CALIFORNIA ENERGY COMMISSION

CA Building Energy Policy

CALIT2 Igniting Technology

California Electrification

November 29, 2018

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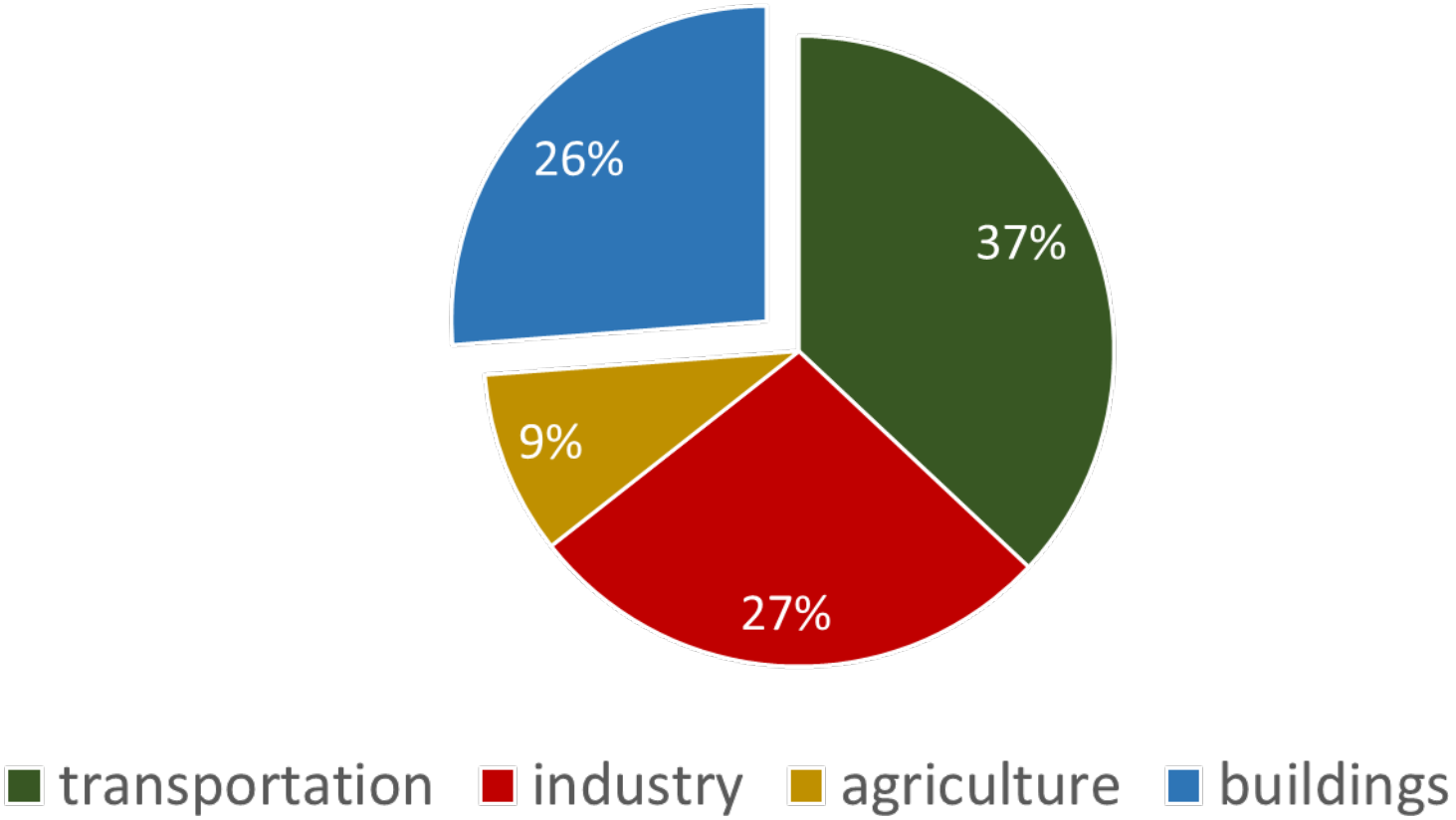
Advisor to Commissioner McAllister

CA Decarb Guiding Lights

- Senate Bill 32 (Pavley, Chapter 249, Statues of 2016)
  - Established a GHG emissions reduction goal of 40 percent below 1990 levels by 2030, building on the 2006 landmark legislation (Assembly Bill 32, Núñez, Chapter 488, Statutes of 2006), requiring GHG emissions be reduced to 1990 levels by 2020.
- Executive Order B-55-18
  - Establishes a new statewide goal to achieve carbon neutrality by 2045, then achieve and maintain net negative carbon emissions thereafter.
- Senate Bill 100 (de León, Chapter 312, Statutes of 2018)
  - Sets a planning target of having renewable resources and zero-carbon electricity resources serve 100 percent of California's electricity use by 2045
  - Increases the 2030 Renewables Portfolio Standard target from 50 percent to 60 percent.

CA GHG Emissions



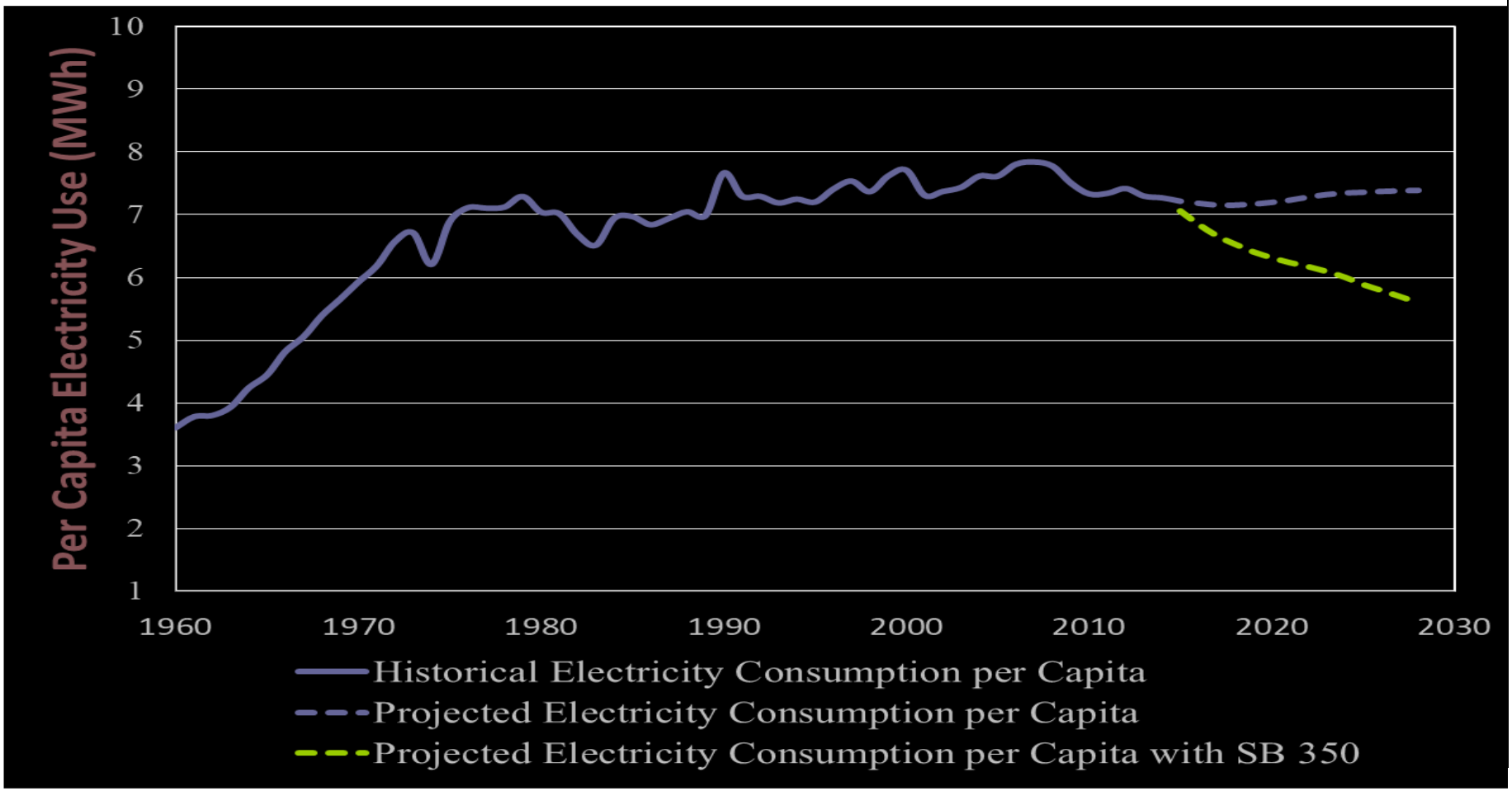
Senate Bill 350

The Clean Energy and Pollution Reduction Act of 2015

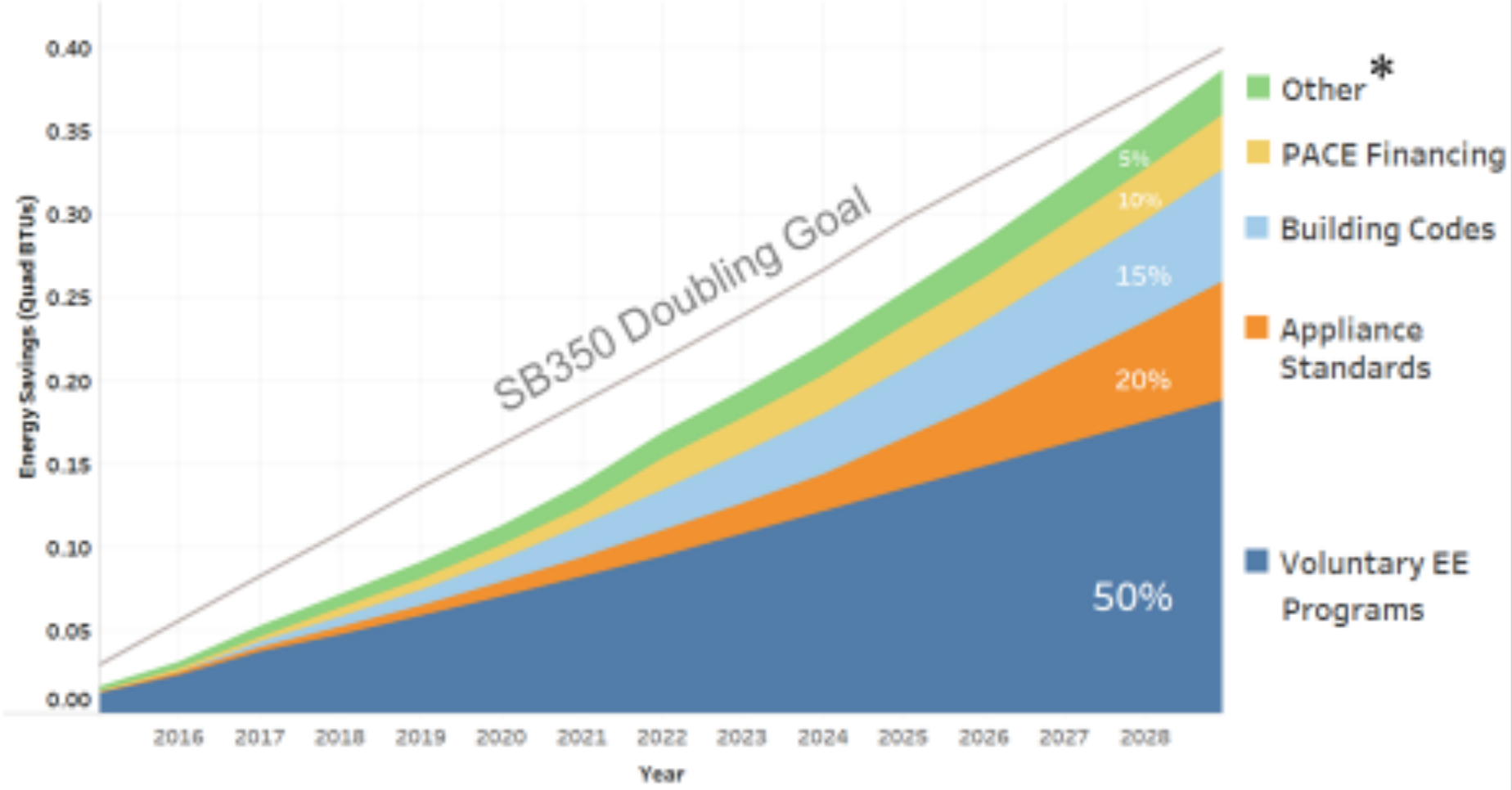
- EE: Double energy efficiency savings by 2030
- Renewables: 50% renewable energy by 2030
- Equity: Address barriers for low-income residents & disadvantaged communities
- EVs: Encourage widespread transportation electrification
- IRPs: Integrated resource planning to reduce greenhouse gas emissions



Energy Use Reductions needed to meet SB 350



Energy Savings (Quad BTUs)



*"Other" includes federal appliance standards; local government ordinances; air quality districts; Proposition 39; industrial and agricultural sectors; Behavioral, Retrocommissioning, Operational Energy Efficiency (BROs); benchmarking; energy asset rating; smart meter and controls; & electrification.

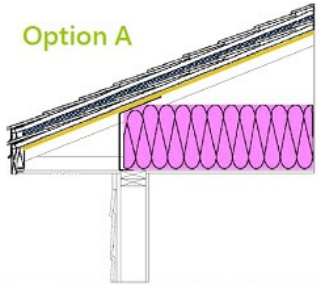
2019 Residential Standards
Path to the Future

- Increases cost effective building energy efficiency and indoor air quality
- Contributes to the State's GHG reduction goals
- Promotes demand flexibility and self-utilization of PV generation

2019 Residential Standards Approach

Priorities:

1. Envelope efficiency,
2. Reasonable options for all-electric homes,
3. Appropriately sized PVs, and
4. Grid harmonization strategies - maximize self-utilization of the PV



Ceiling insulation AND above roof deck insulation

- Above roof deck, which is typically in the purview of the roofer. R-value depends on with or without "airspace".
- Ceiling insulation must also be provided.
- Radiant Barrier dependent on CZ.
- Upper insulation dependent upon CZ.

2016 TABLE 150.1-A COMPONENT PACKAGE-A STANDARD BUILDING DESIGN - ROOF

			Mandatory U-factor	Climate Zone 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Roofs/Ceilings	Option A §150.1(c)8A	Continuous Insulation Above Roof Rafter	No Air Space	0.043 (R-22)	NR	NR	NR	R 8	NR	NR	NR	R 8	R 8	R 8	R 8	R 8	R 8	R 8	R 8	R 8
			With Air Space		NR	NR	NR	R 6	NR	NR	NR	R 6	R 6	R 6	R 6	R 6	R 6	R 6	R 6	R 6
		Ceiling Insulation			R 38	R 38	R 30	R 38	R 30	R 30	R 30	R 38	R 38	R 38	R 38	R 38	R 38	R 38	R 38	R 38
		Radiant Barrier			NR	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	NR

PV – prescriptive requirement

Battery – compliance credit

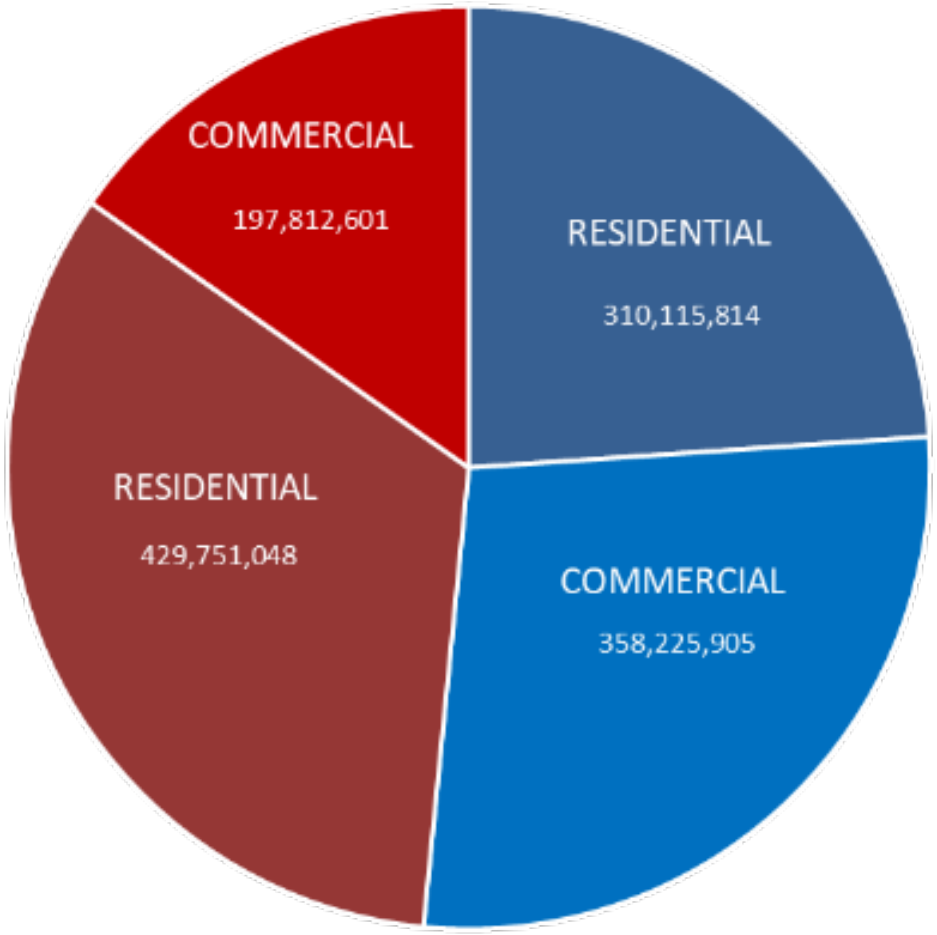
Thermal Storage – compliance credit

Policy Direction: Building Decarbonization

- *Thermal Decarbonization Working Group* of the Pacific Coast Collaborative (West Coast states, province, cities)
- First significant policy discussion - *2018 Integrated Energy Policy Report Update* (Decarb Docket Log)
- *2018 legislation:* new construction & upstream product incentives (SB 1477), plans to meet statewide building decarb targets (AB 3232), 100% RPS (SB 100)
- *2019 EE / Building Decarb Action Plan* – AB 758 / SB 350 / AB 3232
- Several cities working on decarbonization reach codes for 2020

2016 Energy Use in California Buildings (MMBtu)

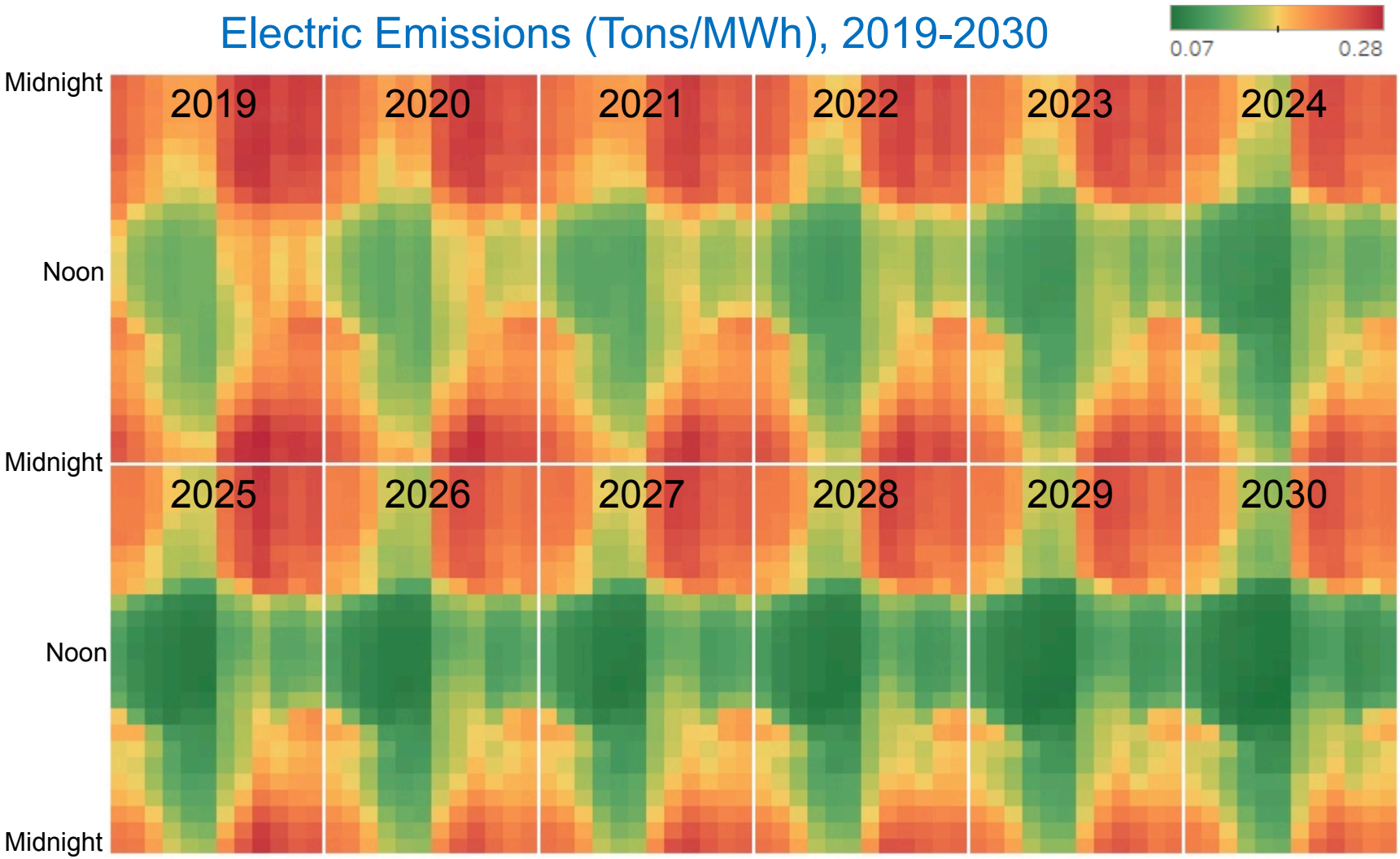
NATURAL GAS (48%)



ELECTRICITY (52%)

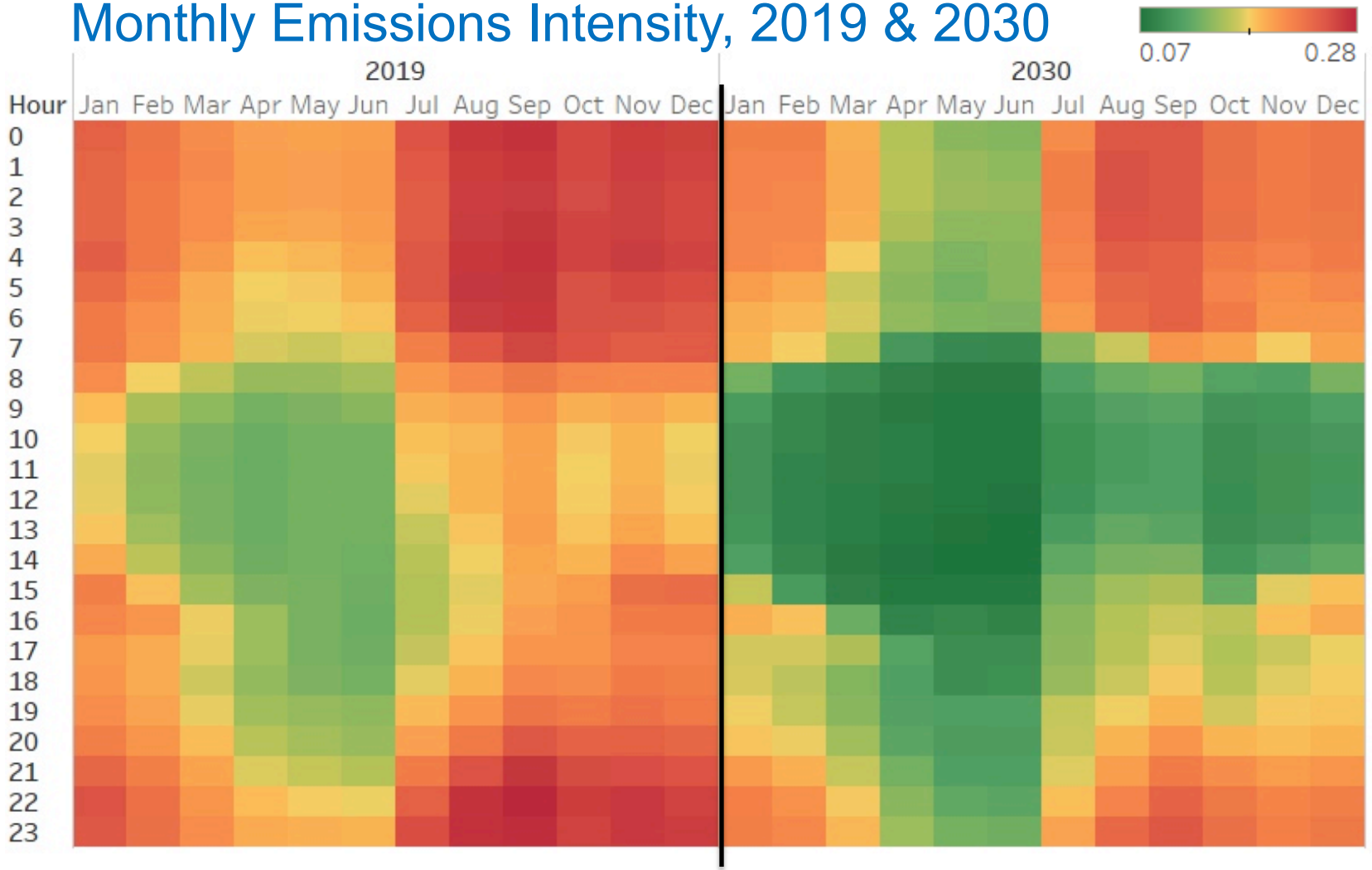
Electricity CO_2 Intensity

Electric Emissions (Tons/MWh), 2019-2030



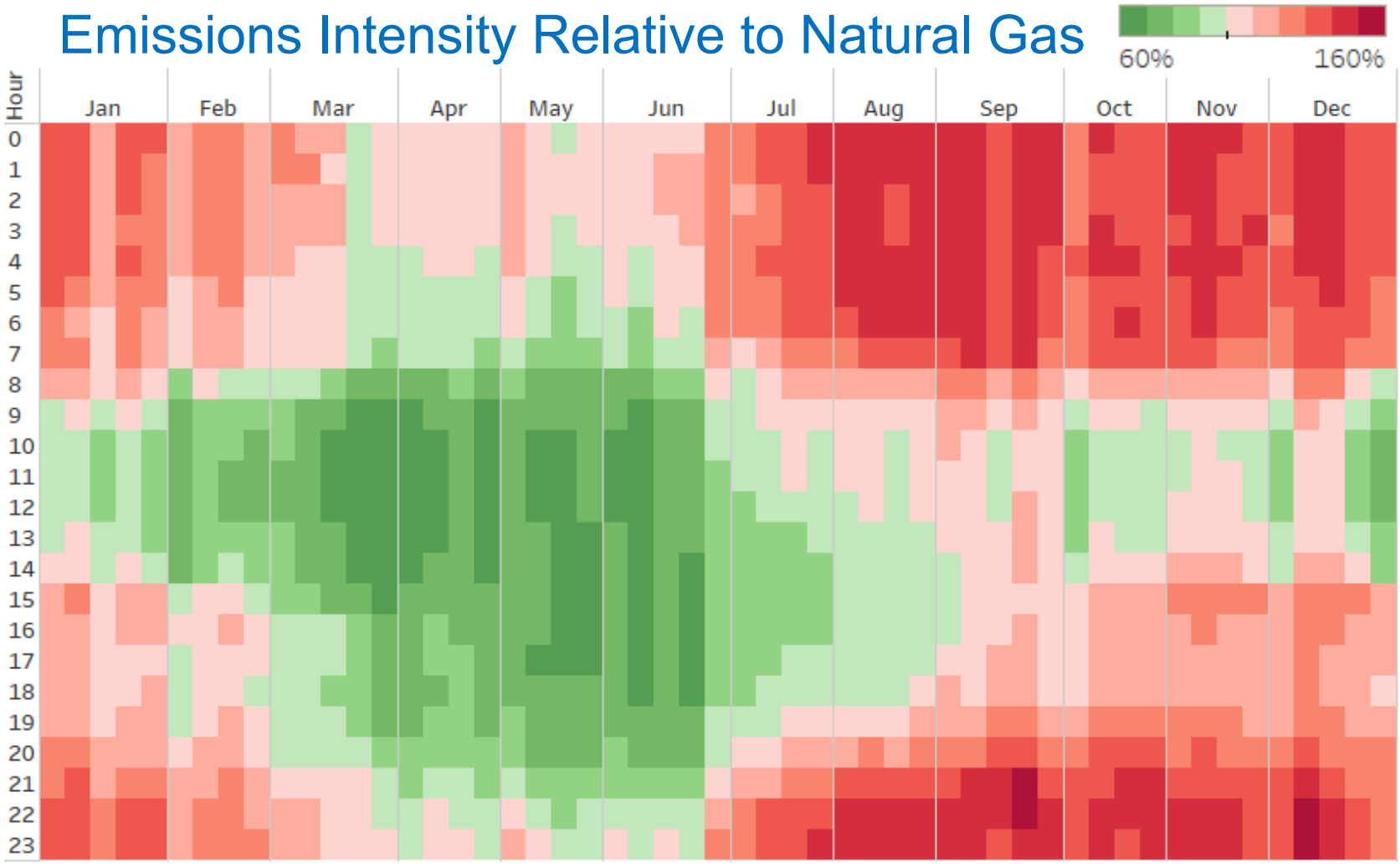
Electricity CO_2 Intensity

Monthly Emissions Intensity, 2019 & 2030



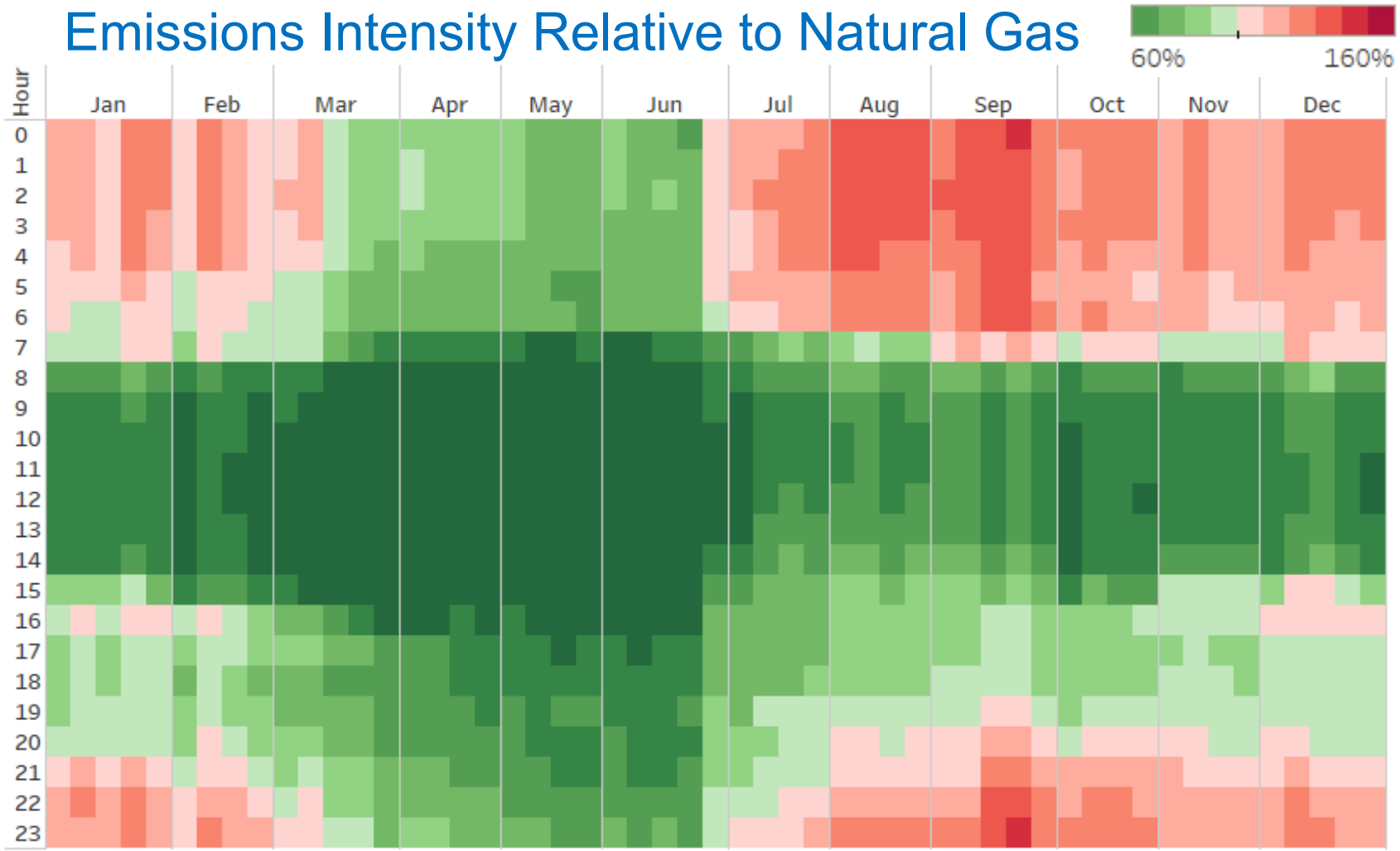
Buildings Perspective: 2019

Emissions Intensity Relative to Natural Gas



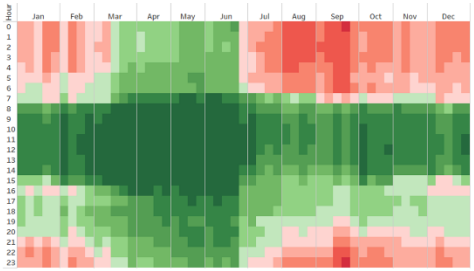
Buildings Perspective: 2030

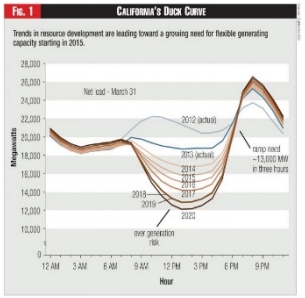
Emissions Intensity Relative to Natural Gas

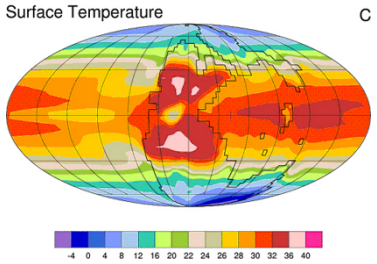


Policy Direction: Building Standards

- Adopt an energy metric that aligns with GHG emissions (applied to all fuel types)
- Adopt a secondary demand flexibility metric (applied only to electricity)
- Implement performance trade-offs that prioritize & protect the building envelope

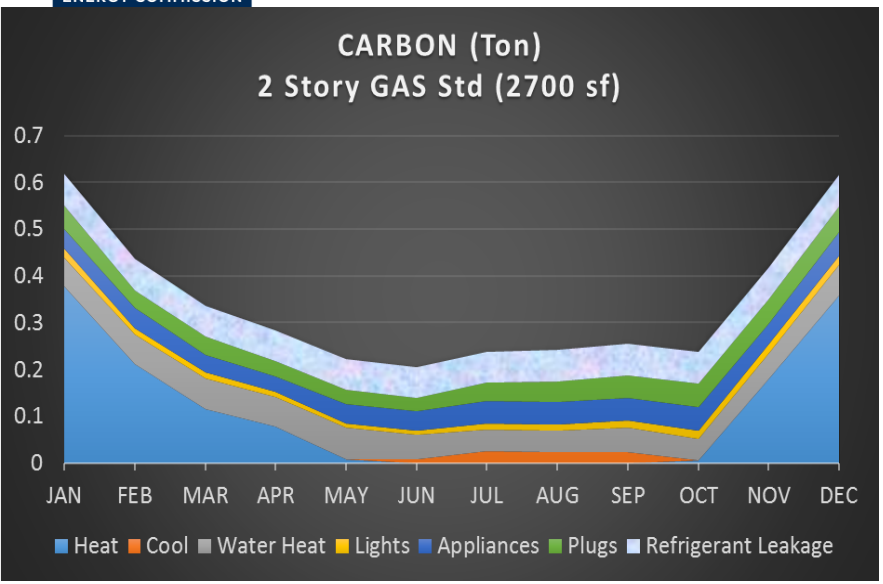


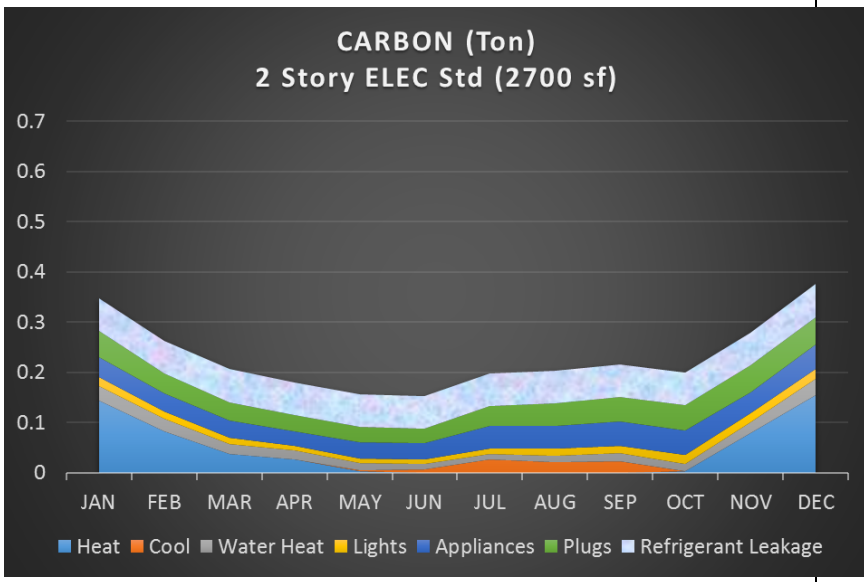




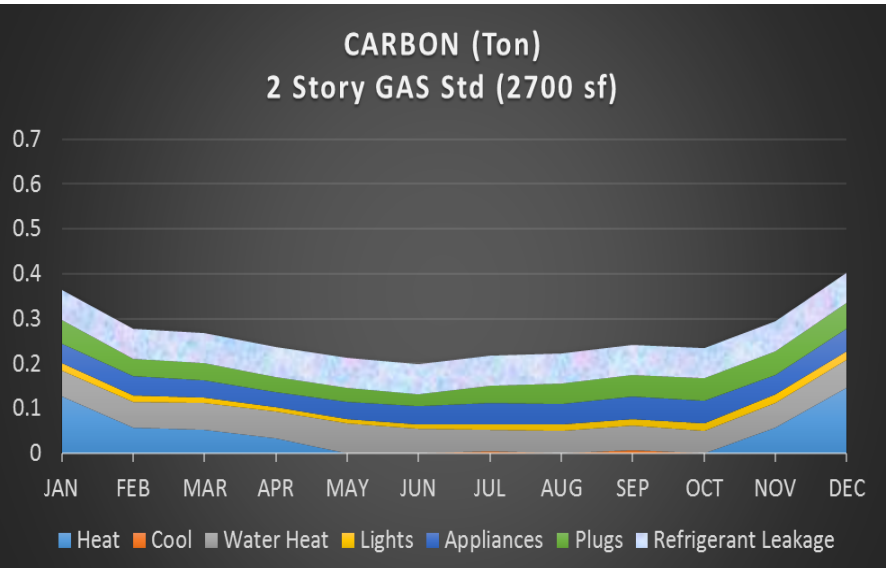
2019 Title-24 Residential

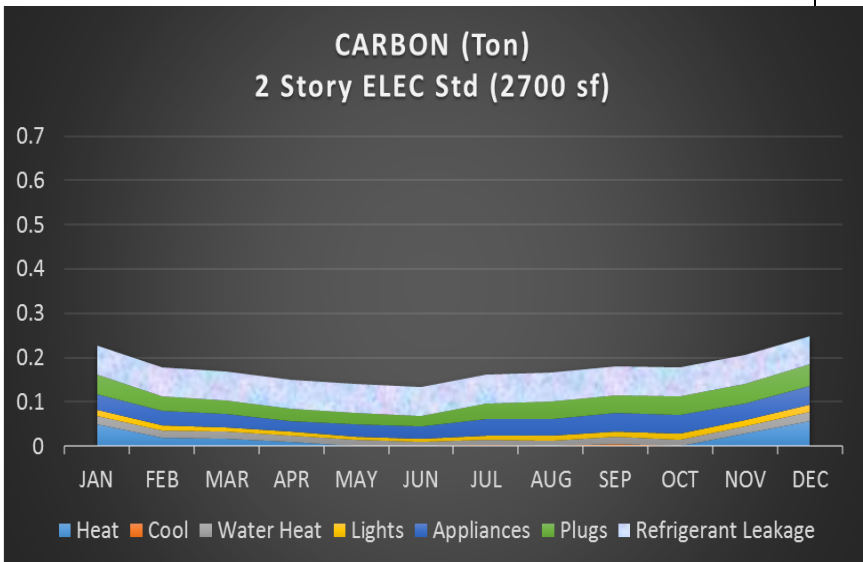
Sacramento





Los Angeles

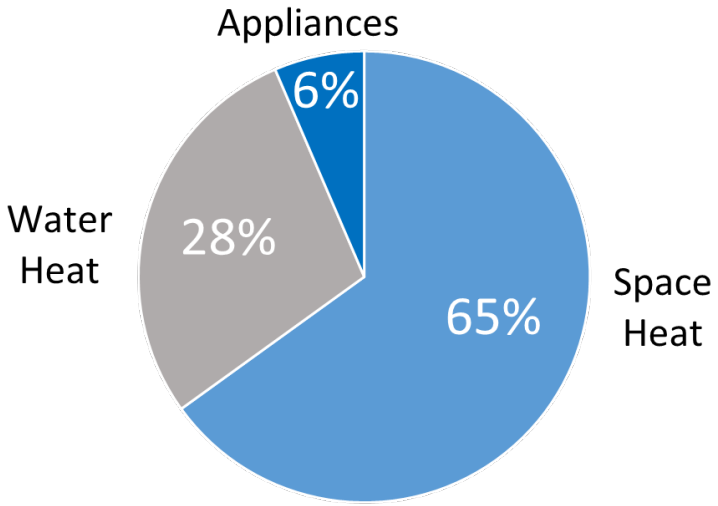




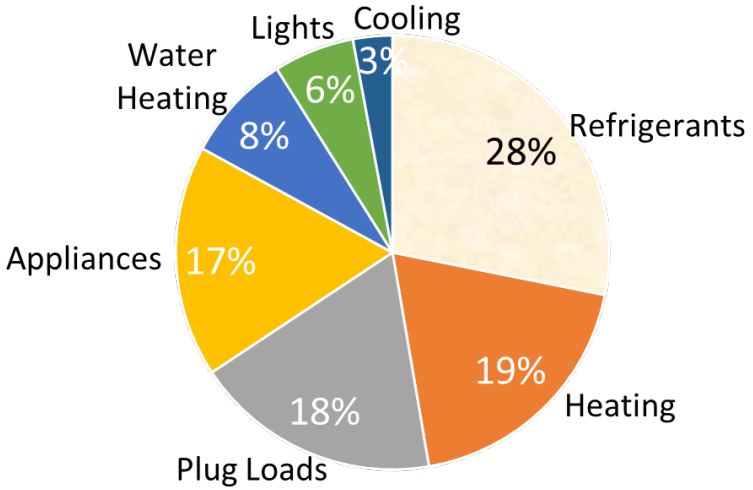
2019 Title-24 Residential

Sacramento

Emission reductions: Mixed Fuel to All Electric



Remaining emissions: All Electric



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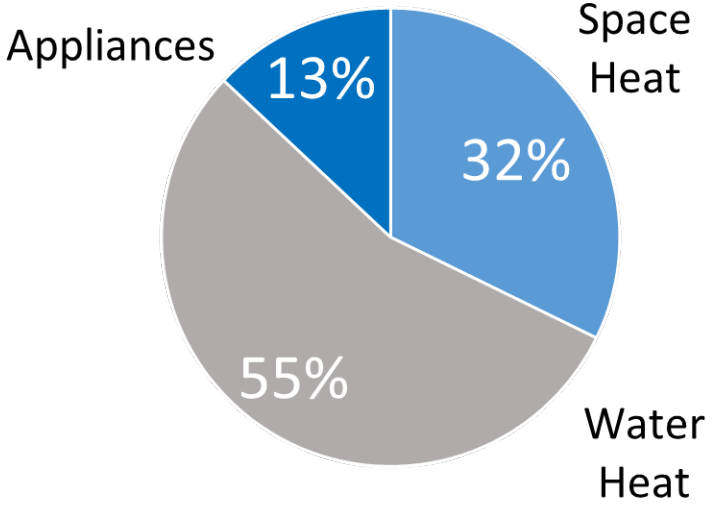
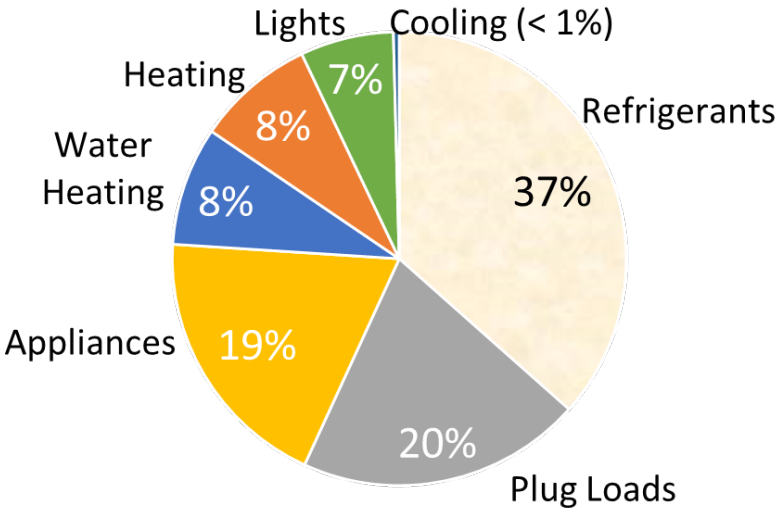
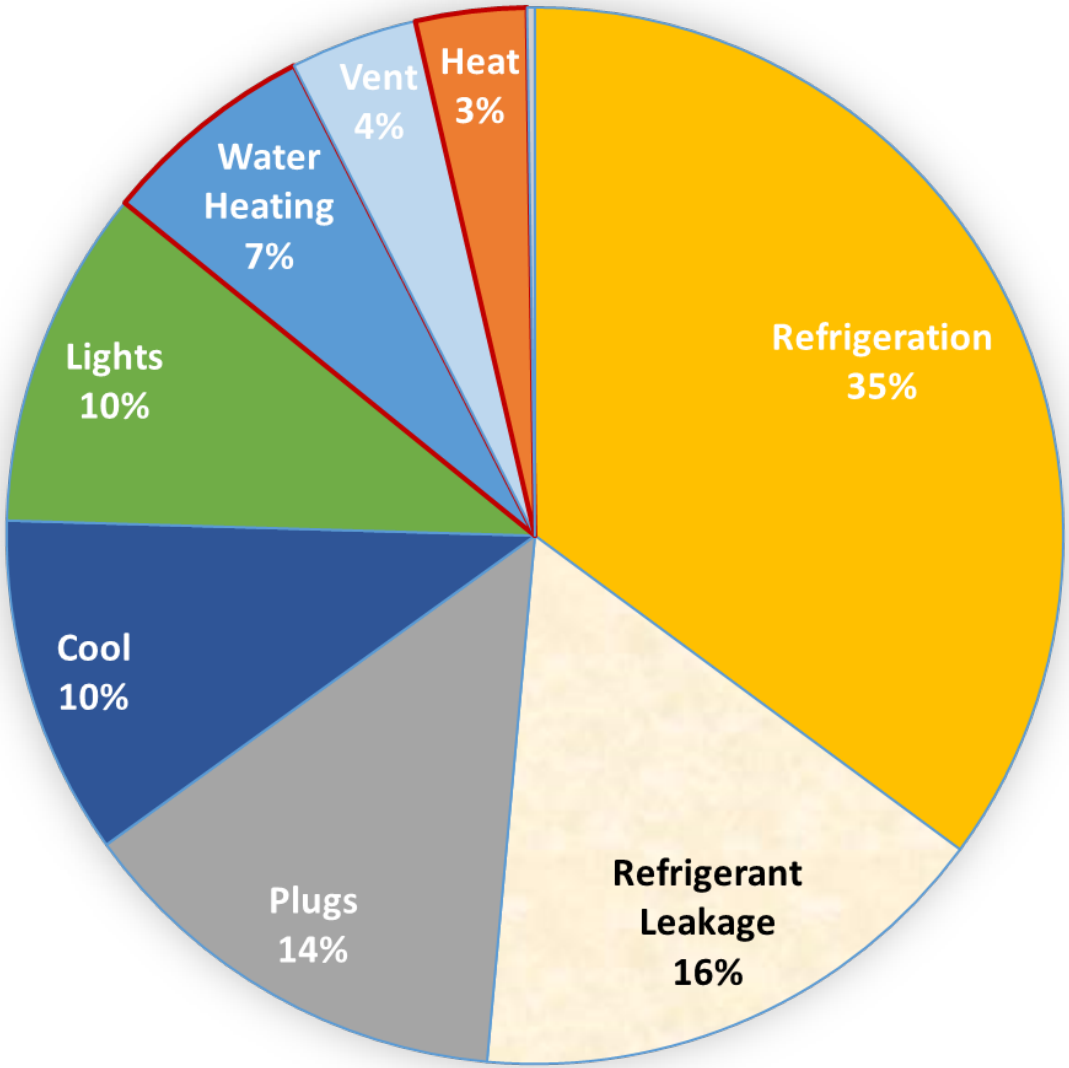




Retail Store with Refrigeration

Shares of Annual GHG emissions



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