DOCKETED	
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Docketed Date:	6/14/2018

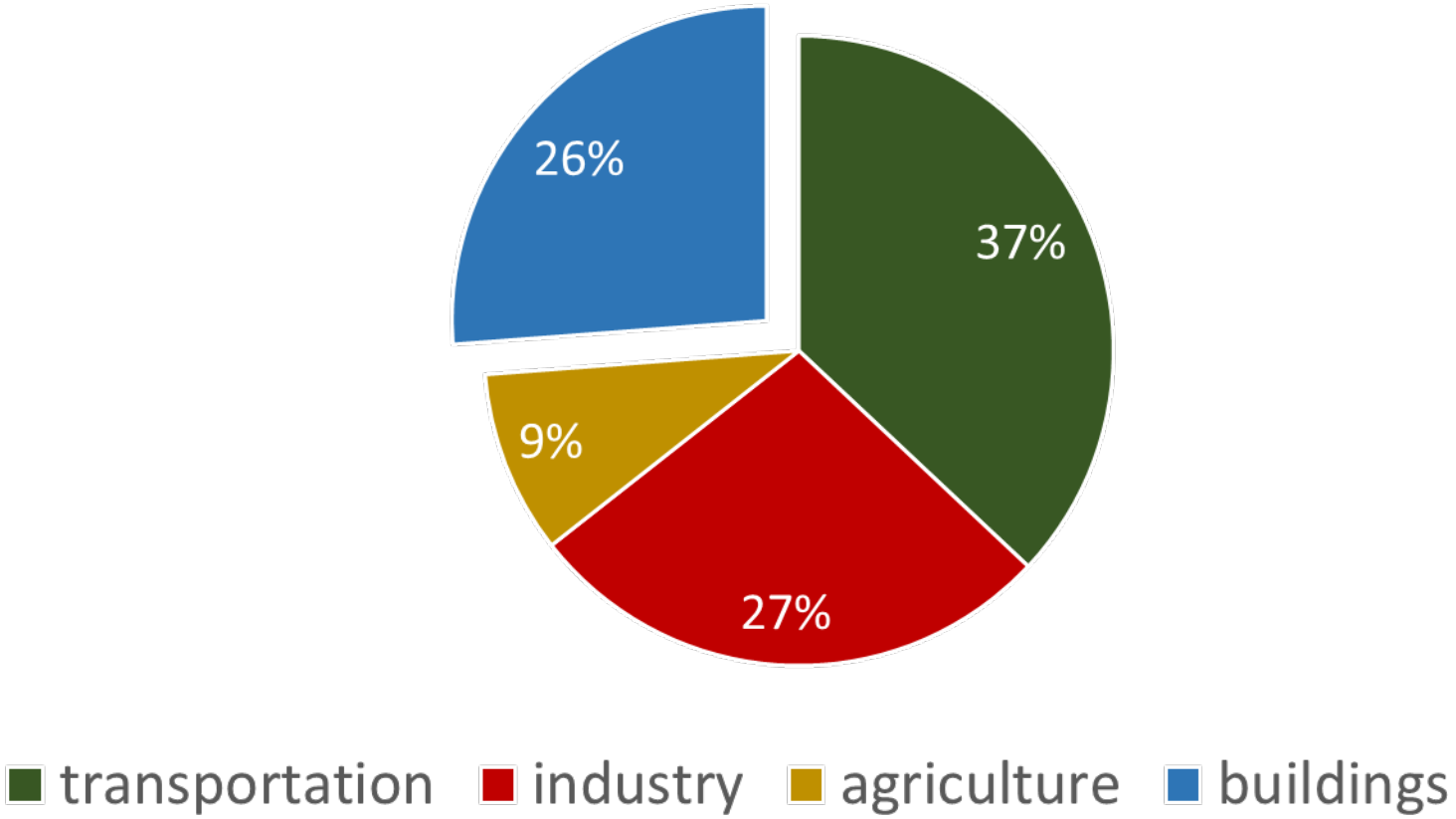
Building Decarbonization

2018 Update
Integrated Energy Policy Report

June 14, 2018

Martha Brook
Advisor to Commissioner McAllister

CA GHG Emissions



Fossil Fuels & Buildings

- Direct emissions from fossil fuels used in CA buildings for space and water heating ~ 10% CA GHG emissions (33 MMTCO2e in 2016)
- Fossil fuels produce NOx, CO and other hazardous pollutants
- 93% of Californians live in ozone non-attainment areas

Pacific Coast Collaborative

- North America's Pacific Coast represents the world's fifth largest economy, with 55 M people & combined $3 T GDP
  - British Columbia, Washington, Oregon, California
  - Vancouver, Seattle, Portland, San Francisco, Oakland, Los Angeles
- In 2016, the PCC committed to lower the carbon intensity of heating fuels in residential and commercial buildings, aka THERMAL DECARBONIZATION

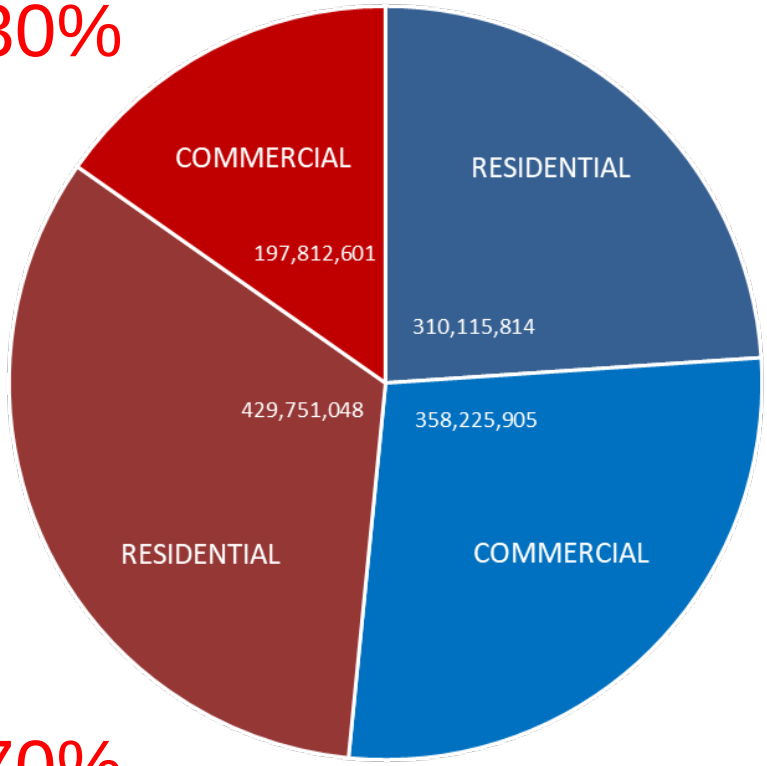
Pacific Coast Collaborative
Thermal Decarbonization

PATHWAYS:

- Electrification
- Renewable Natural Gas
- Energy Efficiency

2016 Energy Use in California Buildings (MMBtu)

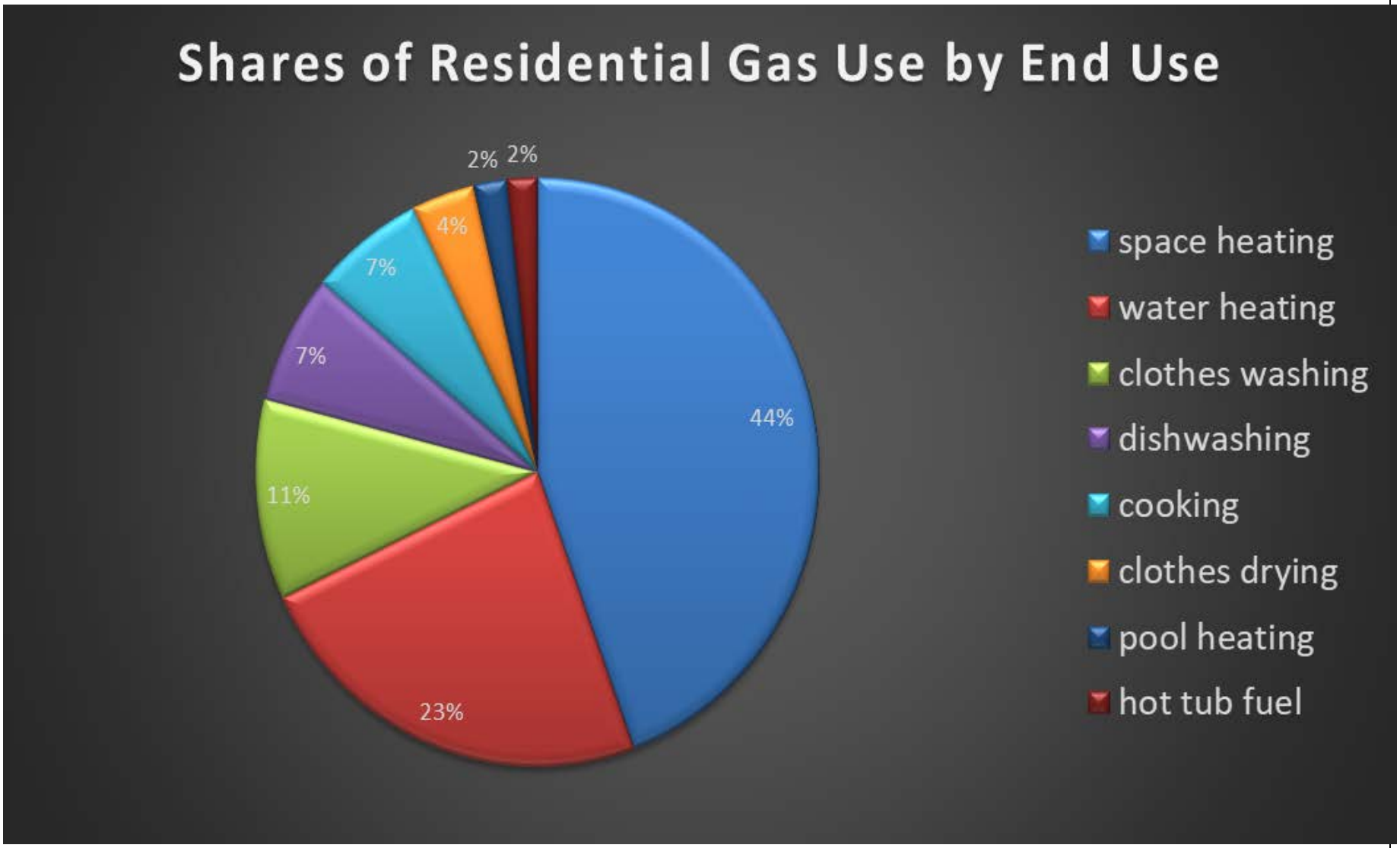
30%

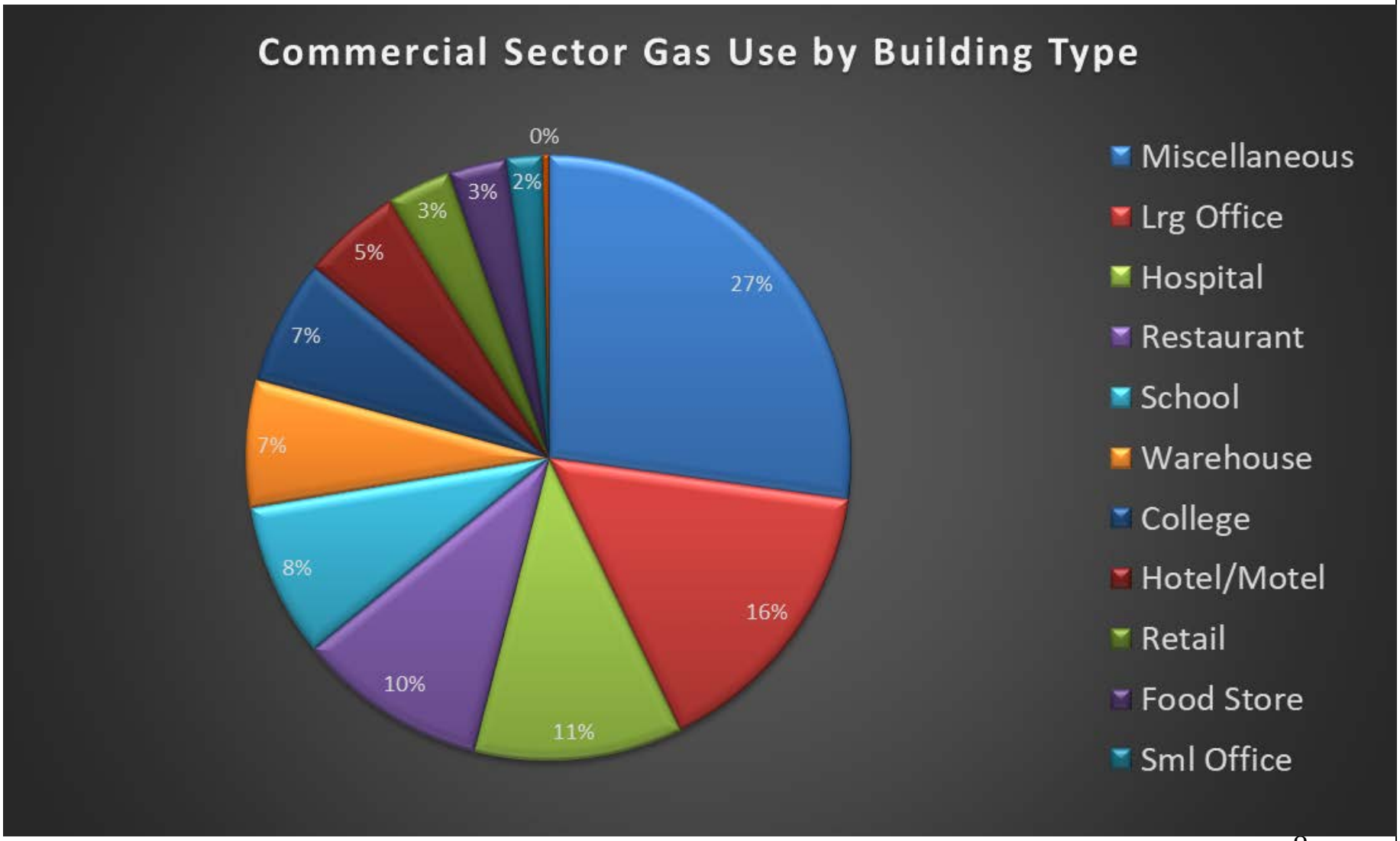


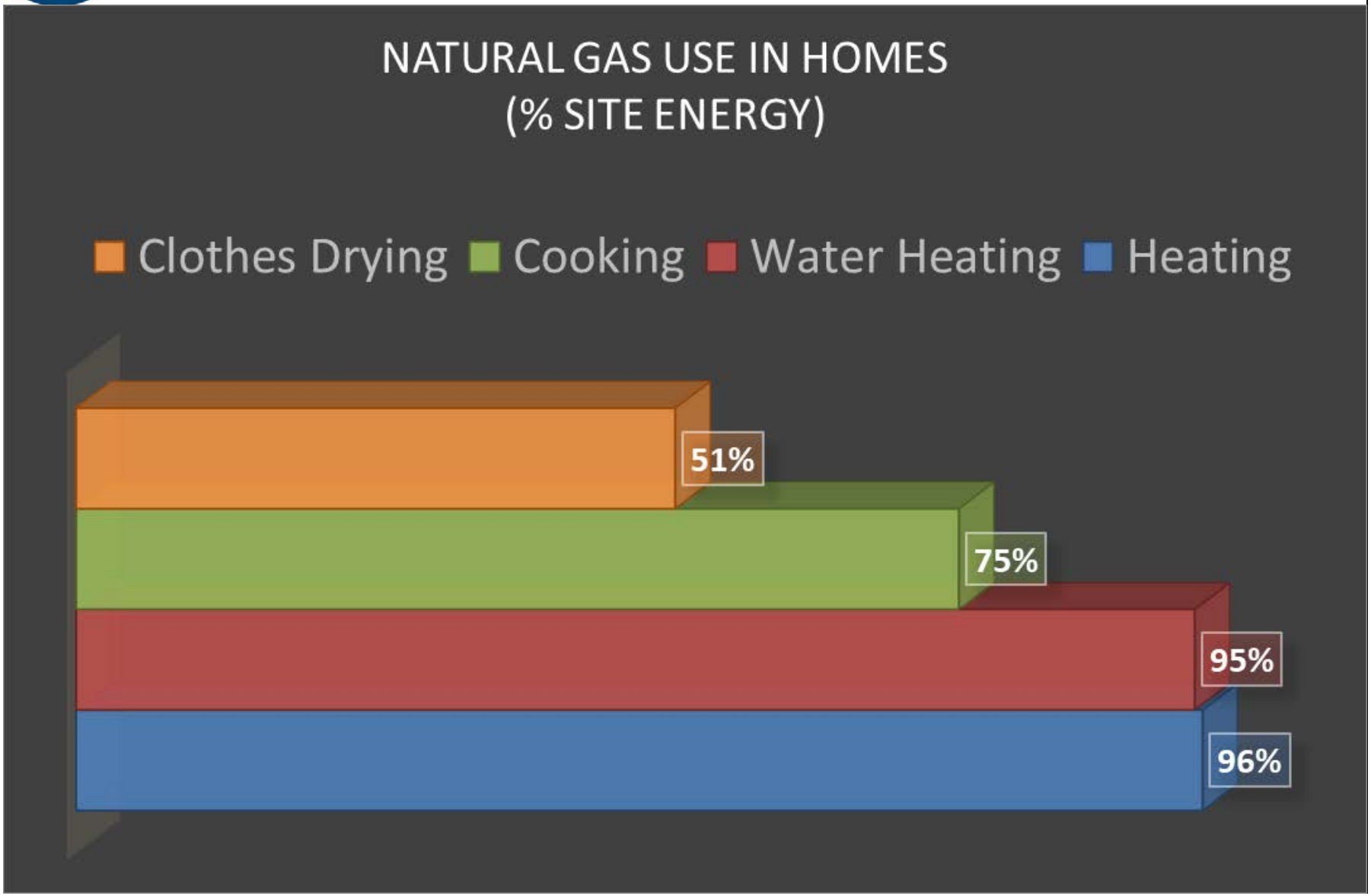
70%

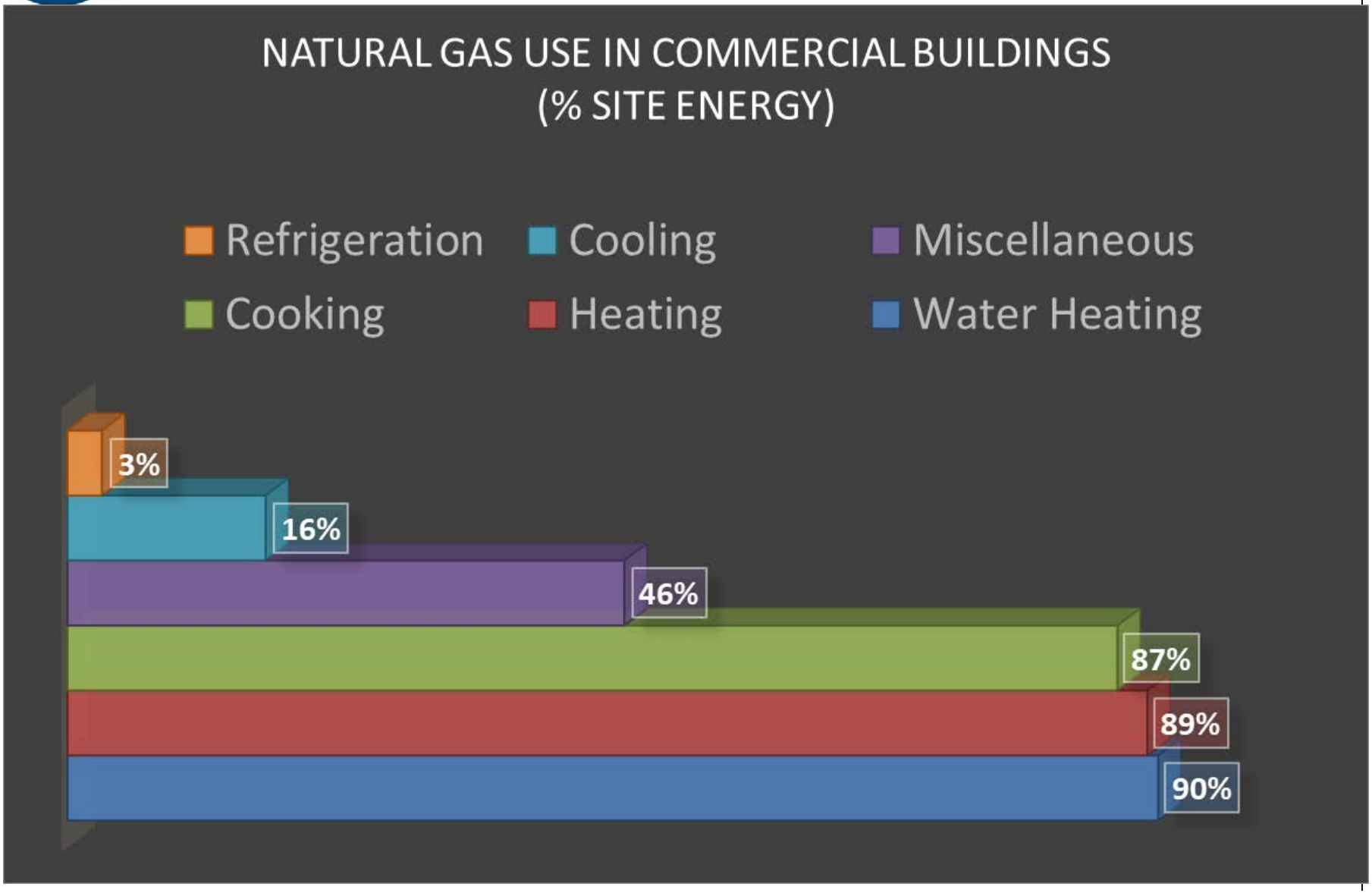
NATURAL GAS (48%)

ELECTRICITY (52%)


Shares of Residential Gas Use by End Use
44%
23%
11%
7%
7%
4%
2%
2%
space heating
water heating
clothes washing
dishwashing
cooking
clothes drying
pool heating
hot tub fuel

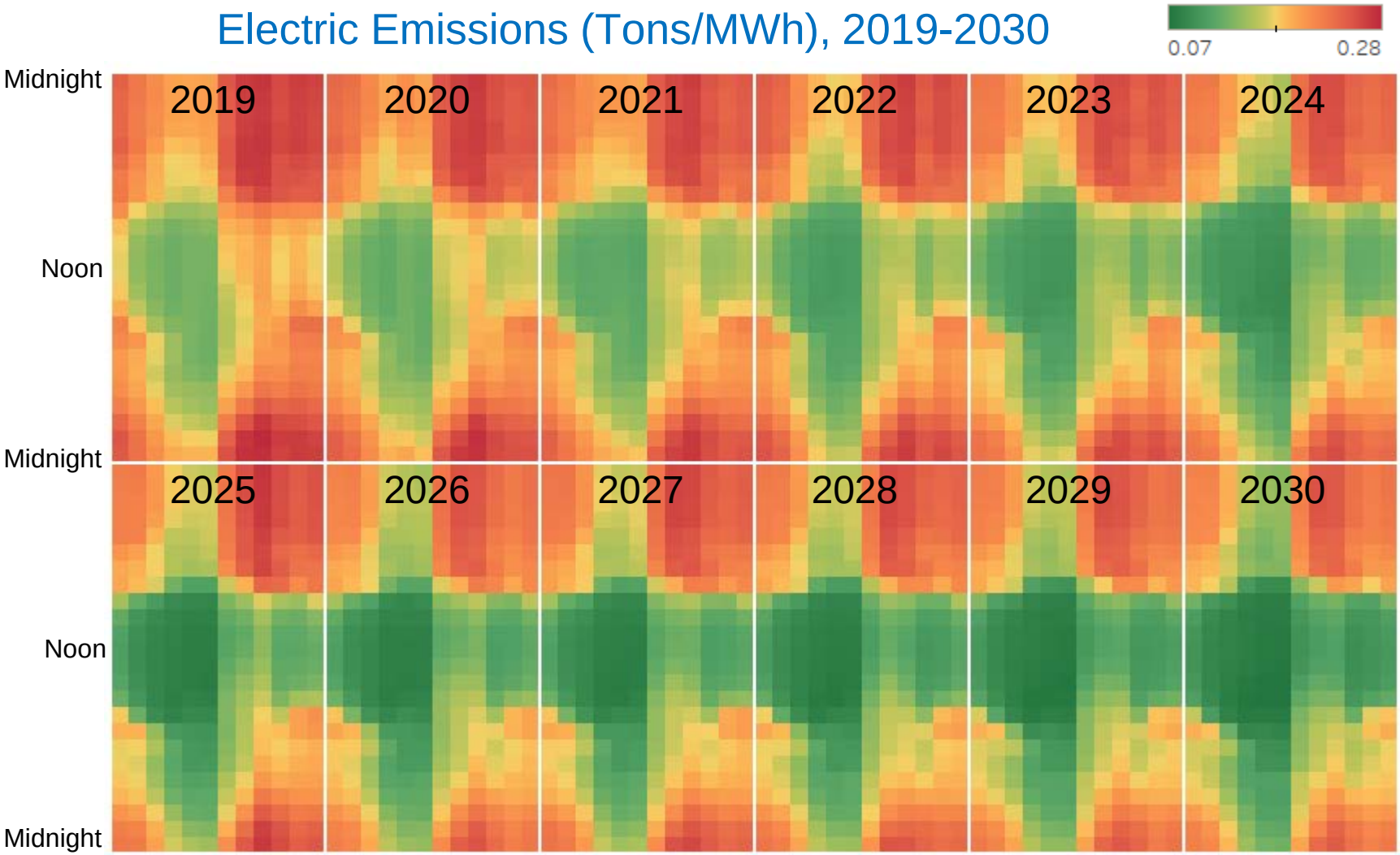

Commercial Sector Gas Use by Building Type
0%
2%
3%
3%
5%
7%
7%
8%
10%
11%
16%
27%
Miscellaneous
Lrg Office
Hospital
Restaurant
School
Warehouse
College
Hotel/Motel
Retail
Food Store
Sml Office


NATURAL GAS USE IN HOMES
(% SITE ENERGY)
Clothes Drying
Cooking
Water Heating
Heating
51%
75%
95%
96%


NATURAL GAS USE IN COMMERCIAL BUILDINGS
(% SITE ENERGY)
Refrigeration
Cooling
Miscellaneous
Cooking
Heating
Water Heating
3%
16%
46%
87%
89%
90%

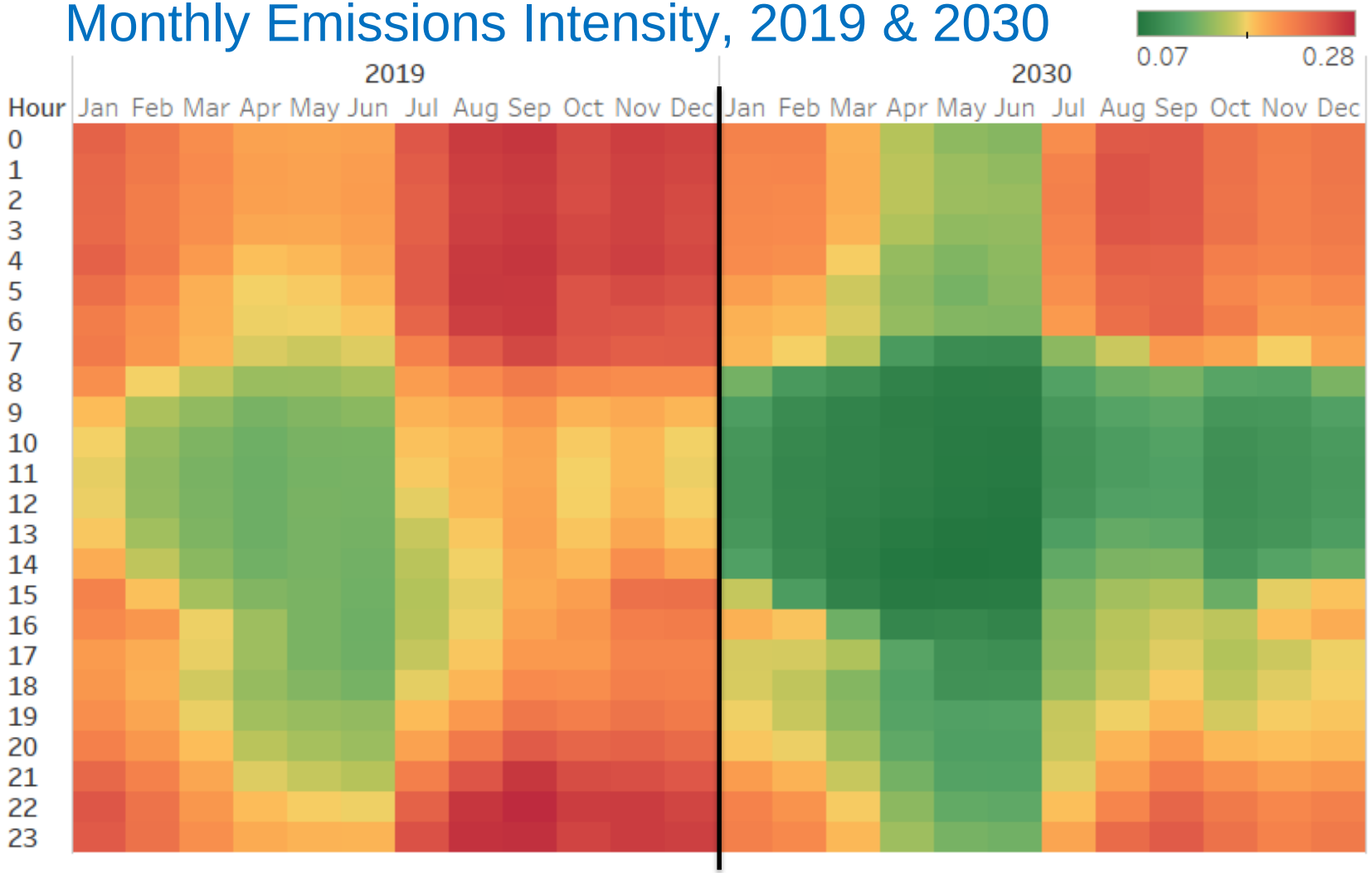
Electricity CO_2 Intensity

Electric Emissions (Tons/MWh), 2019-2030



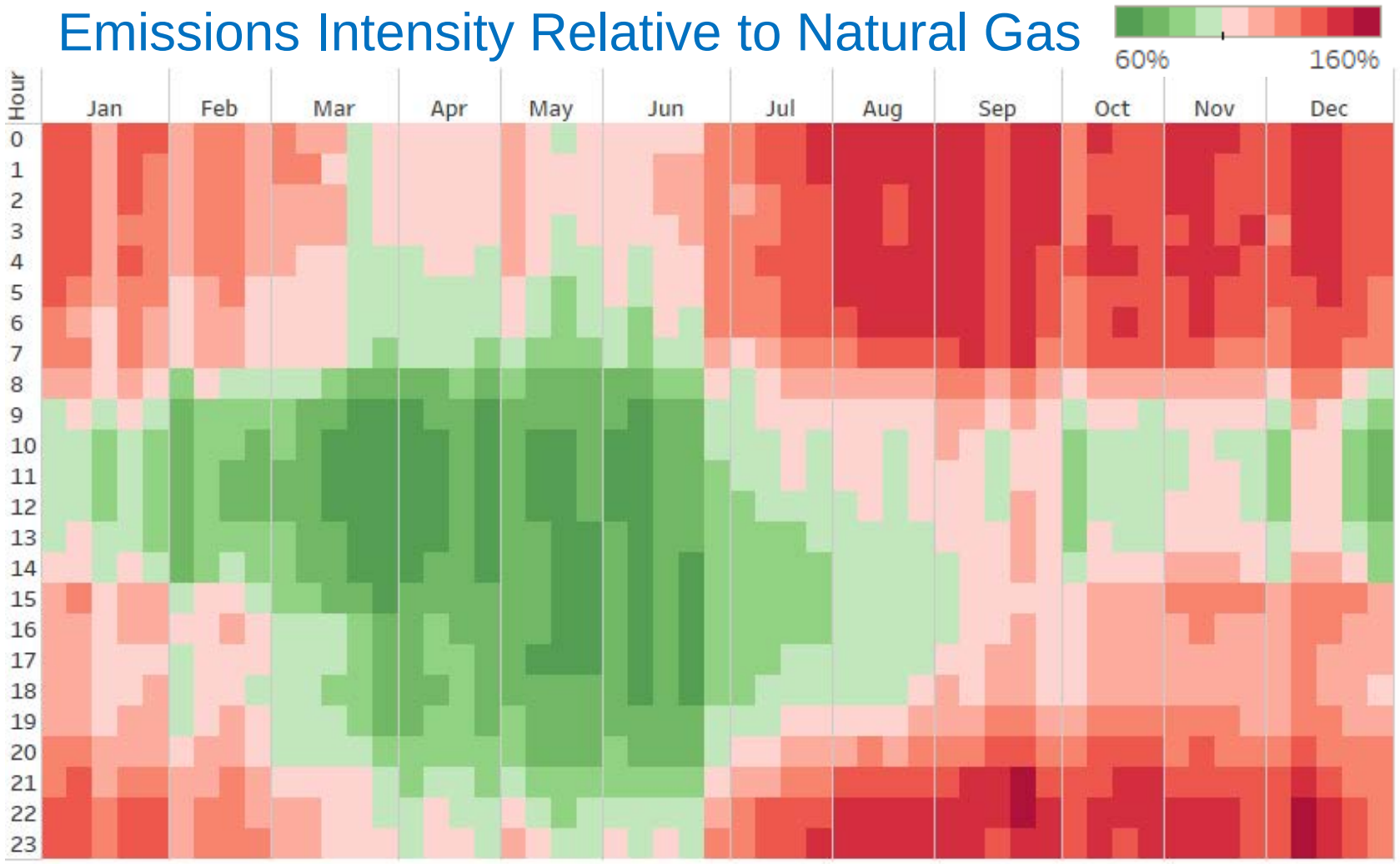
Electricity CO_2 Intensity

Monthly Emissions Intensity, 2019 & 2030



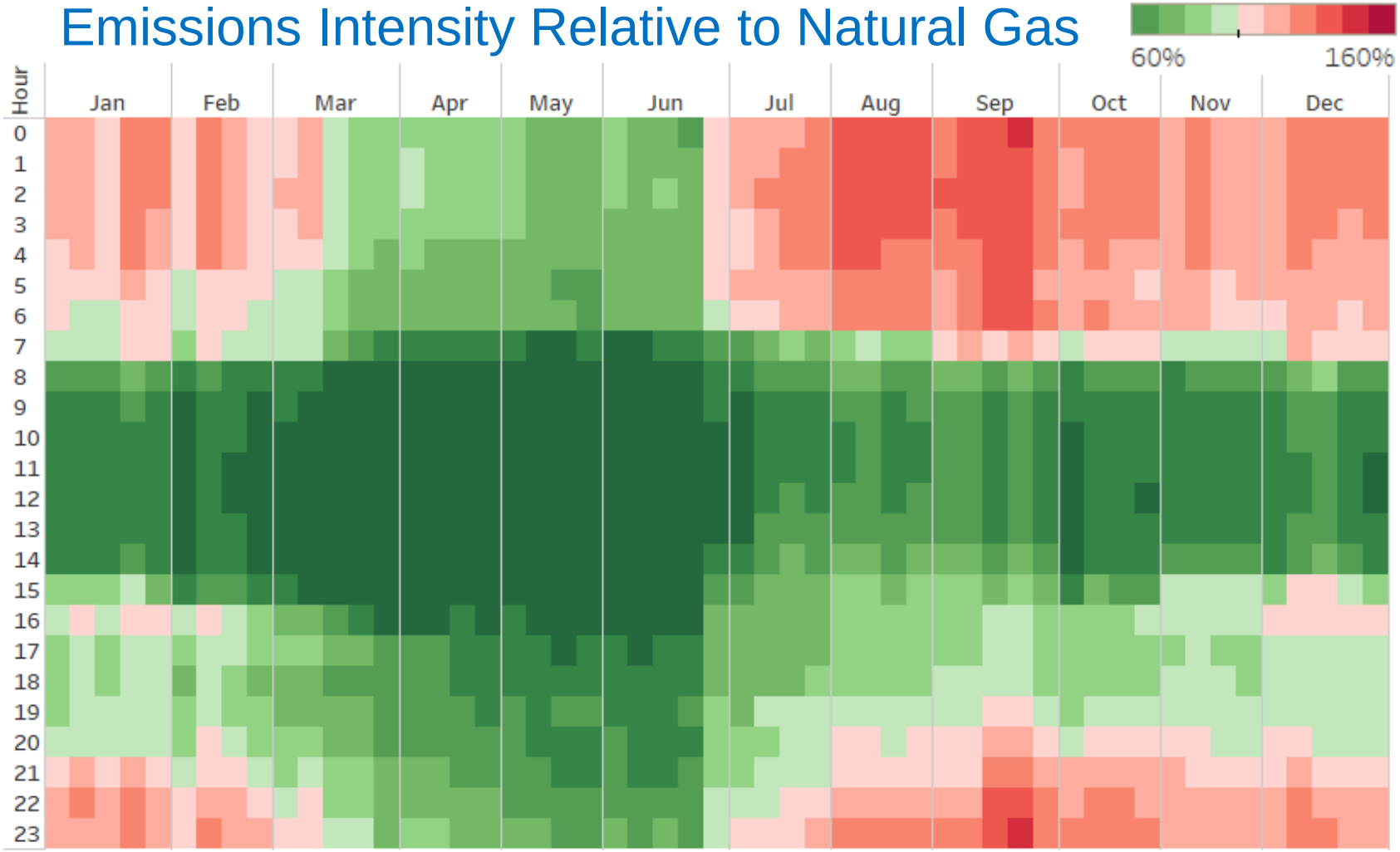
Buildings Perspective: 2019

Emissions Intensity Relative to Natural Gas

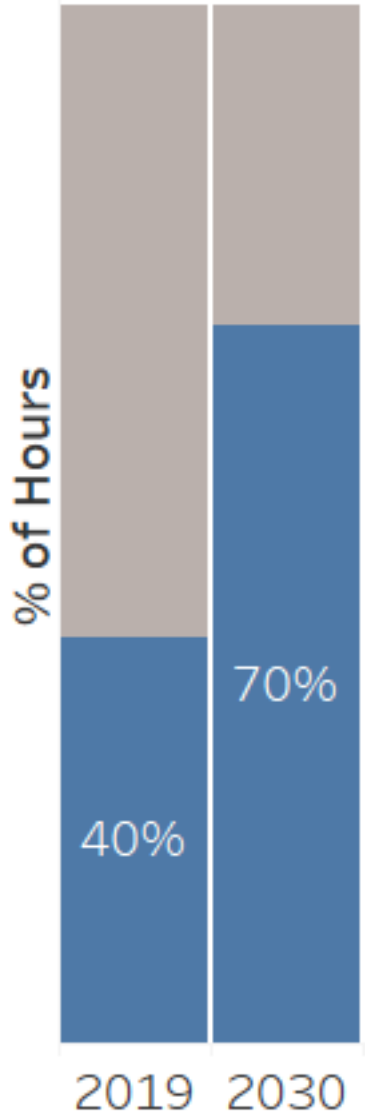


Buildings Perspective: 2030

Emissions Intensity Relative to Natural Gas



Buildings Perspective

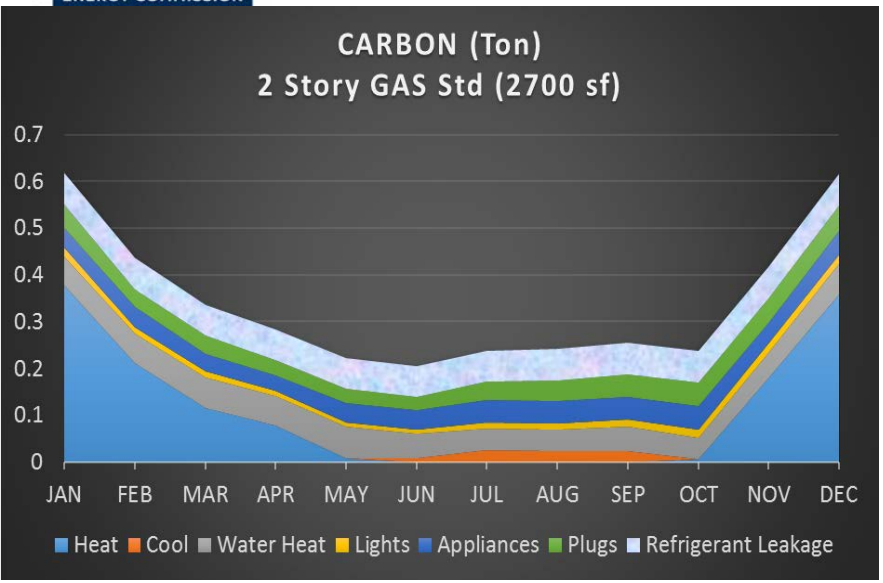


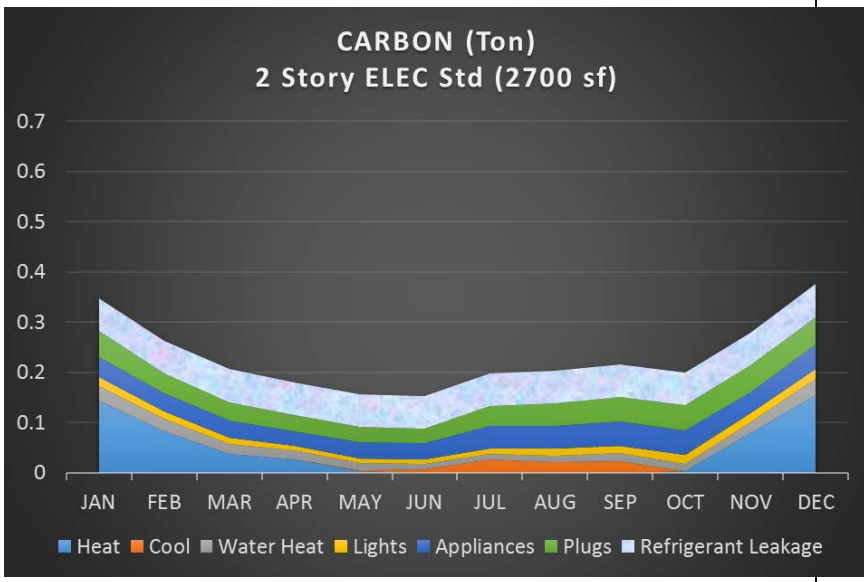
Electricity will be cleaner than natural gas 70% of the time by 2030

- Increase from 40% in 2019

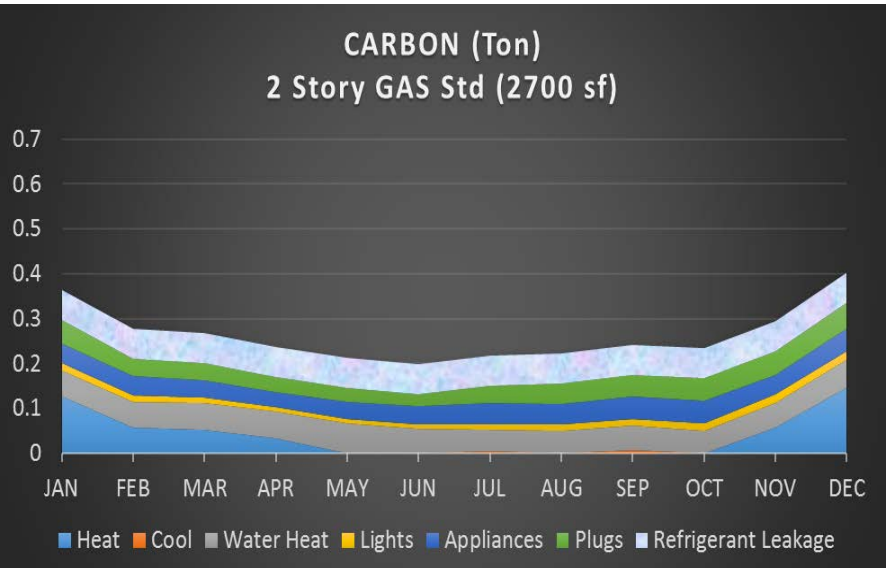
2019 Title-24 Residential

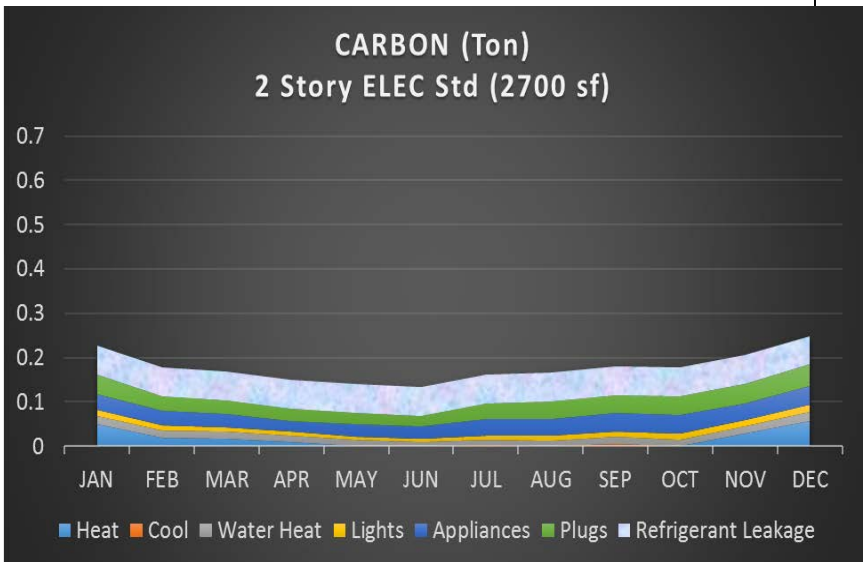
Sacramento





Los Angeles

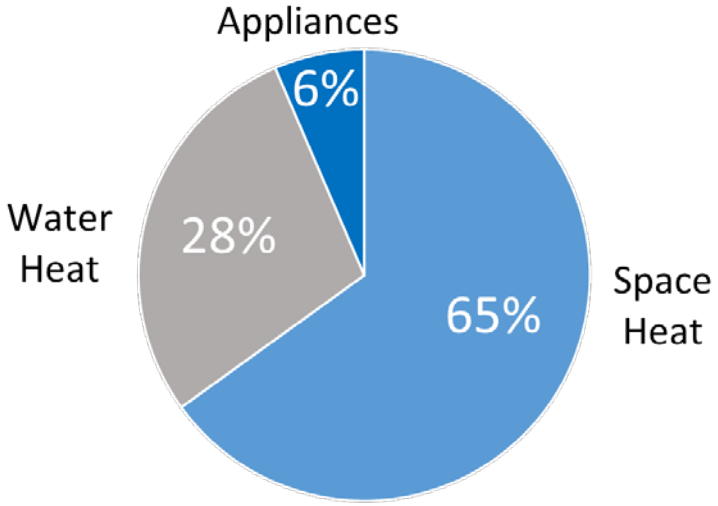




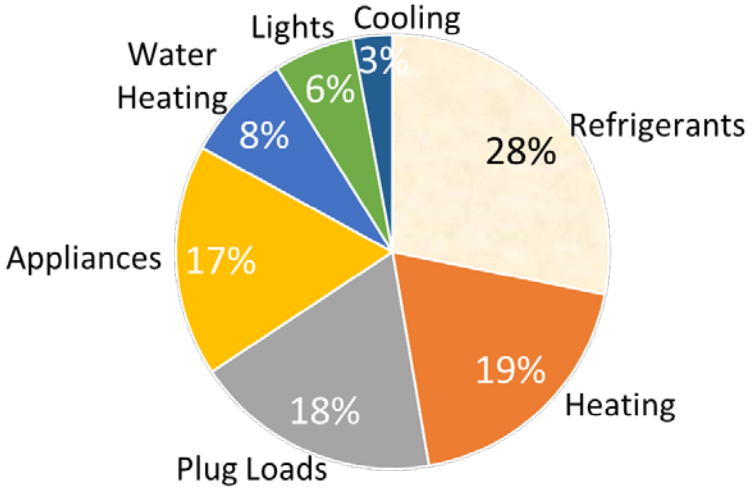
2019 Title-24 Residential

Sacramento

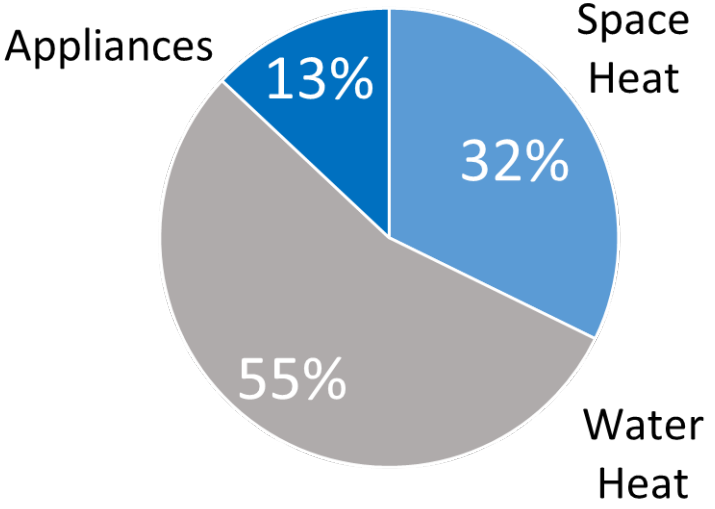
Emission reductions: Mixed Fuel to All Electric

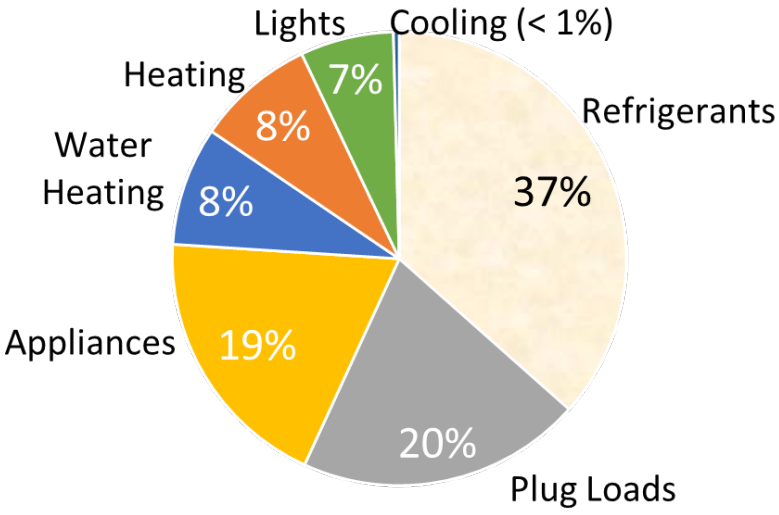


Remaining emissions: All Electric



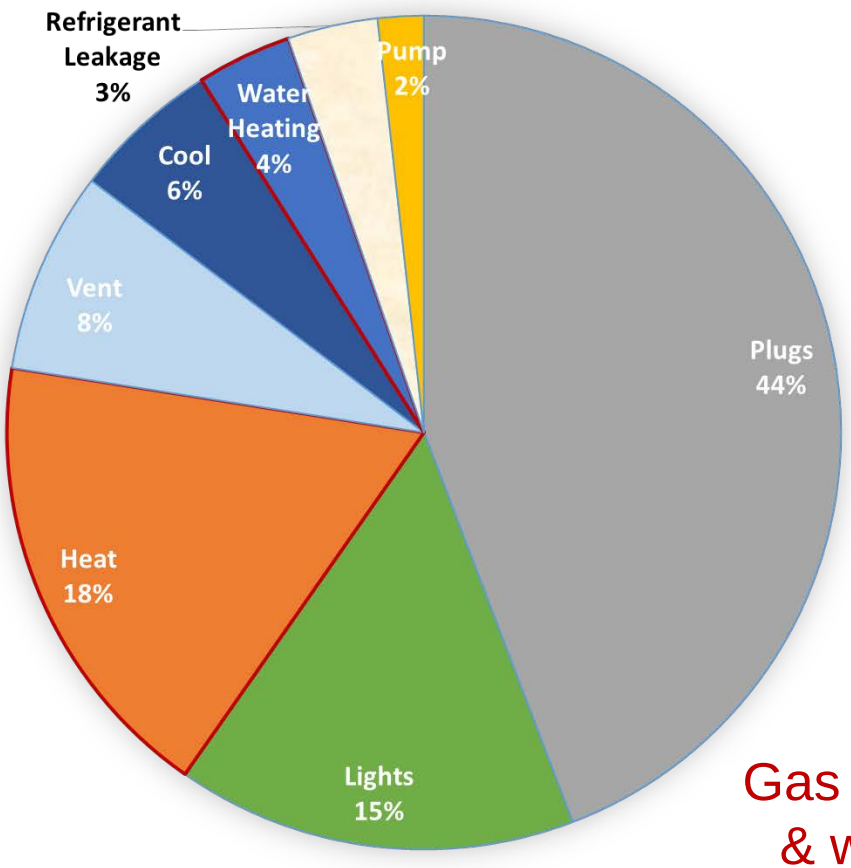
Los Angeles





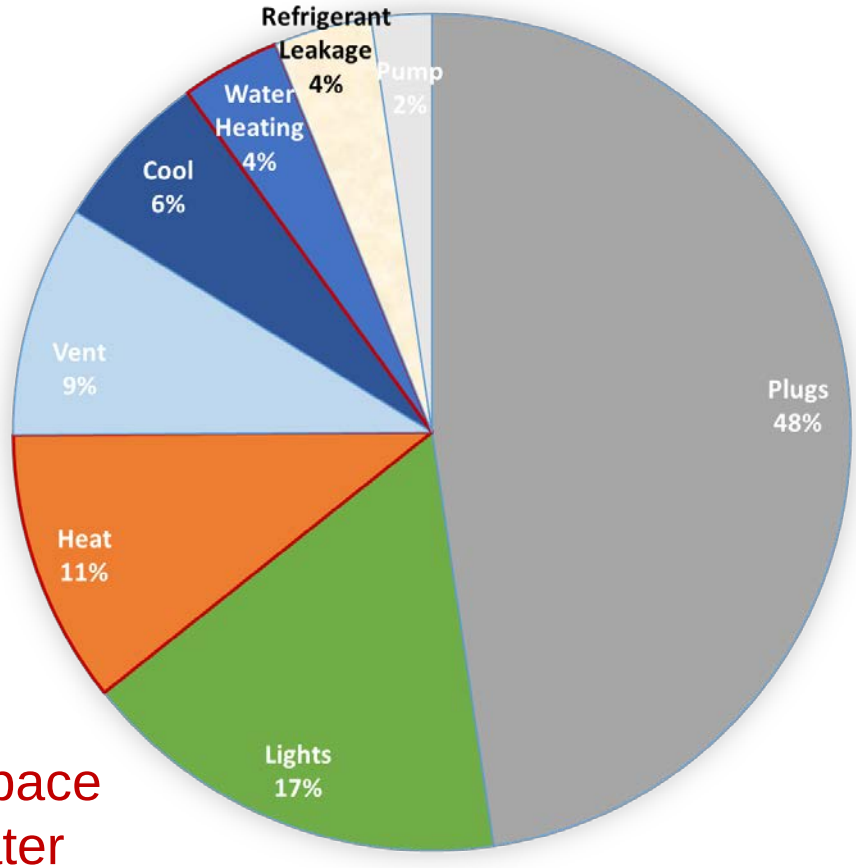
Large Office

Shares of Annual GHG emissions



Sacramento

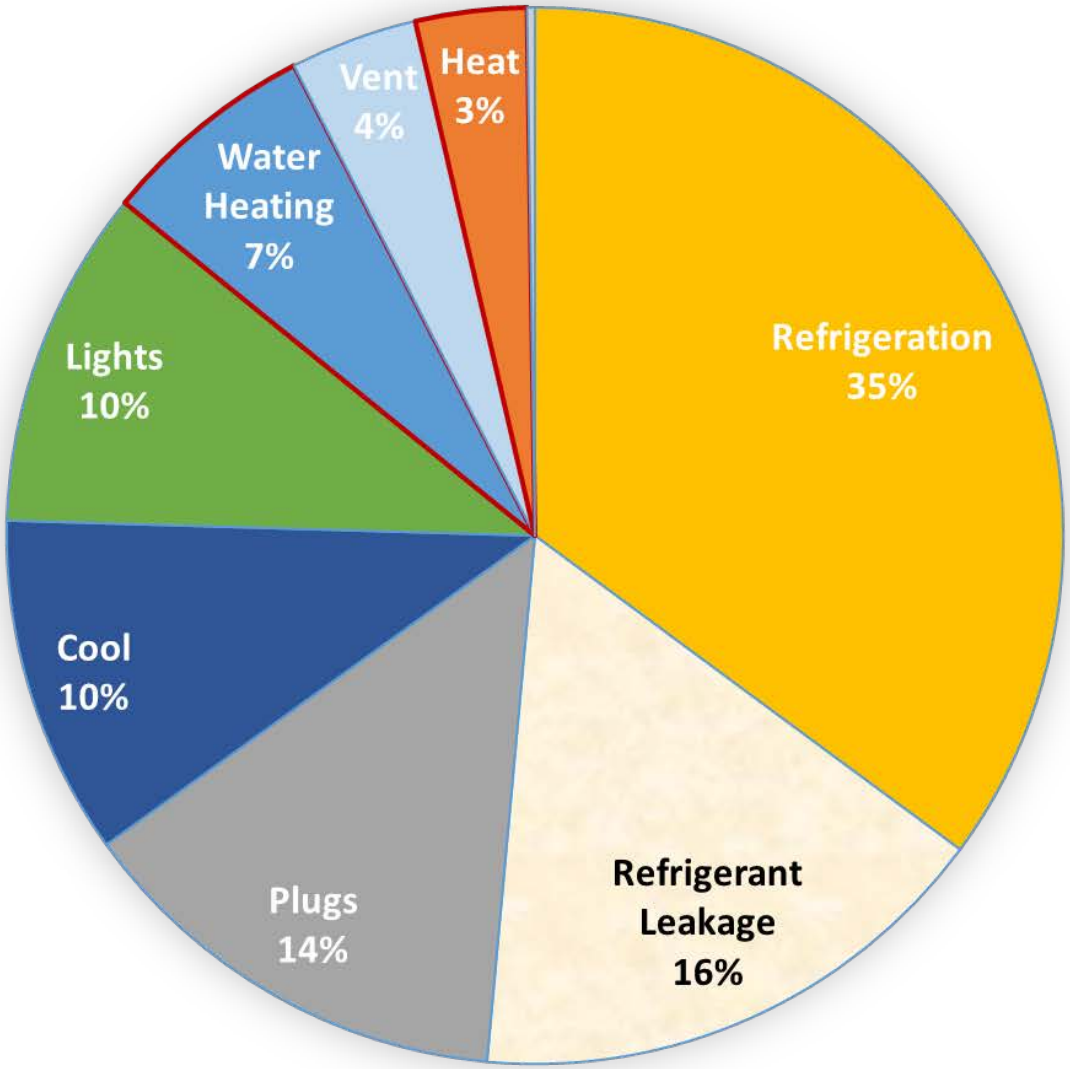
Gas space & water heat



Los Angeles

Retail Store with Refrigeration

Shares of Annual GHG emissions



- 24,000 sf, ½ with refrigeration
- 1.3 W/sf refrigeration load
- Gas water heating
- Gas space heating