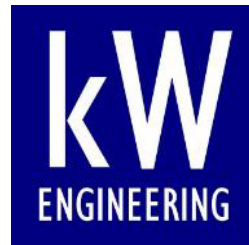


Incentives, Energy Efficiency & Refrigerants

NASRC Sustainable Refrigeration Summit

October 28th, 2022

Jim Kelsey, PE kW Engineering



My points

1. It's all about GHG reduction
2. It's more cost effective to to save GHG through refrigerant retrofits than energy efficiency (this is coming from an EE guy btw)
3. Set policies/incentives to allow the most cost-effective comprehensive approaches ∴

Don't *bind* GHG reduction incentives to Energy Efficiency Savings Alone

Refrigerants Are the Worst Greenhouse Gases You've Never Heard Of. Here's What You Can Do



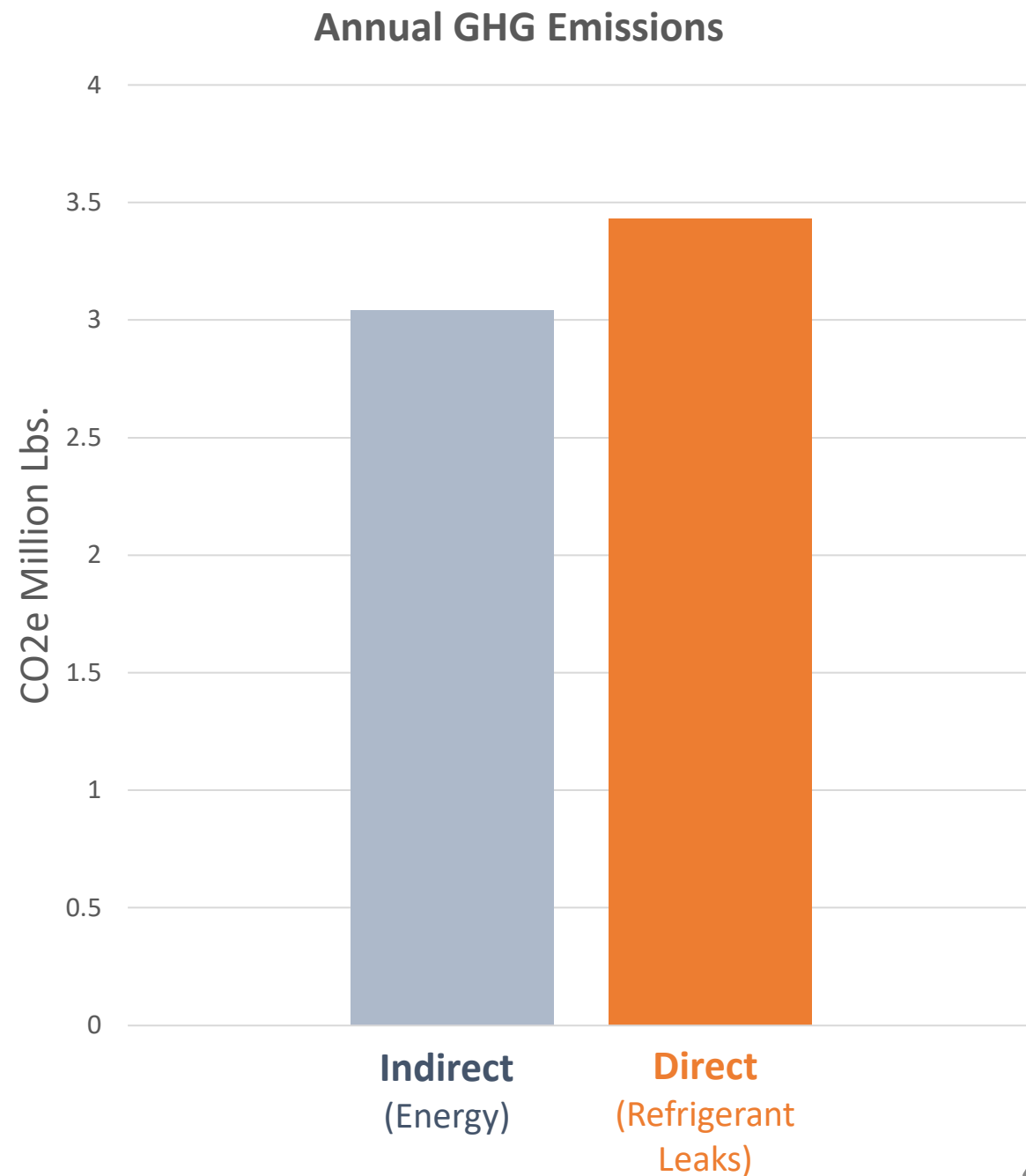
By [Laura Klivans](#)



Mark Koppang, Raley's director of sustainability, stands on the roof of a Raley's supermarket in Sacramento where heat from the market's refrigeration system is discharged. This market keeps their products cool using gases with near zero impact on global warming. (Laura Klivans/KQED)

Grocery Store Greenhouse Gas (GHG) Emissions

Source: US EPA, Profile of an Average U.S. Supermarket's Greenhouse Gas Impacts from Refrigeration Leaks Compared to Electricity Consumption



California HFC Regulations

- **SB 1383** (2016) – 40% reduction in HFCs from 2013 levels by 2030
- **SB 1013** (2018) – Ban high GWP HFCs (SNAP), established CARB incentive program (FRIP), CPUC to *consider* developing strategy
- **CARB HFC Rulemaking** (2020)

NEW Refrigeration
Systems

< 150 GWP Refrigerant Jan 1, 2022

EXISTING
Refrigeration
Systems

< 1400 Average Weighted GWP by 2030

OR

55% Reduction GHG Potential

California HFC Regulations - New

SB 1206 (2022)

Bans sale and distribution of new refrigerants (not reclaim)

Year (January 1)	Highest GWP Allowed
2025	2,200
2030	1,500
2033	750

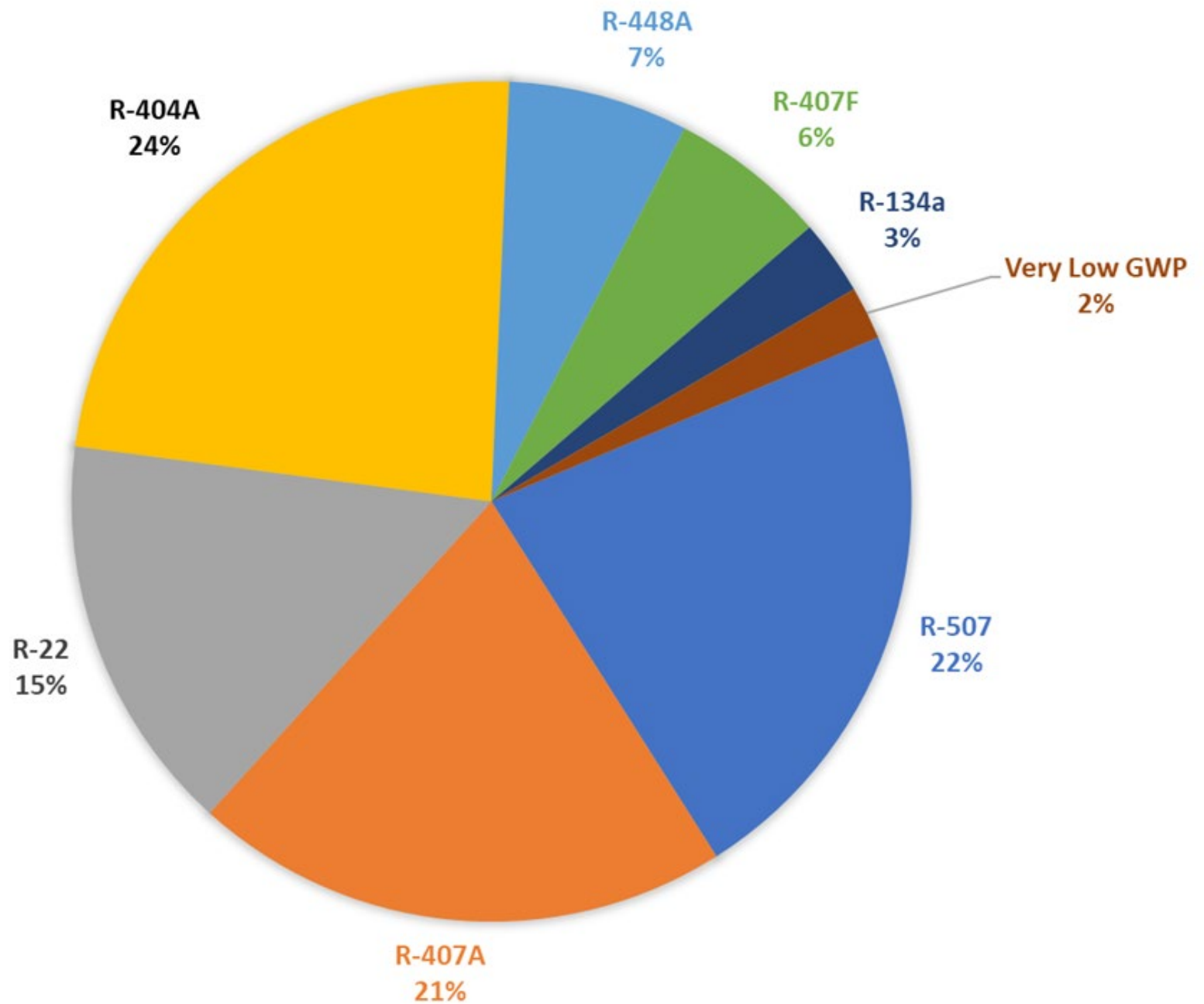
New Definitions

“Low GWP” = < 150 GWP*

“Ultra-low” < 10 GWP*

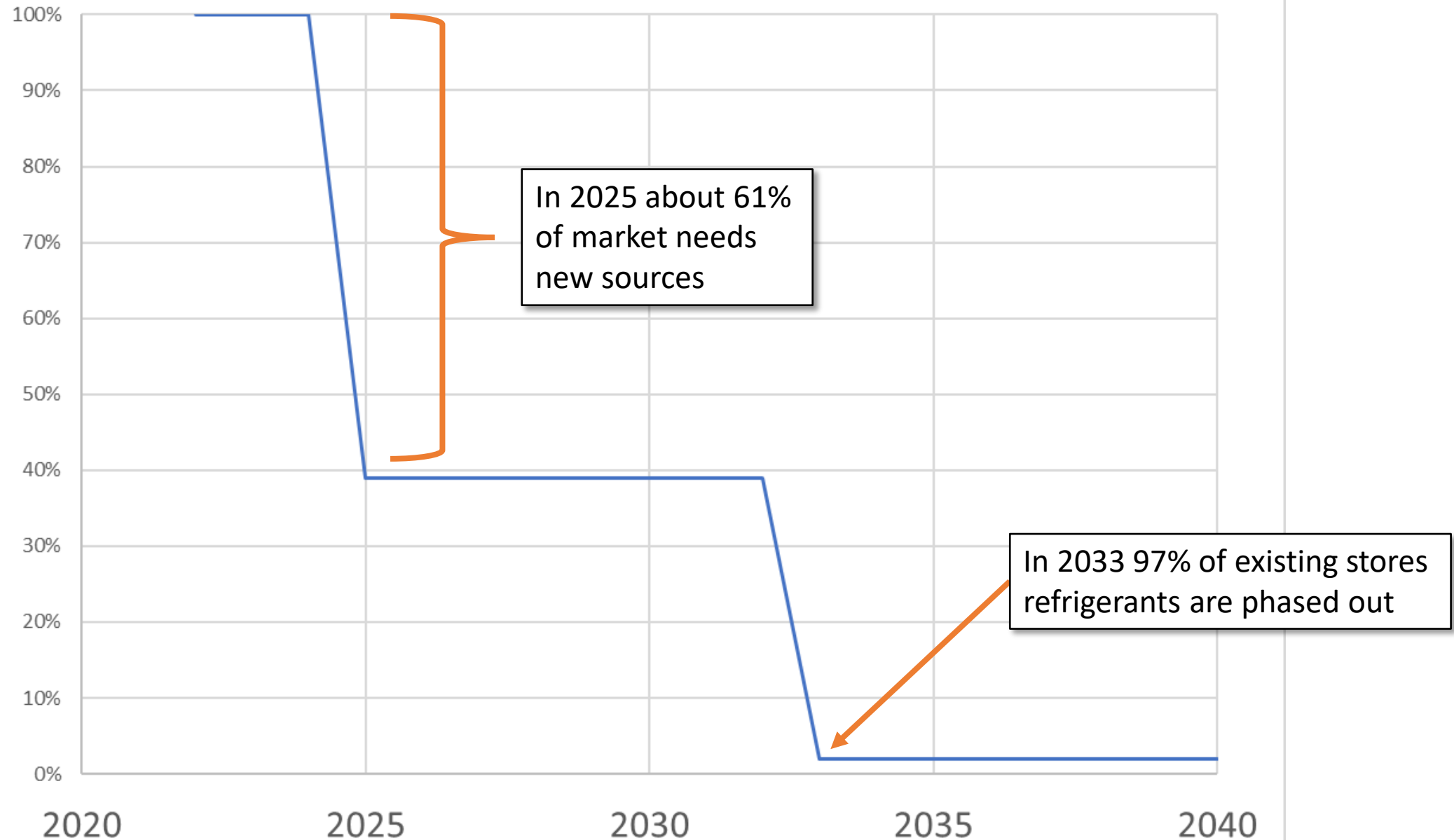
*GWP’s referenced are 100-year (AR4 / AR5)

Existing Refrigerant Makeup



Fraction of reported leaks by mass in CA 2019

Future Availability for Existing Stores
(approx % of existing stores w/ future availability of current refrigerant)



ET Study – What we did

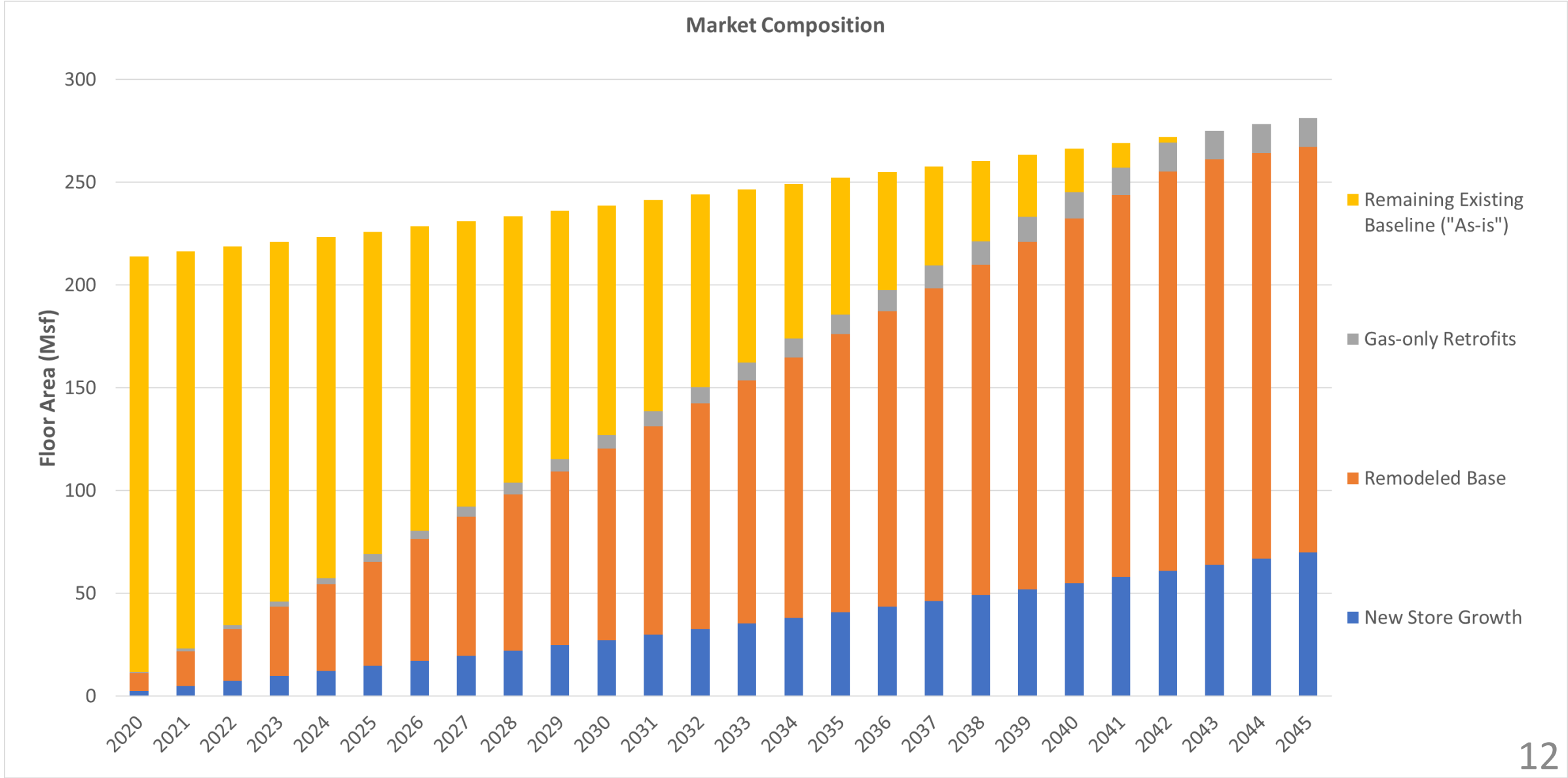
- Surveyed market stakeholders
 - Industry trends
- Gap Analysis – Modeling Tools
- Market Study
 - Gathered data on baseline stock / refrigerants
 - Projected direct and indirect emissions

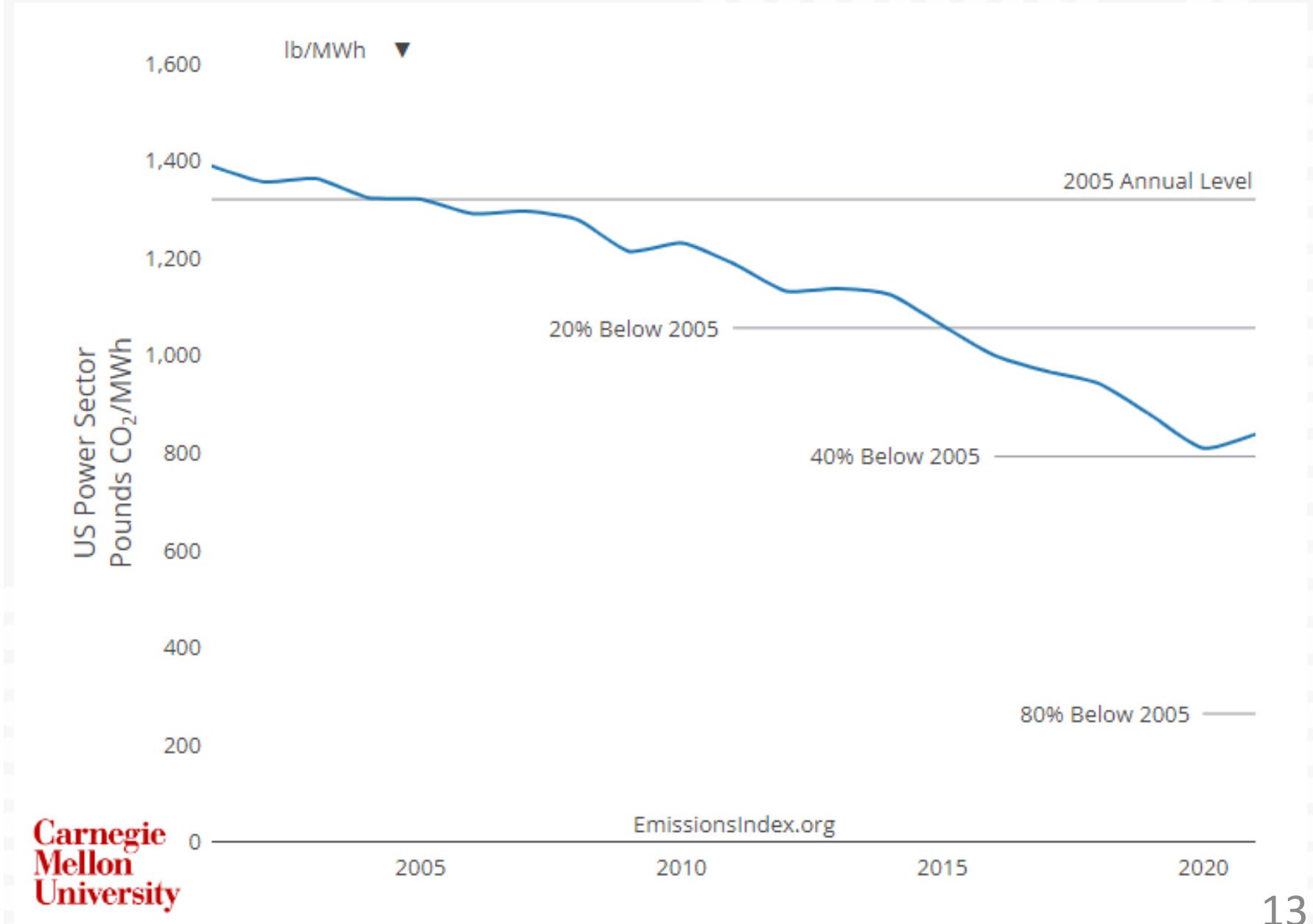
www.etcc-ca.com/reports/next-generation-low-gwp-refrigeration-systems-tools-assessment-and-market-impacts

<https://tinyurl.com/32y98ae8>



California Grocery Floor Area Projection

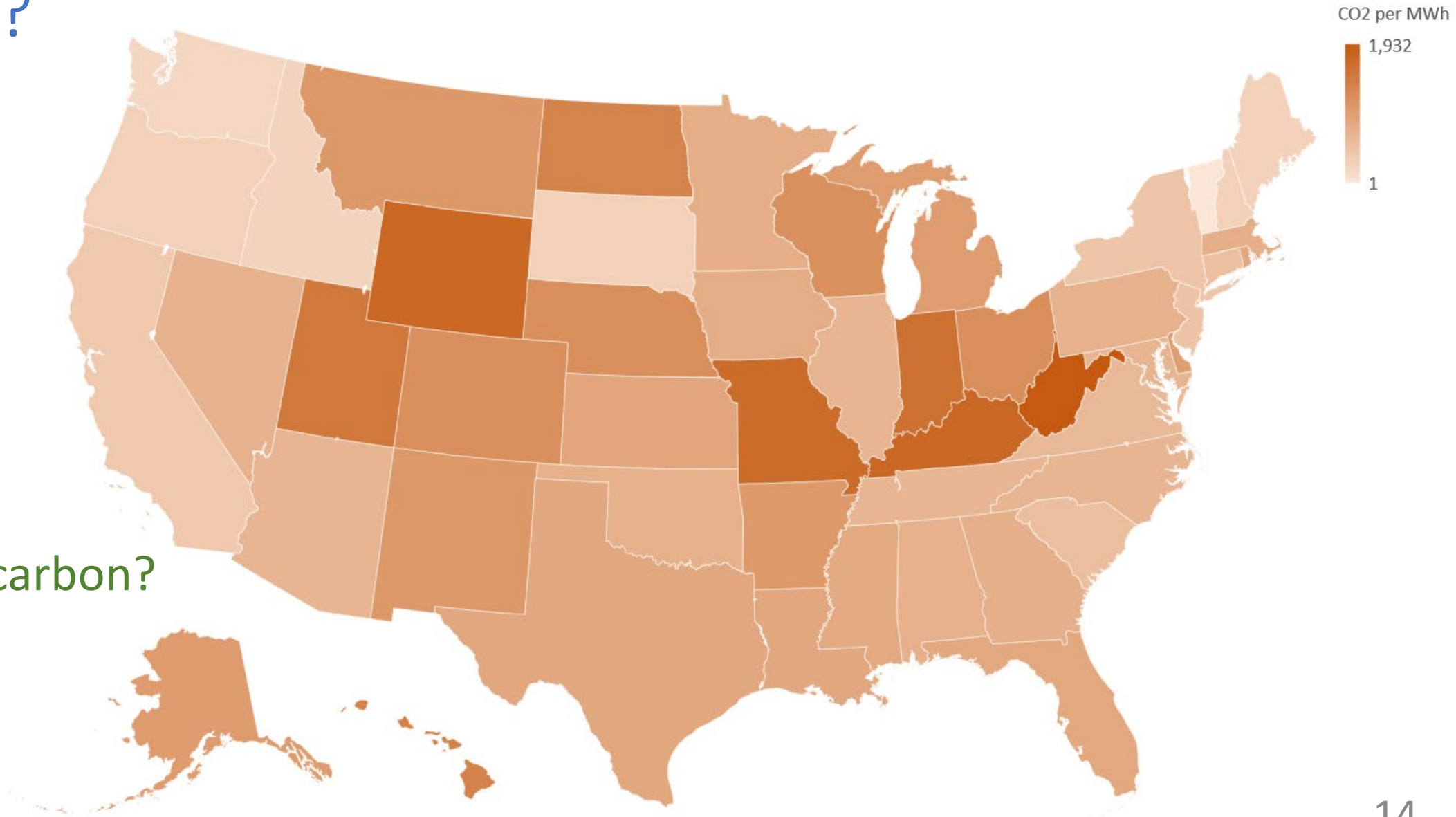




As the grid greens,
Energy Efficiency has less CO₂ impact

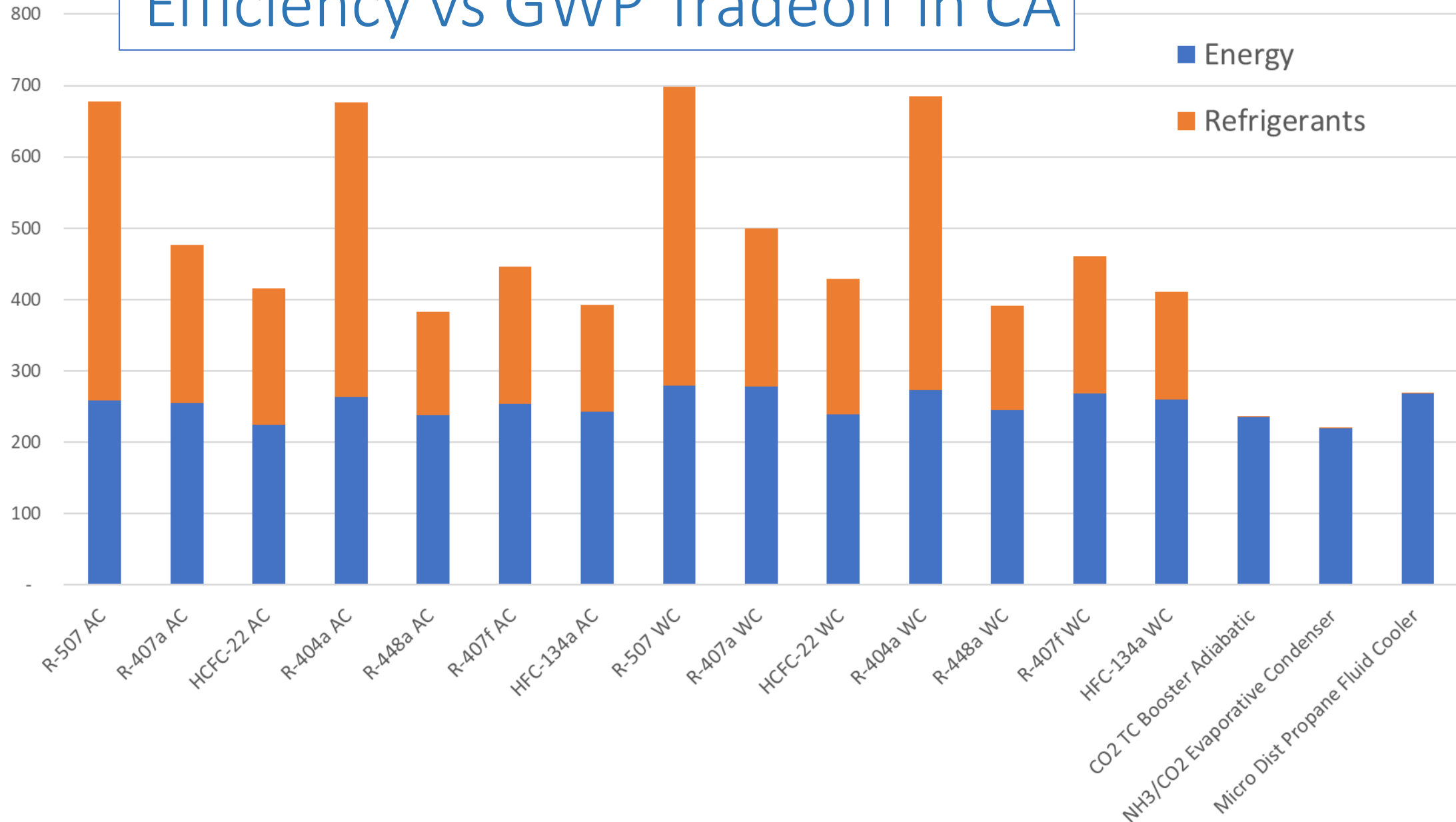
How green is
your grid?

Electric Grid Carbon Intensity [lbs CO2e per MWh]



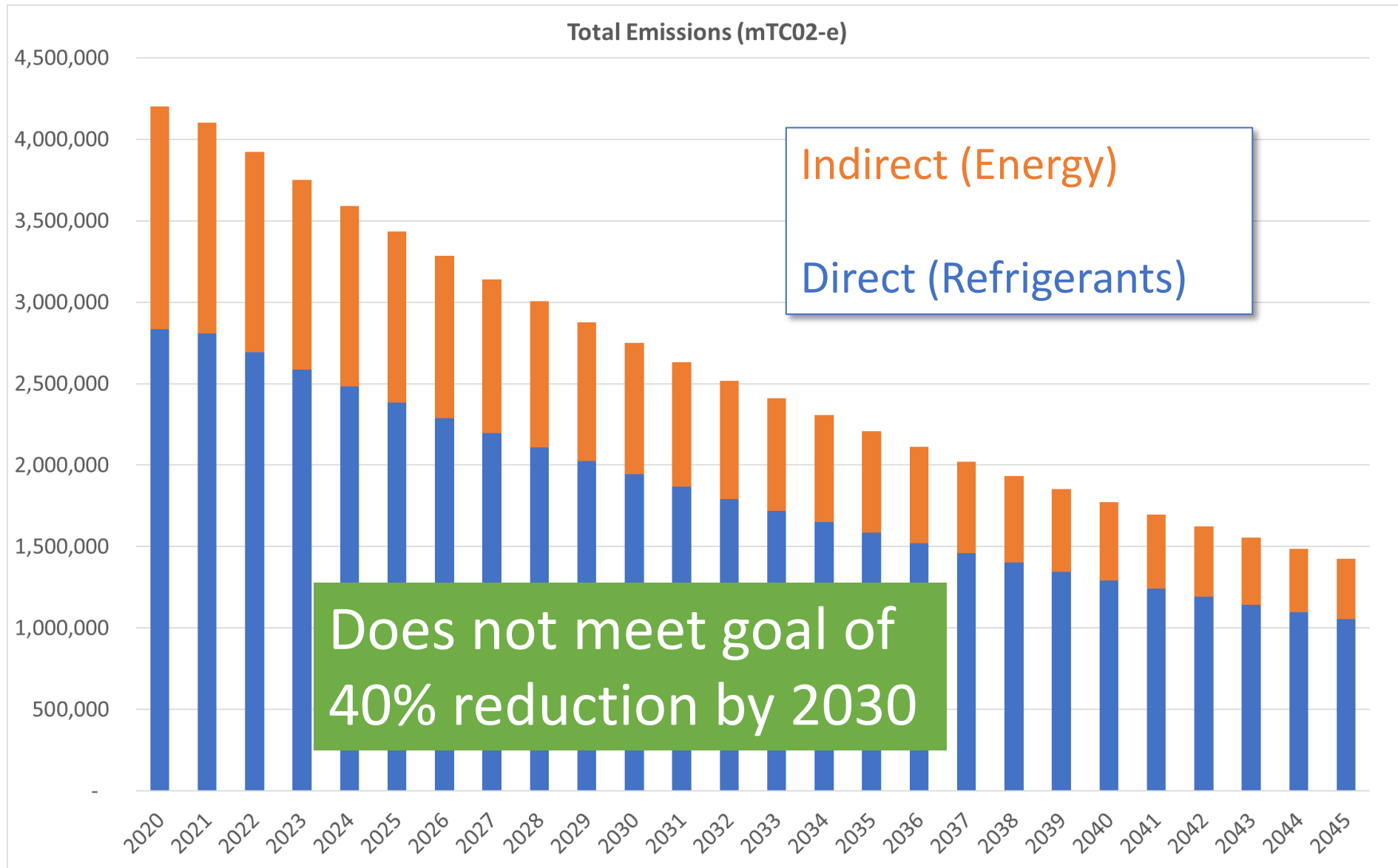
Btw...
heard of wattcarbon?

Efficiency vs GWP Tradeoff in CA

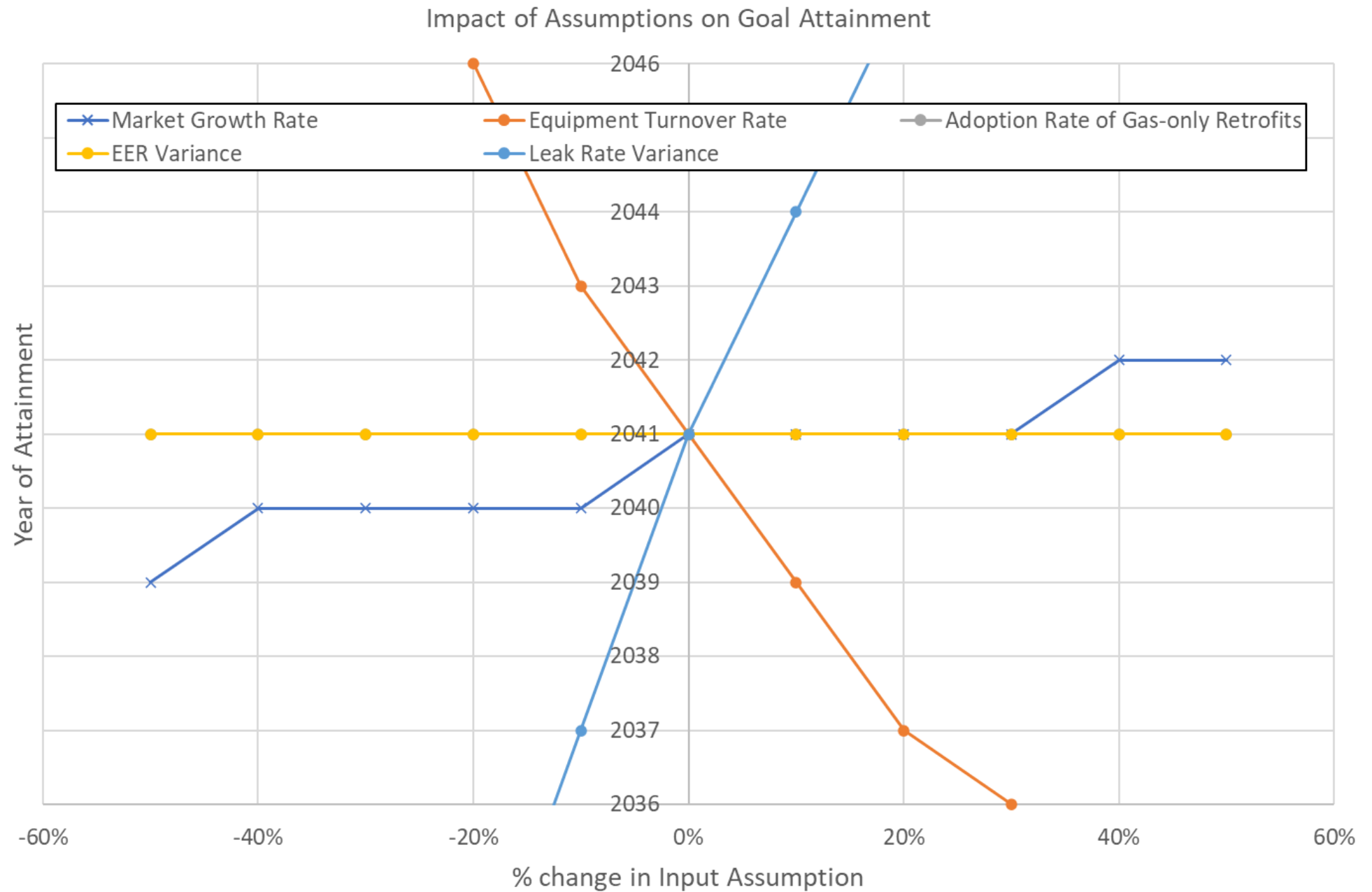


Avg over CA climate zones, typical store size, leak rates, AC = Air cooled, WC = Water cooled or combi

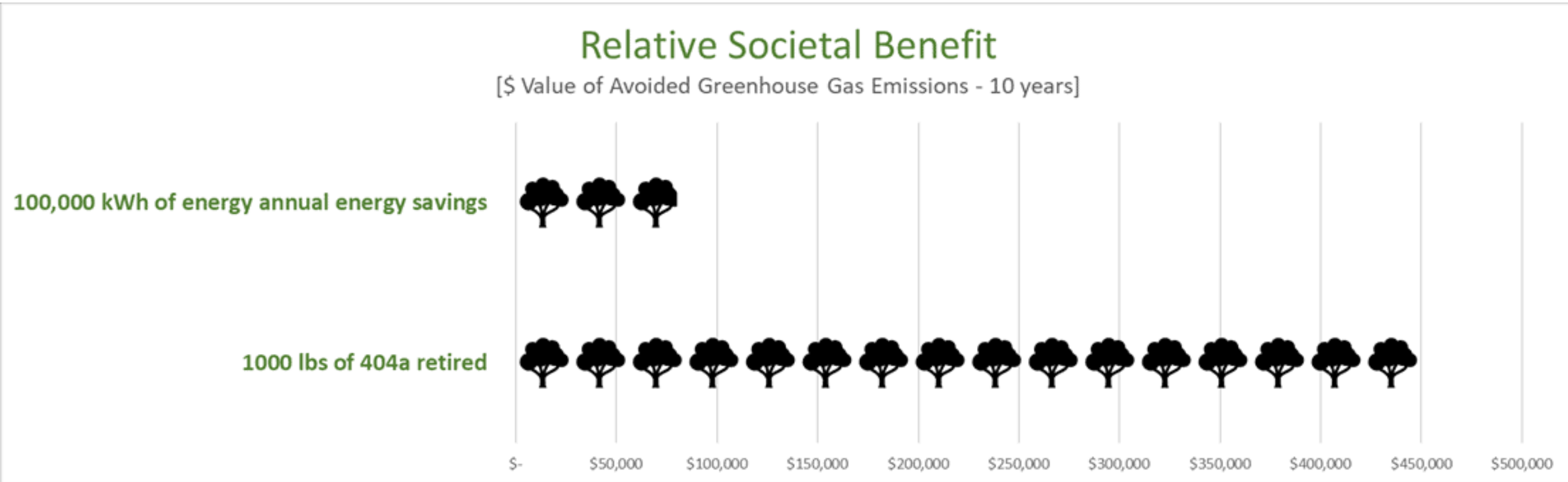
Emission Reductions over Time



Sensitivity



Energy efficiency vs. GHG Benefits



1 Grocery Store Retrofit



Typical Store (medium)

- About 40,000 sf
- About 50 kWh/sf
- Average annual energy use ~ 2,000,000 kWh

HFC Retirement Project

- 700 lbs of retired refrigerant
- \$500,000 Avoided Cost
- Equivalent to 6,500,000 kWh saved (equivalency based on avoided cost of EE savings CA 2022)

= 6,500,000 kWh!



Conclusions / Recommendations

- Value EE and GHG reductions using the same metric

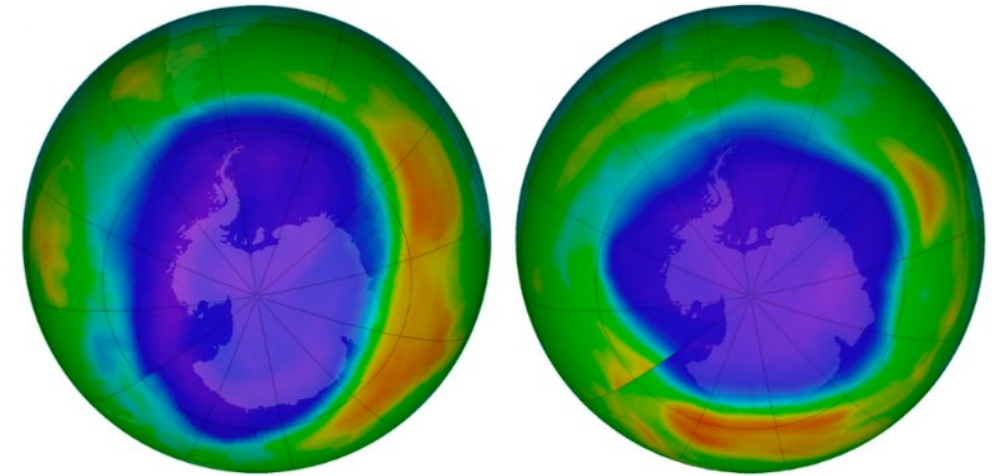
MTCO₂e 

- Turnover is key to meeting GHG reduction goals

We've done this before...

- Montreal Protocol – the most successful environmental action ever completed (“.. that you’ve never heard of.”)
- Recognized problem
- 1st Step; Industry claims it was impossible to remove CFCs
- Worldwide cooperation
- Retrofits drove equipment investment, replacements, retrofits, energy efficiency...

= Business opportunities for those
who are prepared



By Associated Press

WASHINGTON – Earth’s protective ozone layer is finally healing from damage caused by aerosol sprays and coolants, a new United Nations report said.

The ozone layer had been thinning since the late 1970s. Scientist raised the alarm and ozone-depleting chemicals were phased out worldwide.

As a result, the upper ozone layer above the Northern Hemisphere should be completely repaired in the 2030s and the gaping Antarctic ozone hole should disappear in the 2060s, according to a scientific assessment released Monday at a conference in Quito, Ecuador. The Southern Hemisphere lags a bit and its ozone layer should be healed by mid-century.

What can you do?

- Are you advocating your regulators to fund the most cost effective GHG reduction strategies?
- Are you designing programs that reflect the cost effectiveness and magnitude of the opportunity?

What policies can help?

- Prioritize comprehensive GHG reduction strategies
- Don't bind GHG reductions to energy reductions

Thanks!

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