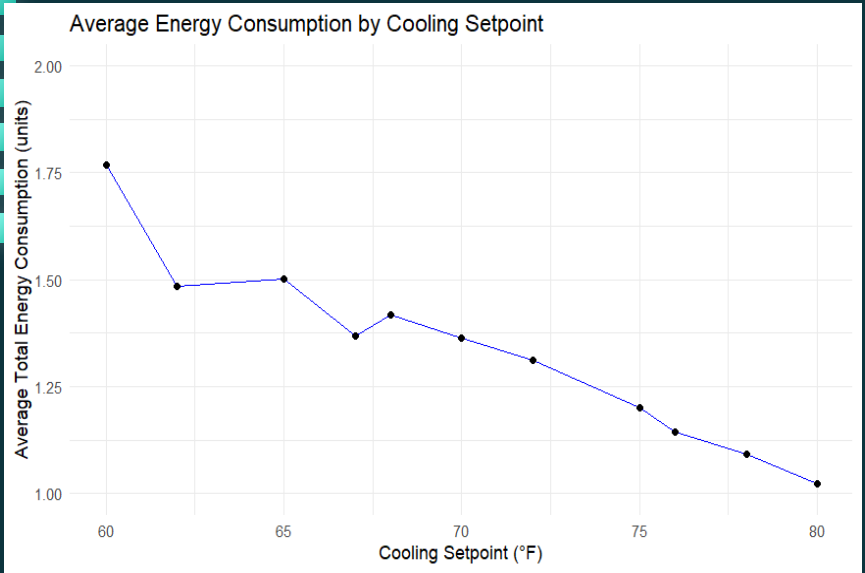
Weather Data

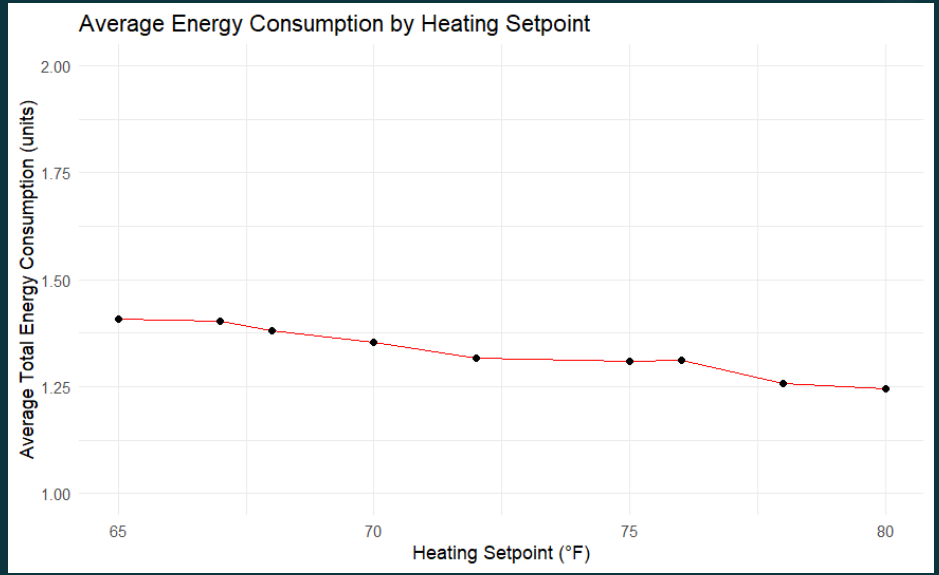
Hourly weather data, with one file for each geographic area (county).

4,000,000+ obs. Of 100+ variables

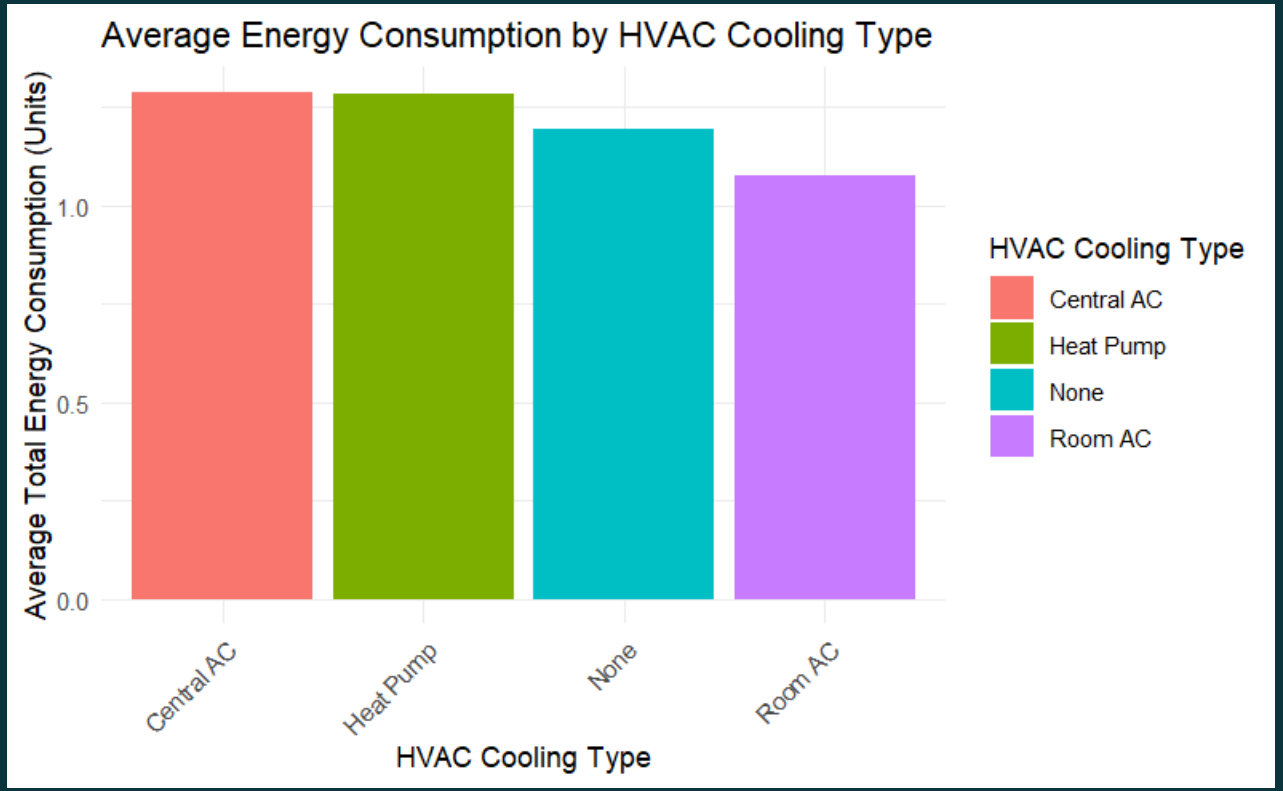
- Number of records in dataset evaluated

Energy Consumption By Setpoint

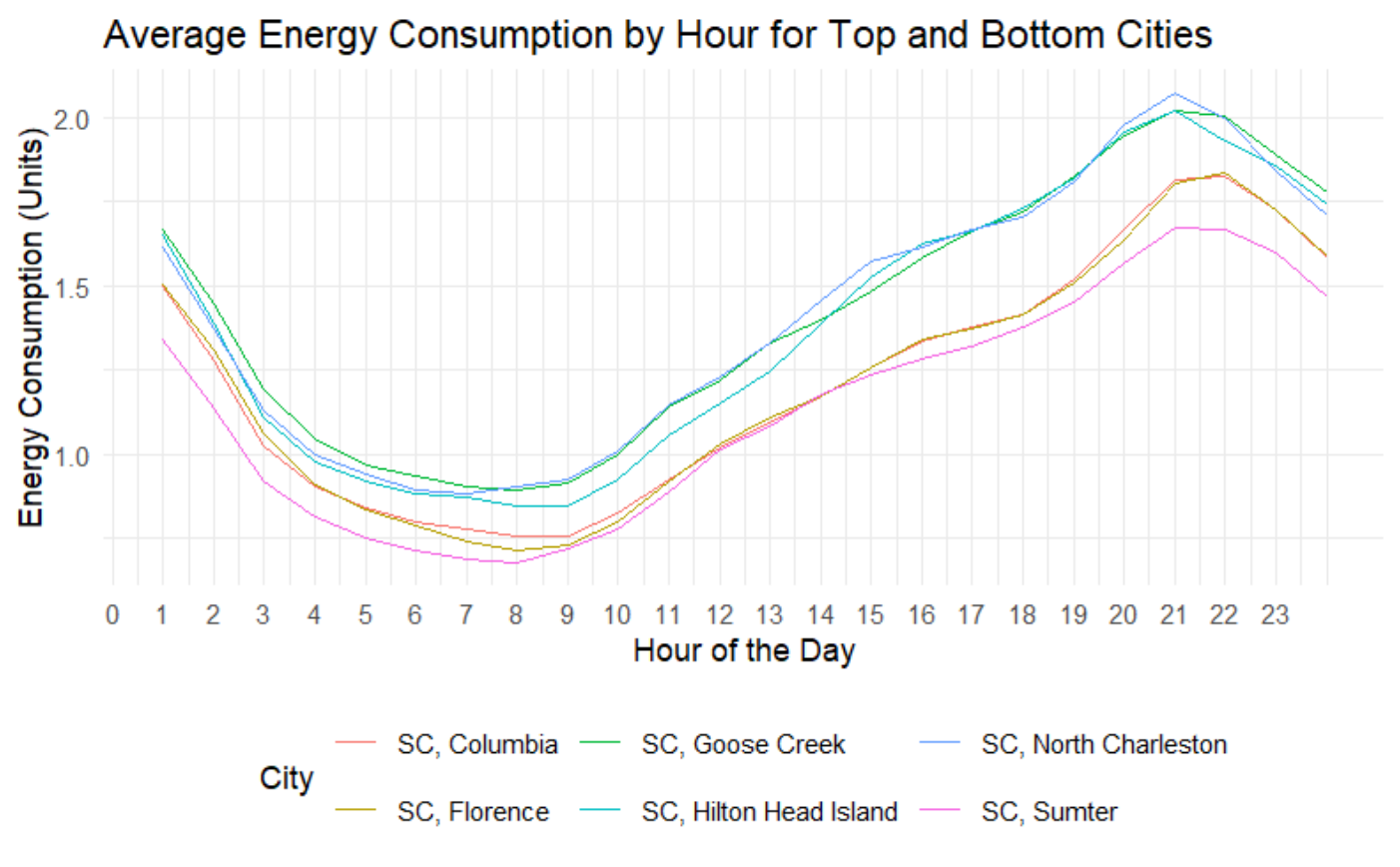




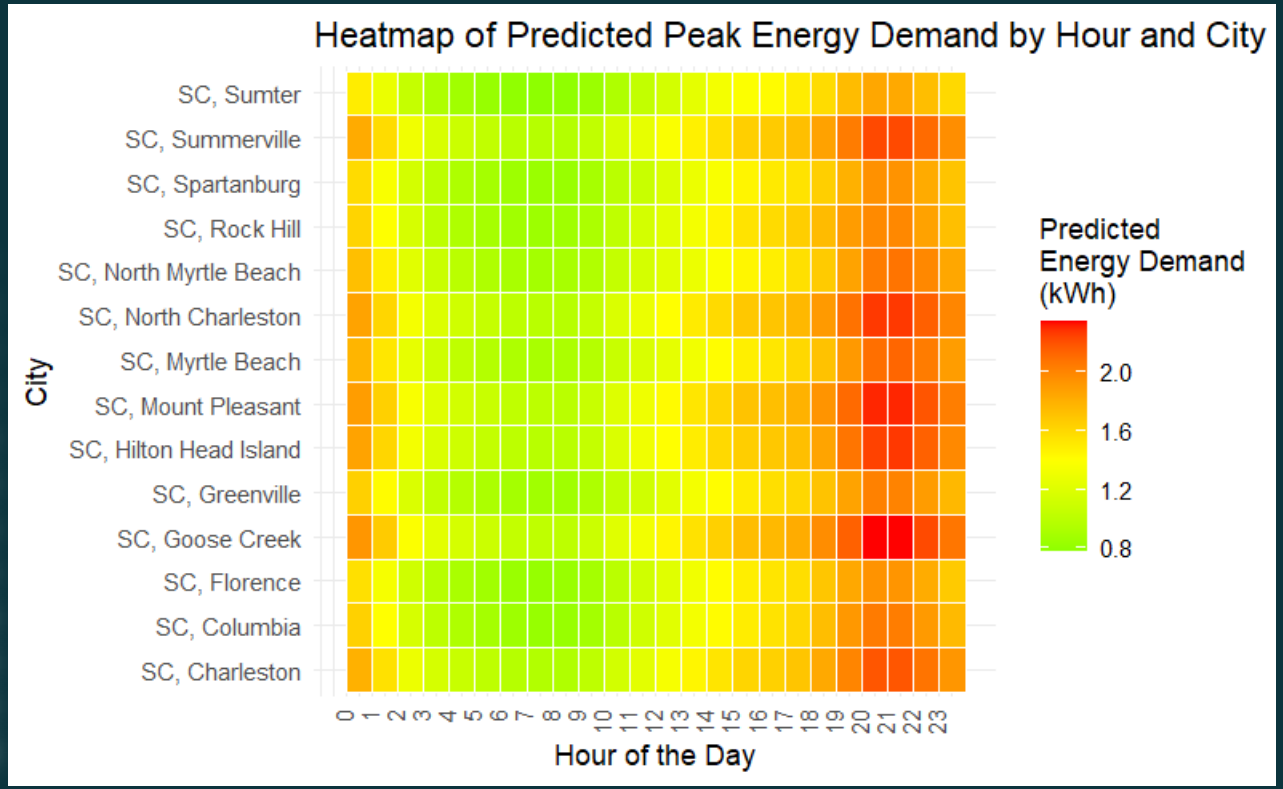
HVAC Cooling Type



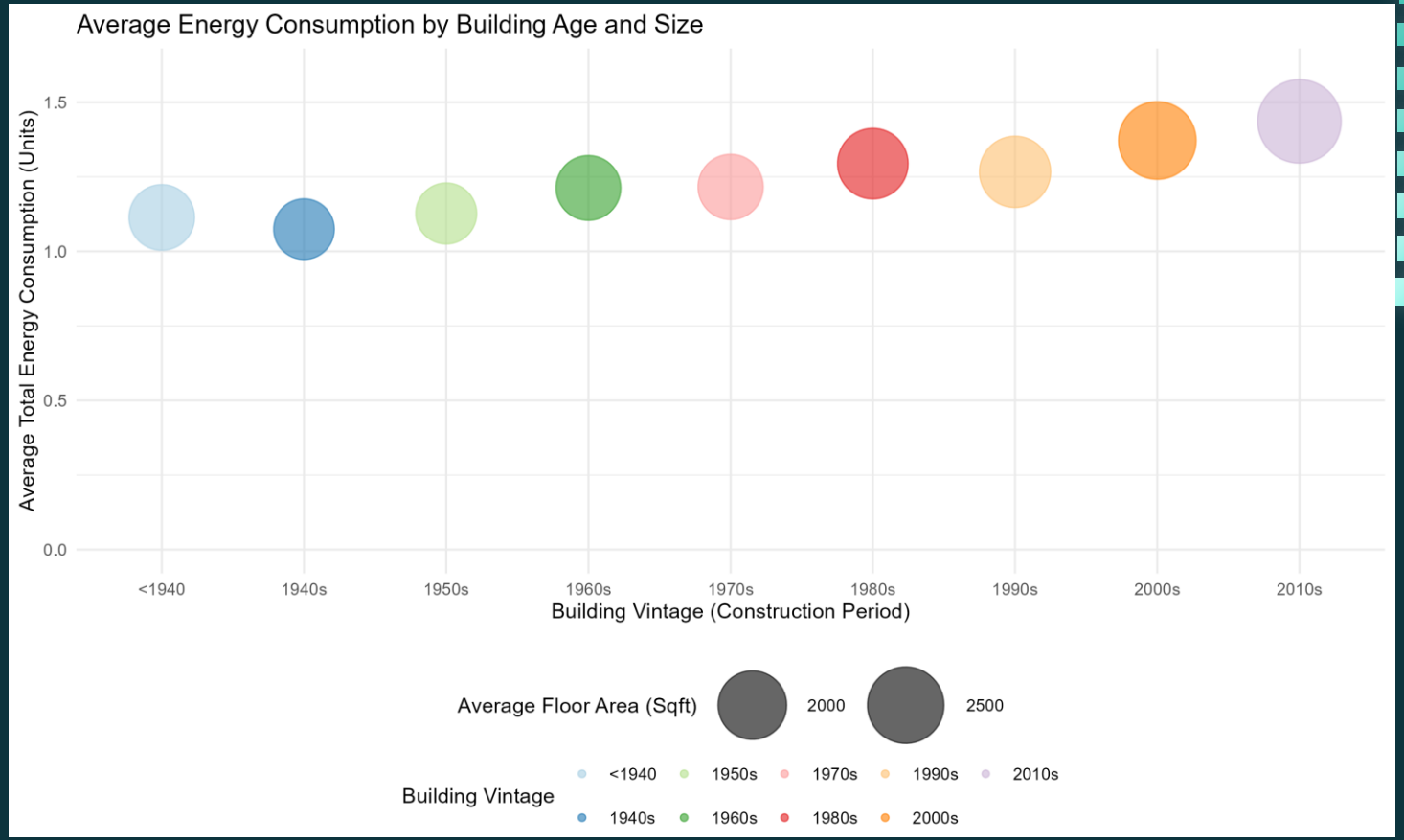
Peak Energy by Region and Hour (Top &Bottom)



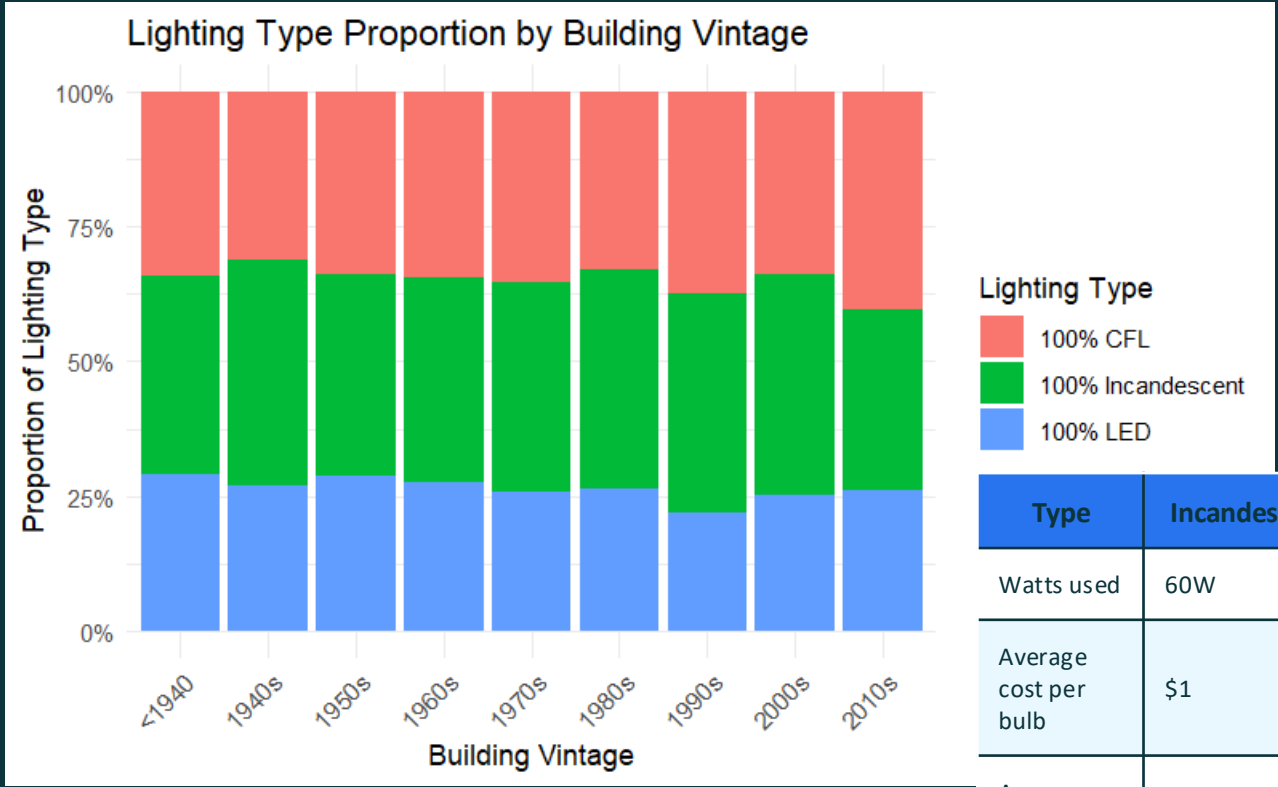
Heatmap of Predicted Peak Energy



Energy Consumption by Building Age & Size



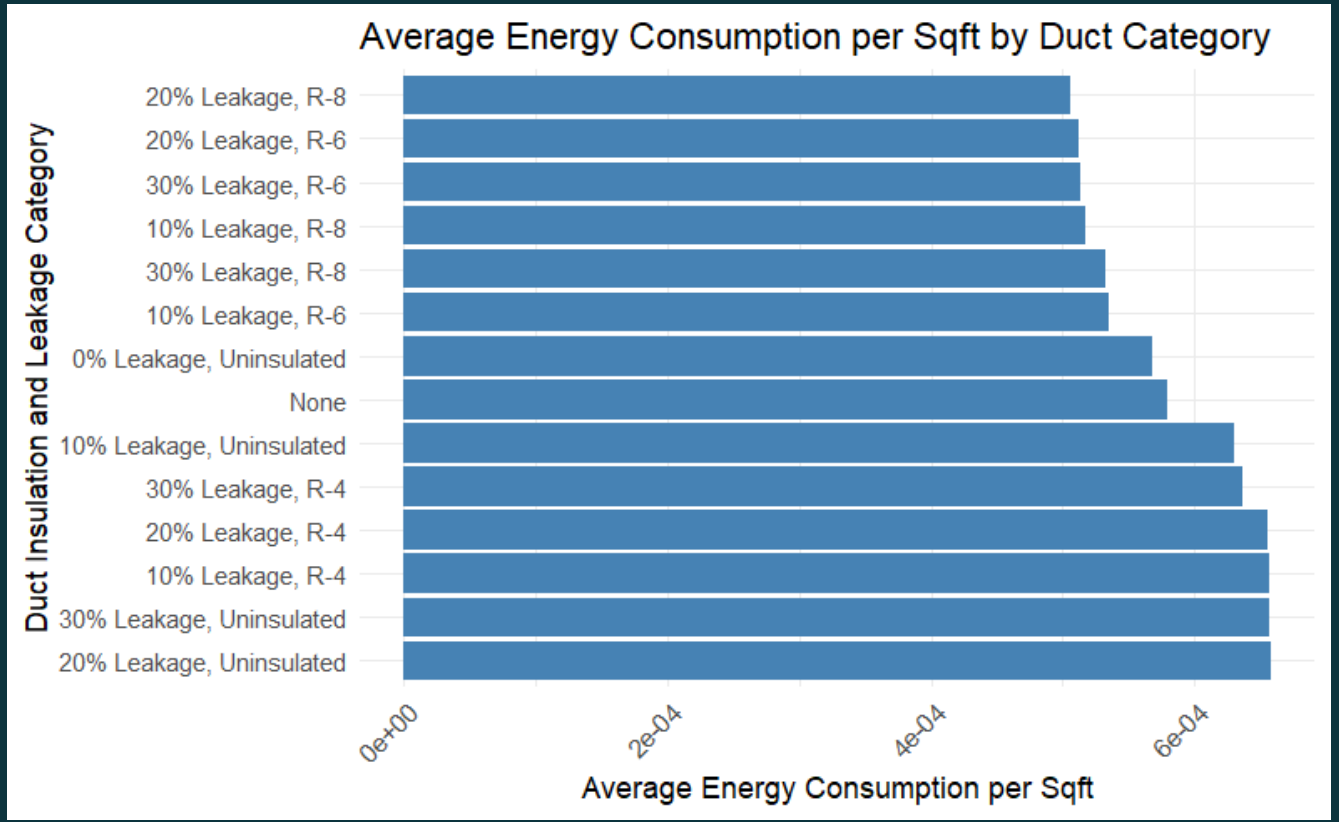
Lighting Type Proportion by Building Vintage



Type	Incandescent	CFL	LED
Watts used	60W	14W	7W
Average cost per bulb	$1	$2	$4 or less
Average lifespan (hours)	1,200	8,000	25,000

https://viribright.com/blogs/insights/comparing-led-vs-cfl-vs-incandescent-light-bulbs

Duct Insulation and Energy Consumption



Duct Insulation and Energy Consumption

- 20% Leakage, ~~Uninsulated~~
- 20% Leakage, R-8

Save

11105.62

(kWh)/month

≈0.19%

Conclusion –1/2

- Strategic Energy Management
  - Move beyond building age, focus on performance-based energy management.
  - Conduct detailed energy audits to pinpoint specific areas of energy loss.
- Smart Thermostat Implementation
  - Promote the use of smart thermostats for real-time energy optimization.
  - Utilize data for adjusting energy use during off-peak hours and according to occupancy.

Conclusion –2/2

- Targeted Retrofits for Building Systems
  - Focus retrofits on the least efficient HVAC systems identified by consumption data.
  - Upgrade to high-efficiency technologies like VRF systems and improve ductwork to minimize leakage.
- Data-Driven Infrastructure Development
  - Develop infrastructure based on regional energy demand data.
  - Support demand-side generation with community solar projects to alleviate grid stress during peak times.

Thanks!

Do you have any questions?