



A Critical Role for Utilities

Leading Customers Through Change

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Food Retailers Are Key Accounts

What Food Retailers Do... Matters to Utilities

- Key load growth and system management partners
- Often engaged through efficiency and Demand Response programs
- Look to utilities for guidance & partnership on energy



Food Retailer Priorities Are Changing

Refrigerants Eclipsing Energy In Driving Retailer Decision-Making

Drivers:

- Policy
- Corporate Climate Goals



Current Regulation is Insufficient for a 1.5°C Warming Goal

- The Montreal Protocol & Kigali Amendment
- The U.S. AIM Act
- E.U. F-Gas Regulation
- Other National Policies
- California Regulation & other State Policies



Background on Refrigerants

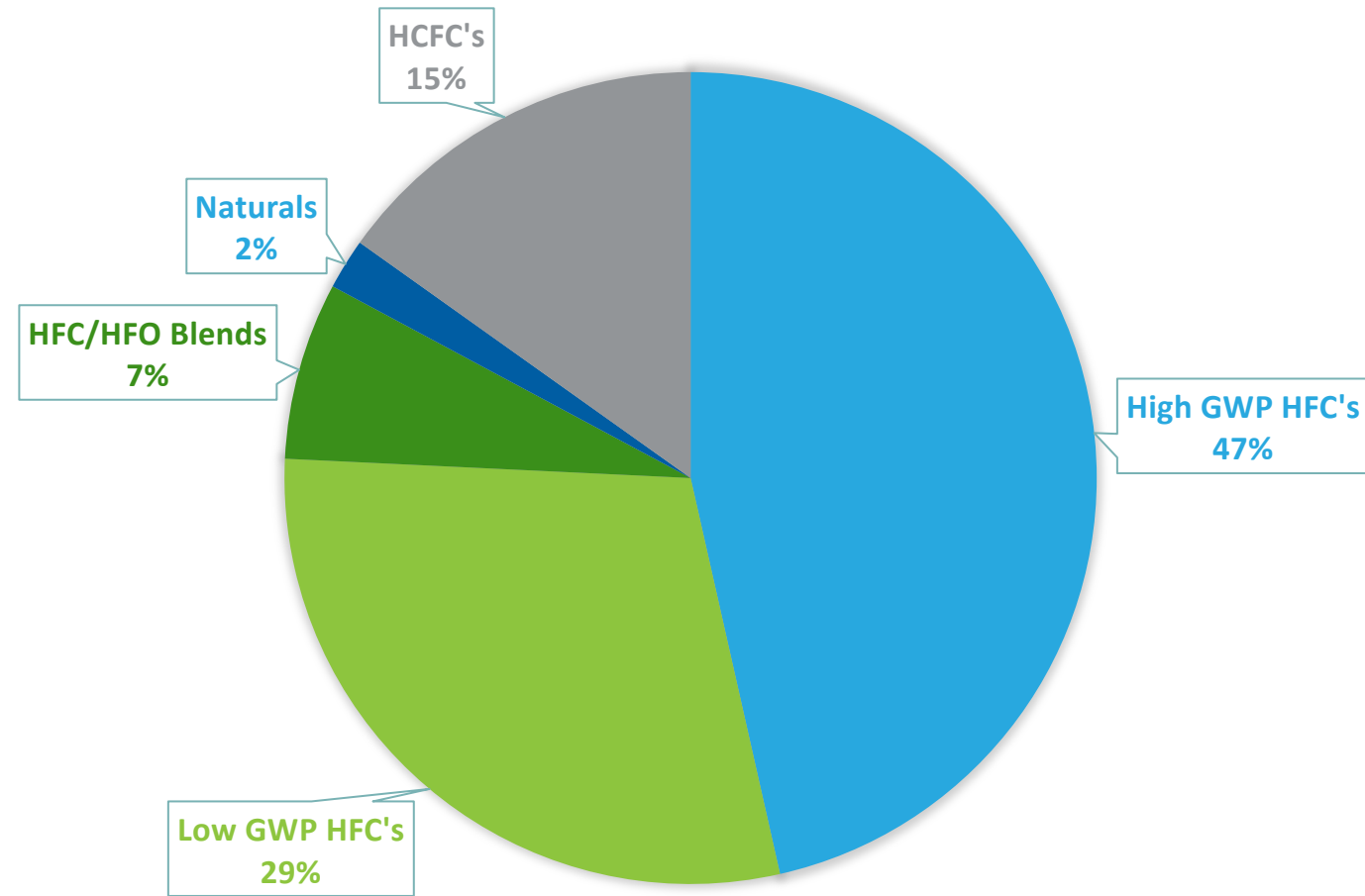
Hydrofluorocarbons (HFC's) are the fastest growing greenhouse gases globally

- Warming impact 1000+ times that of CO₂
- Short Lived Climate Pollutants (SLCP's)
- Mitigation can avoid 0.5 degrees Celsius of warming by 2100
- 100 - 200 gigaton opportunity



Supermarket Refrigerants

Current Conditions

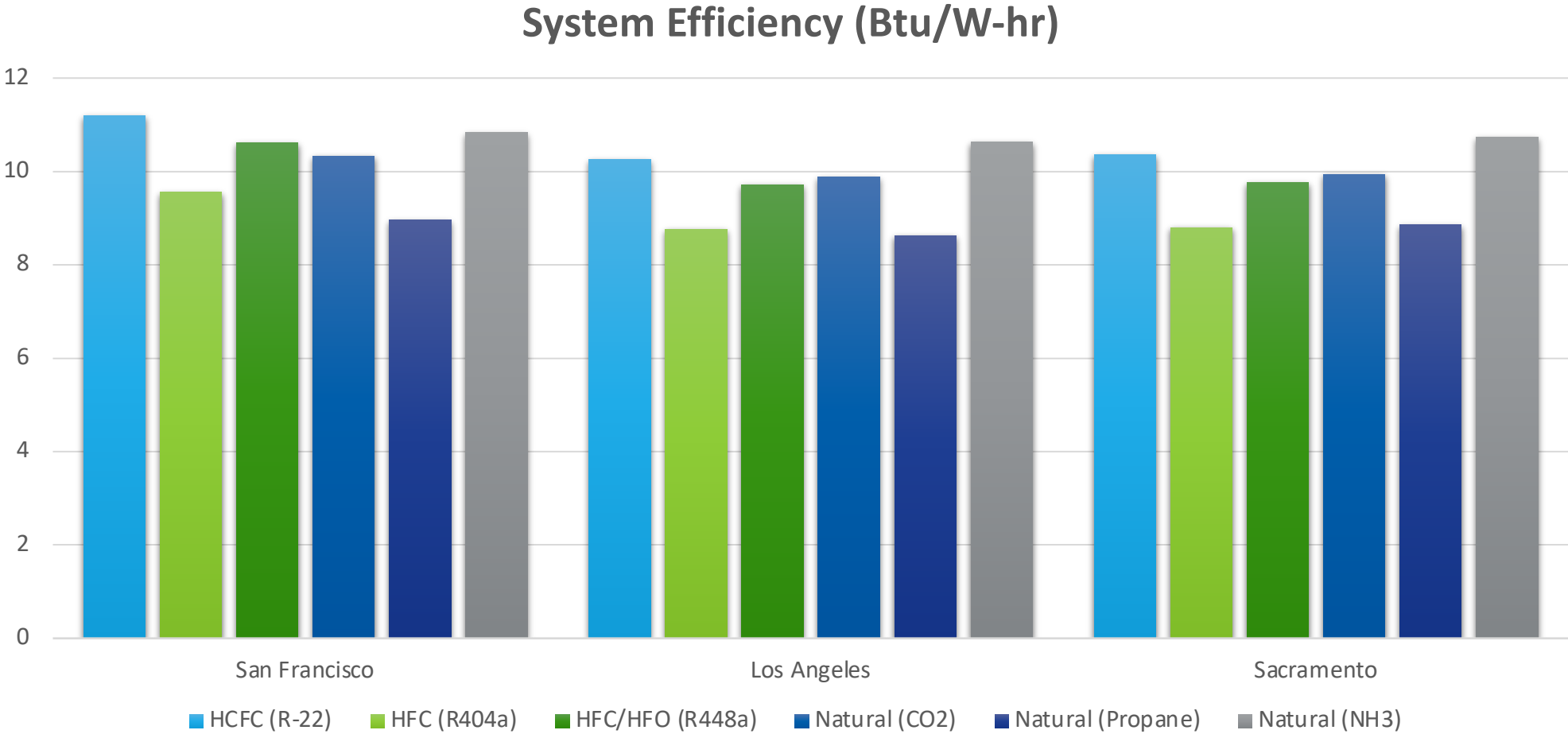


What Gets Installed Now Will Impact for Decades...

Refrigerant Category	Refrigerant(s)	Ozone Depleting (Y/N)	Global Warming Potential (CO2 = 1)
HCFC	R-22	Y	~1800
High GWP HFC's	R404a / R507a	N	~4000
Low GWP HFC's	R407a/f / R134a	N	~2000
HFC/HFO Blends	R448a / R449a	N	~1400
Natural	R290 / R717 / R744	N	<10

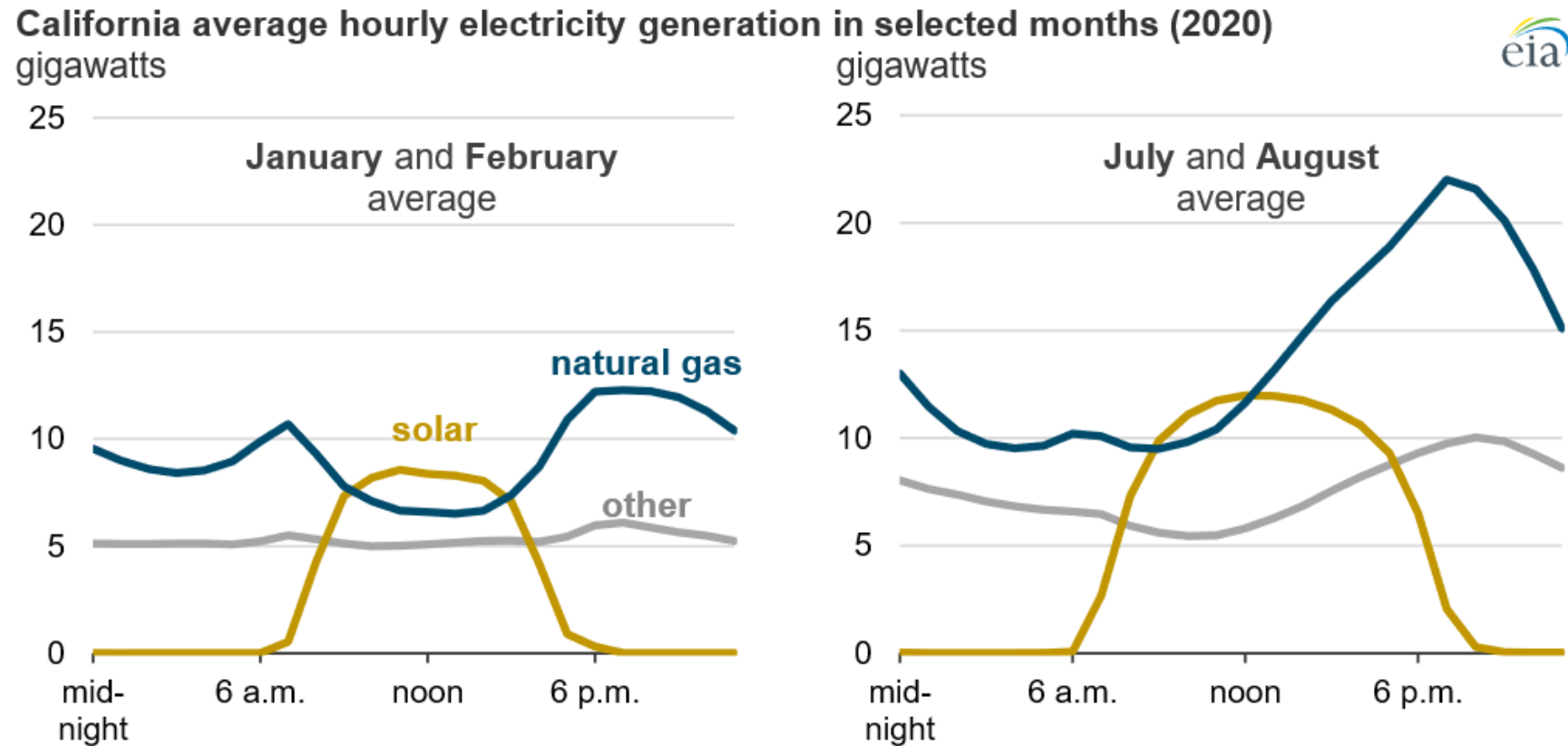
Note: R290 = Propane
R717 = Ammonia
R744 = Carbon Dioxide

Common Refrigerants Comparative Energy Use by Climate Zone



Source: Extrapolated from SCE Next Generation Low-GWP Refrigeration Systems Report, 2021 (ET18SCE7080)

The Real Energy Need Reflected in Total System Benefit (TSB)



Source: U.S. Energy Information Administration, [Hourly Electric Grid Monitor](#)

Note: Data are for the [California](#) region, which includes electric power markets regulated by the California Independent System Operator (CAISO) and other balancing authorities operating largely in California.

Challenges of Retrofit

- Retrofit Costs
- Solution Shelf Life
- Refrigerant Safety
 - Flammability
 - Toxicity
- System Resilience
- Workforce Education & Training
- Energy Impacts



Challenges of Retrofit

Project Scope	Cost (\$)	GWP Reduction (%)
Drop-In Gas Replacement to HFC/HFO Blend	\$125-175K	67%
Replacement with TC CO2	\$2-3M	99%
Drop-In MT HFC/HFO Blend plus CO2 LT	\$750K-1M	77%
Drop-In closed loop high side HFC/HFO blend plus CO2 MT & LT	\$1M-2M	94%

Typical Store Economics:

- ✓ 40k sq ft store
- ✓ Existing standard rack system

The Value of GHG Based Incentives

Retailers will be looking for a holistic and flexible incentive



kWh Incentives drive trade-off between refrigerant & energy goals:

- ✓ Retailers must transition refrigerants
- ✓ Many Retailers want to move ahead of regulations
- ✓ The cost of solutions is still high
- ✓ Retailers must manage electricity usage, demand and refrigerants