



MULTIUNIT
FOODSERVICE
EQUIPMENT
SYMPOSIUM
MUFES 2020

HEAT, TRASH, AND CARBON: THE CHANGING LEGAL LANDSCAPE



**The Food Service
Technology Center**



January 27th, 2020



California Energy Wise

CAEnergyWise.com

Presentation by:
Richard Young
Director
ryoung@frontierenergy.com



fishnick.com

**The Food Service
Technology Center**

32 Years of Food Service Energy Efficiency

FRONTIER
energy

operates



**The Food Service
Technology Center**

fishnick.com

Partners/Clients



Mfg., Designers, Operators

The Big Picture

Voluntary Carbon, Solid Waste, and Heat Stress Reduction is moving toooooooo sloooooow....



So, governments are creating laws to
“get ‘er done”

Chapter One: Carbon

The challenges facing food service operators,
as we move towards:

DECARBONIZATION
&
ELECTRIFICATION

(related but not necessarily the same thing)

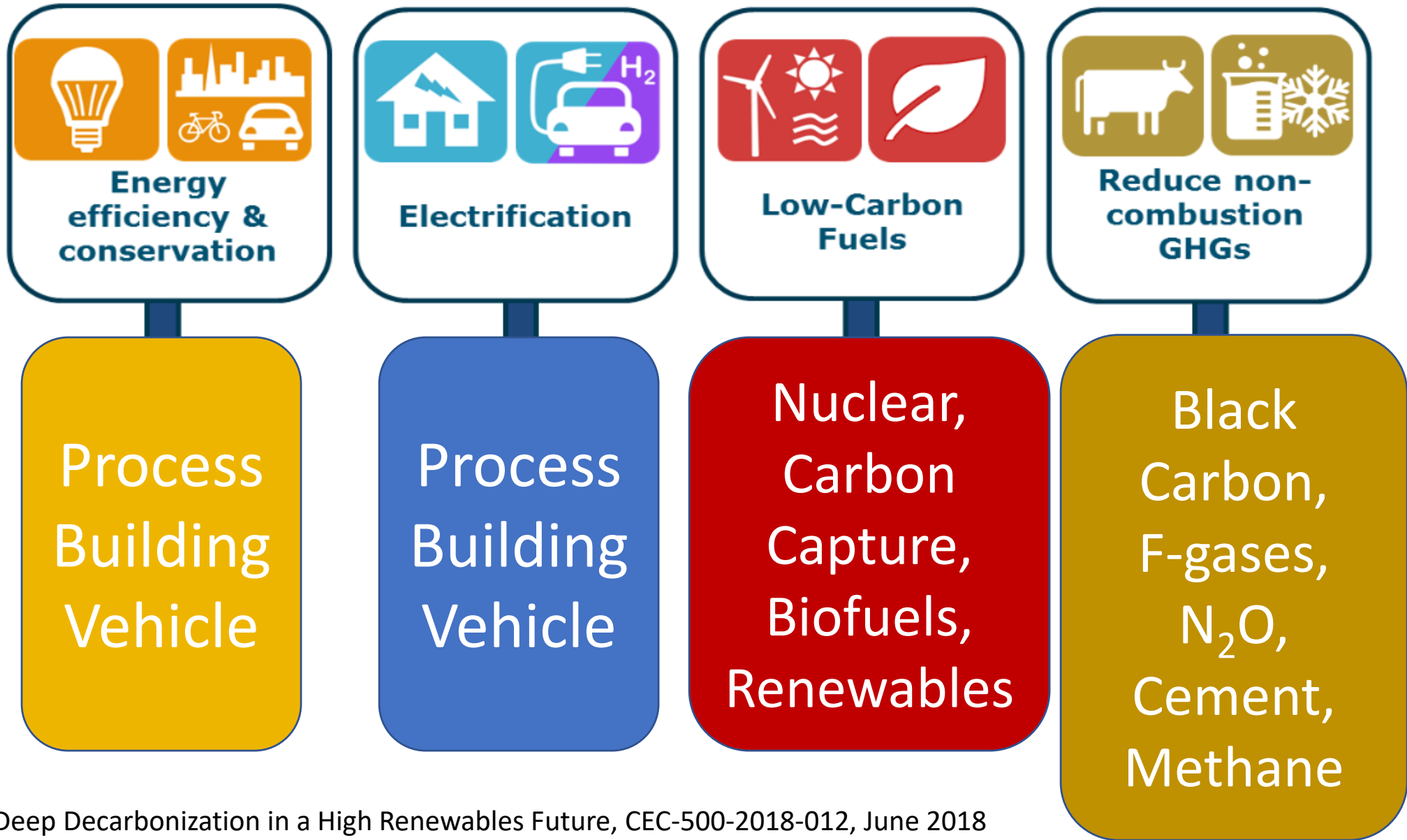
Decarbonization

“...reduction of carbon inputs to socioeconomic metabolism.”*

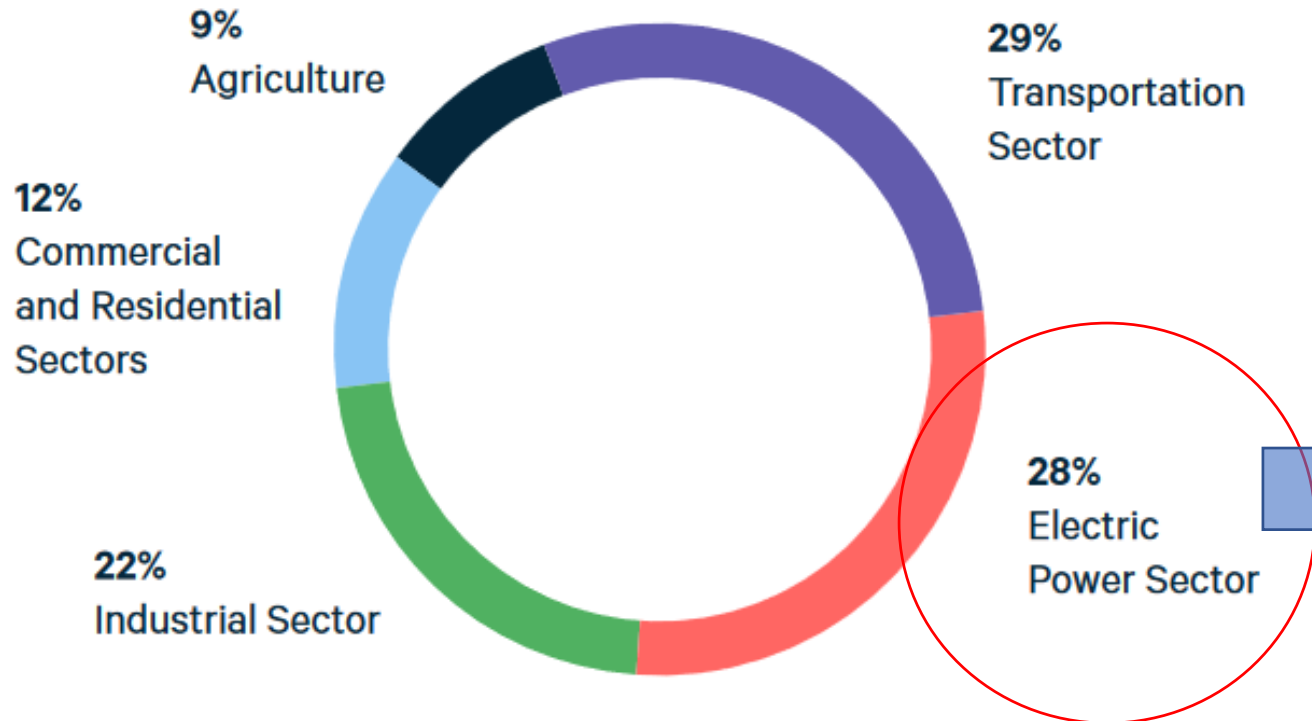
Reducing human-related carbon and CO₂-equivalents
in all aspects of human society

**Helmut Haberl, International Encyclopedia of the Social & Behavioral Sciences (Second Edition), 2015*

Pillars of Decarbonization



2017 US GREENHOUSE GAS EMISSIONS BY SECTOR



Data from EPA "Inventory of US Greenhouse Gas Emissions and Sinks" (2017)

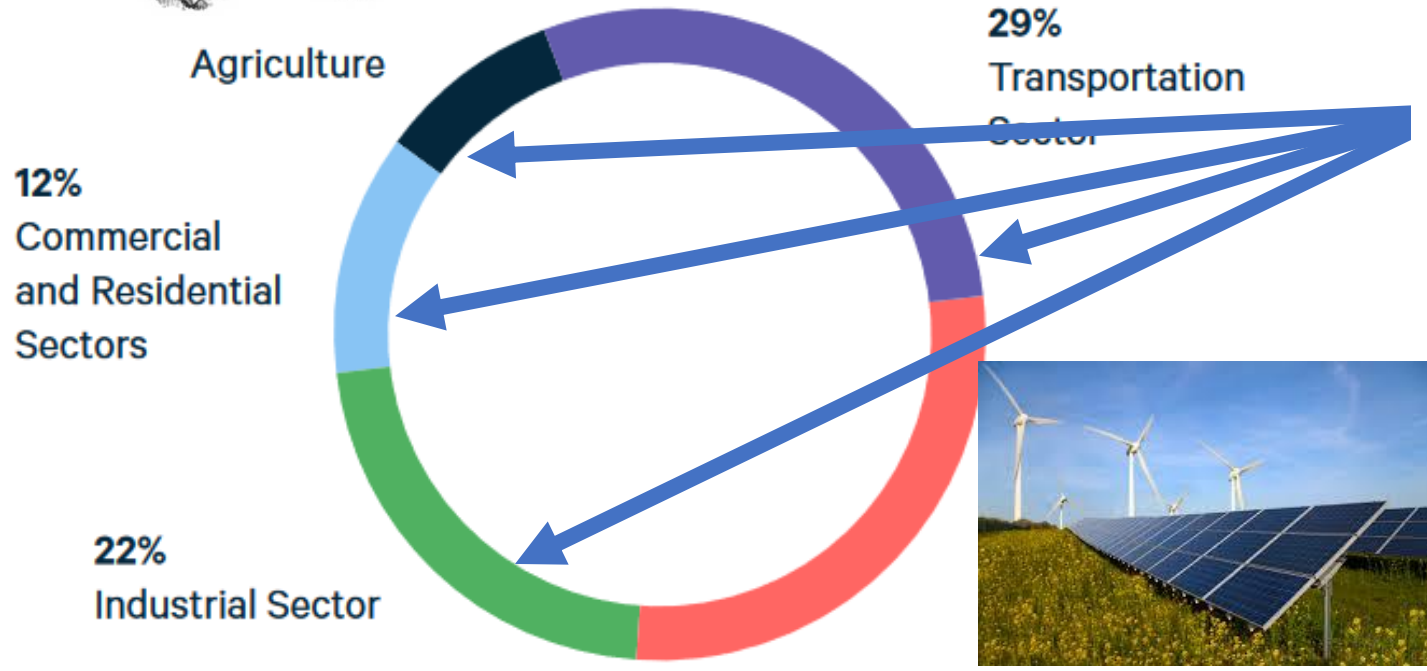
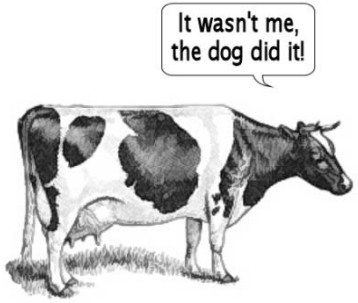
**Carbon Free
Clean Energy
(CA SB100 = 100%
by 2045)**



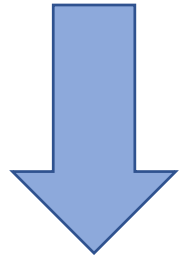
Source: Electrification 101 – Resources for the Future

https://media.rff.org/documents/Electrification_Explainer_101_odobEoP.pdf

2017 **GREENHOUSE GAS EMISSIONS BY SECTOR**



Carbon Free Electricity helps solve other sectors



Electrification

Data from EPA "Inventory of US Greenhouse Gas Emissions and Sinks" (2017)

Source: Electrification 101 – Resources for the Future

https://media.rff.org/documents/Electrification_Explainer_101_odobEoP.pdf

Electrification

Replacing technologies that consume fossil fuels with technologies that consume electricity



Electrification

Positives

- **Clean Energy**
- Lowest Cost of Generation
- Getting cheaper than energy efficiency
- Removes midday demand charges for kitchens
- Higher Efficiency than gas

Challenges

- Storage!
- Over-generation during peak hours
- Huge cost to upgrade the distribution system
- Duck curve creates new demand issues
- Cost more than Natural Gas

Electrification is Happening because...

- It's the most convenient and direct solution to zero carbon energy use
- Utilities want to power your vehicle!

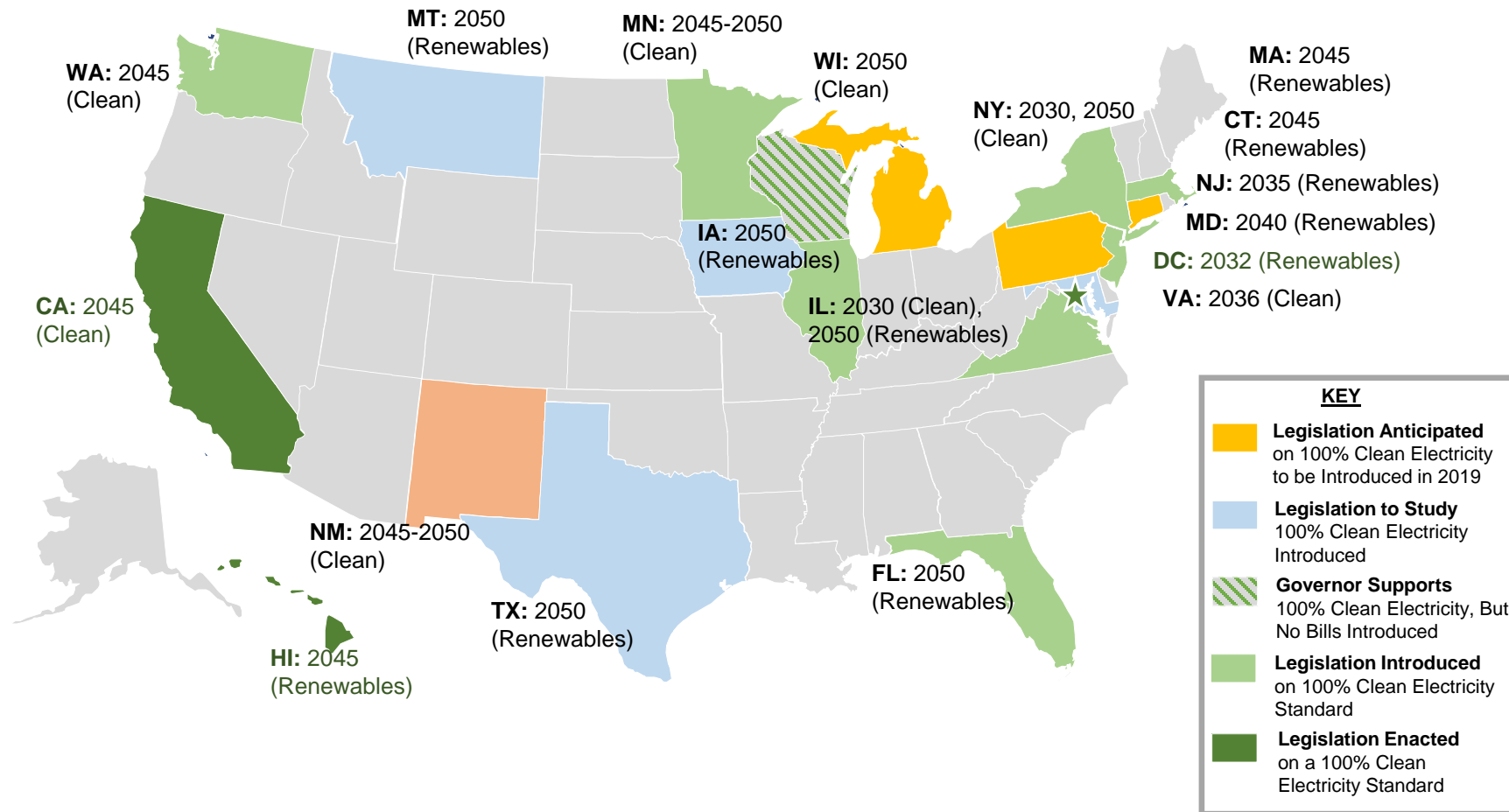


100% Clean or Renewable Electricity Targets

Anticipated, Proposed or Enacted 100% Standards and Studies

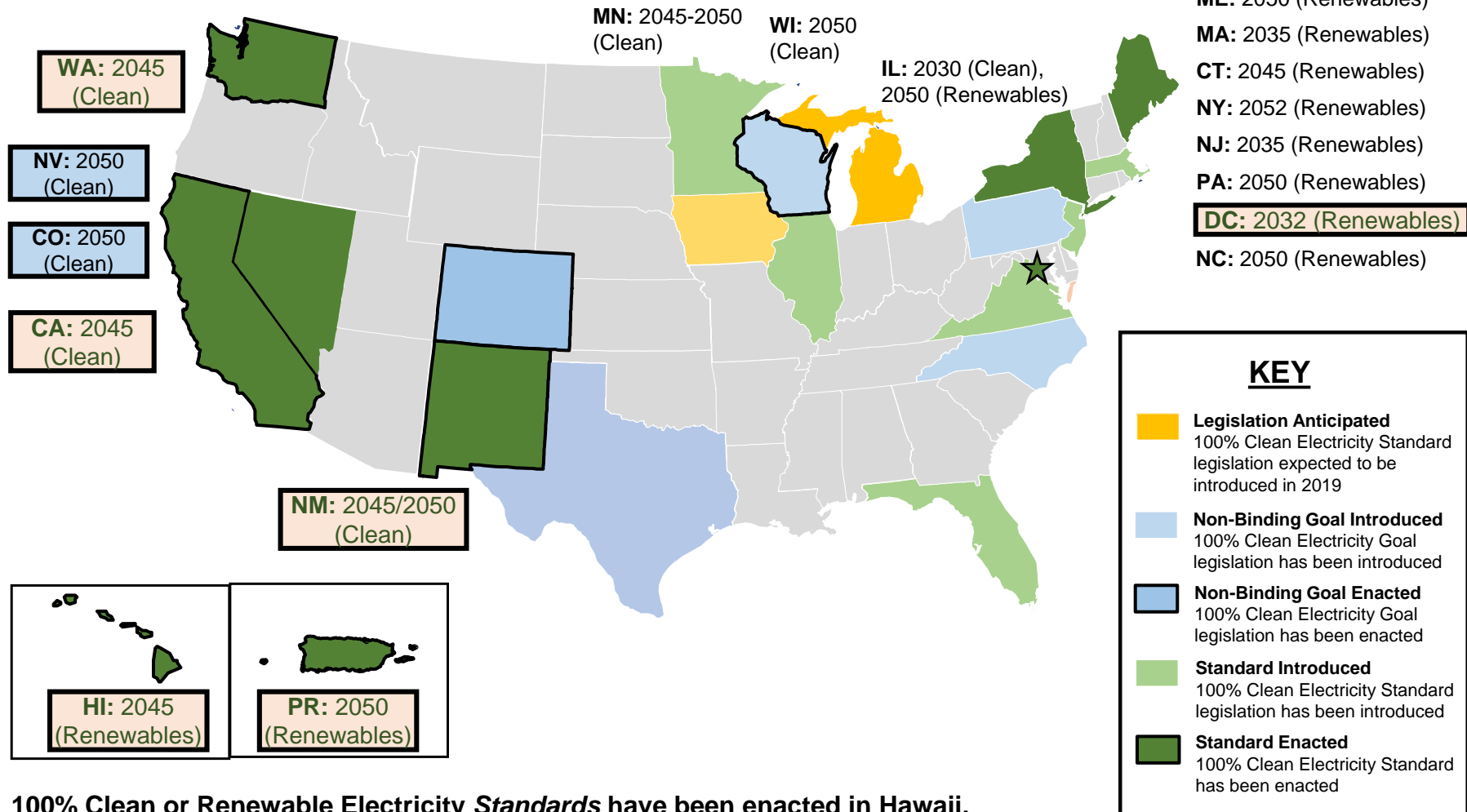
Source: EQ Research Policy Vista™
Legislative Tracking Database as of

March 2019.



100% Clean or Renewable Electricity Targets

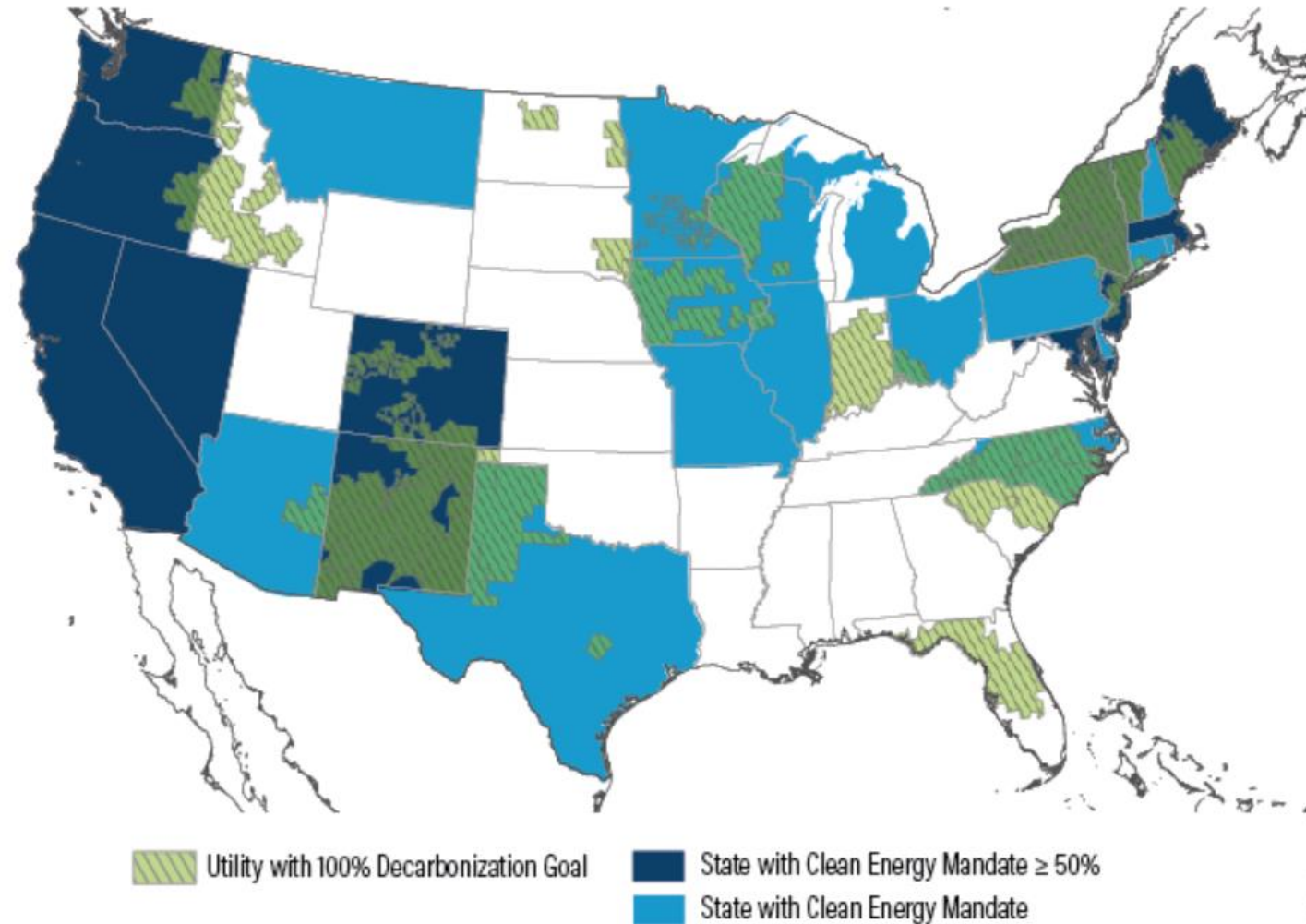
Anticipated, Proposed or Enacted 100% Standards and Goals



100% Clean or Renewable Electricity *Standards* have been enacted in Hawaii, California, New Mexico, Washington, Puerto Rico, Maine, NY, Nevada, and the District of Columbia.



U.S. States with Clean Electricity Mandates & Utilities with Decarbonization Goals, 2019



Source: Smart Electric Power Alliance.

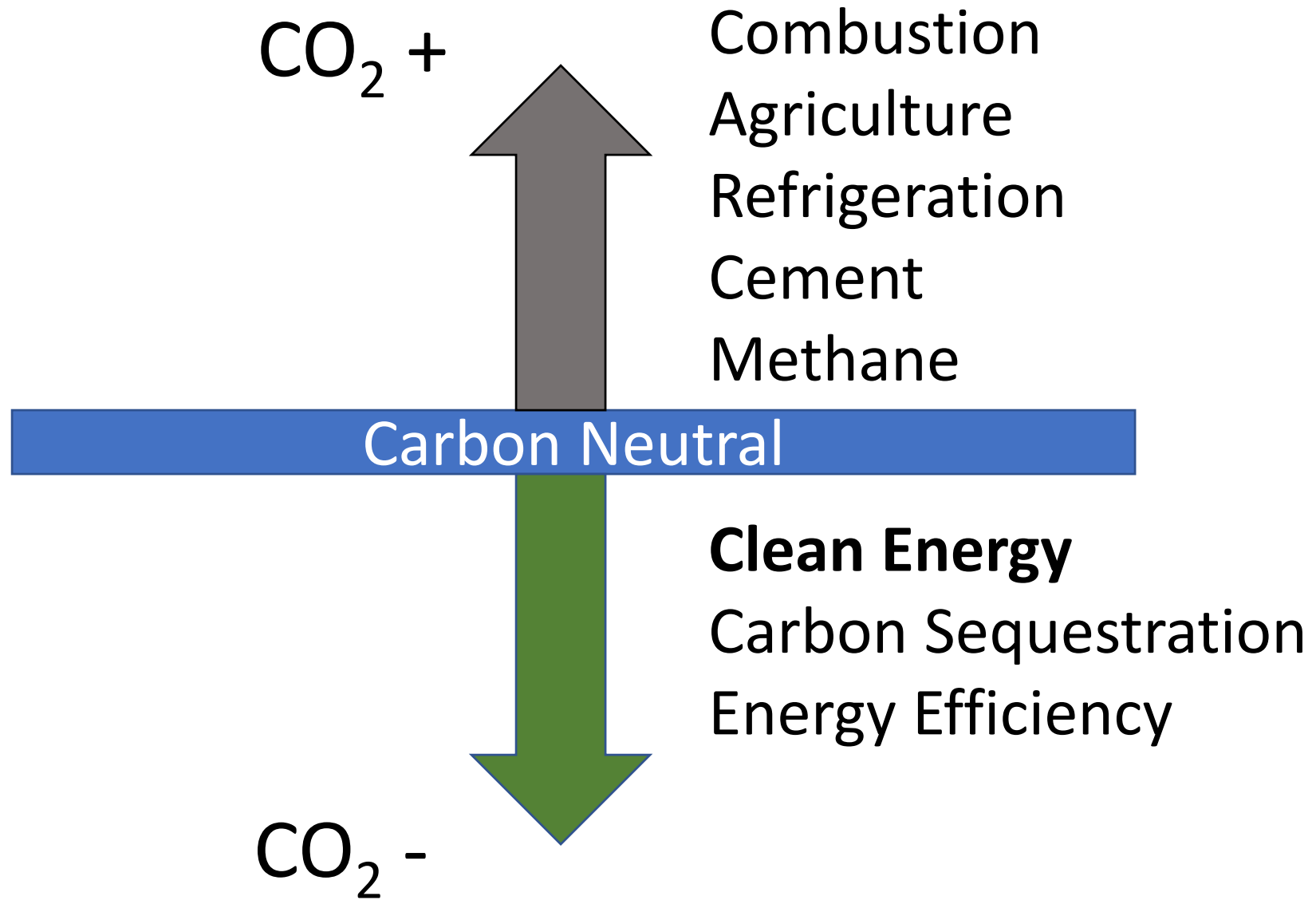
 WORLD RESOURCES INSTITUTE

The Big Goal

**Total, economy-wide
carbon neutrality by 2050**

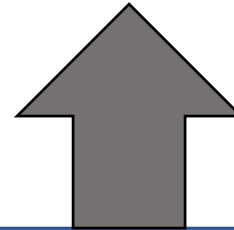
(2045 in CA by Executive Order B-55-18)

Zero Net Carbon (ZNC)

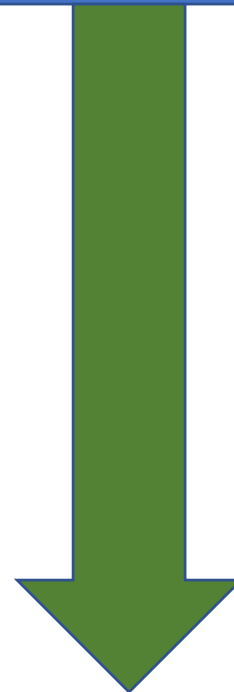


CO₂ +

Combustion
Agriculture
Refrigeration
Cement
Methane



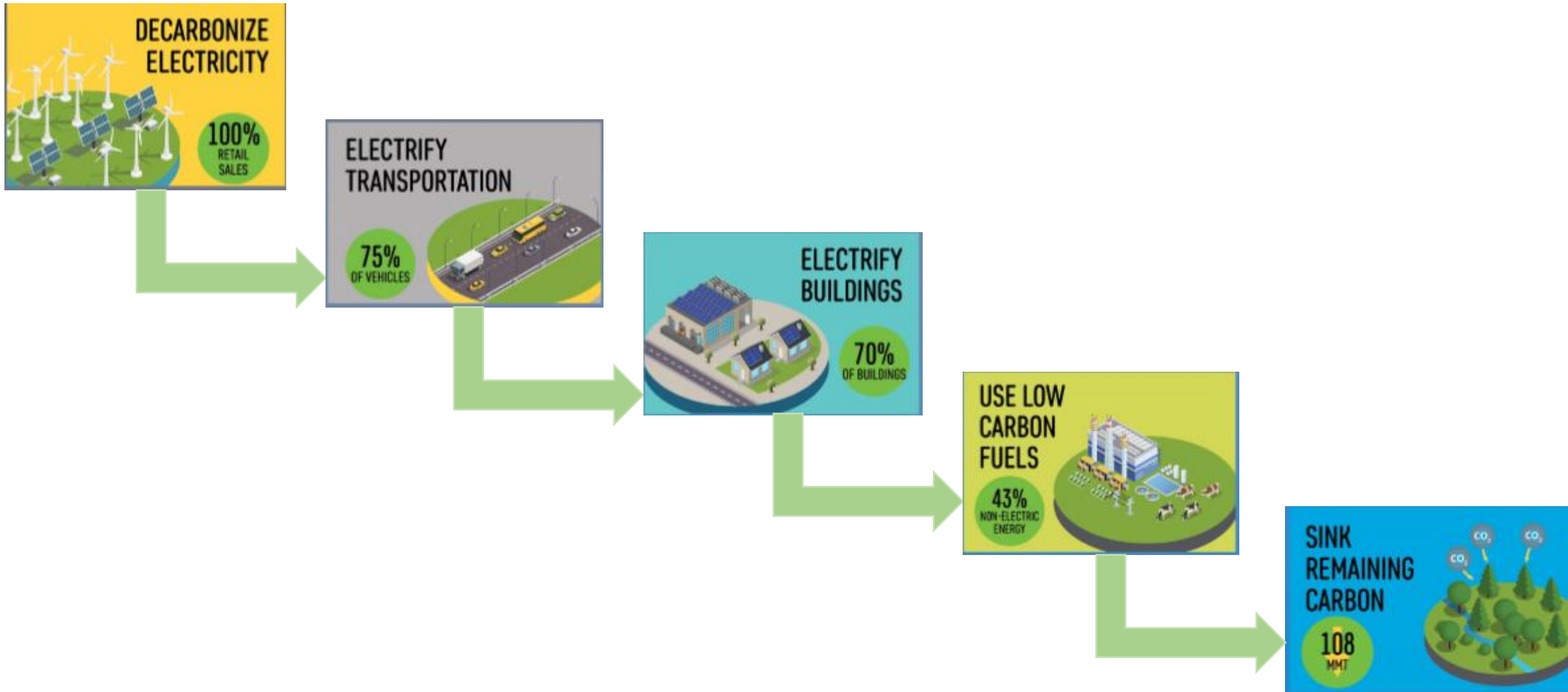
Carbon Neutral



Clean Energy
Carbon Sequestration
Energy Efficiency

CO₂ -

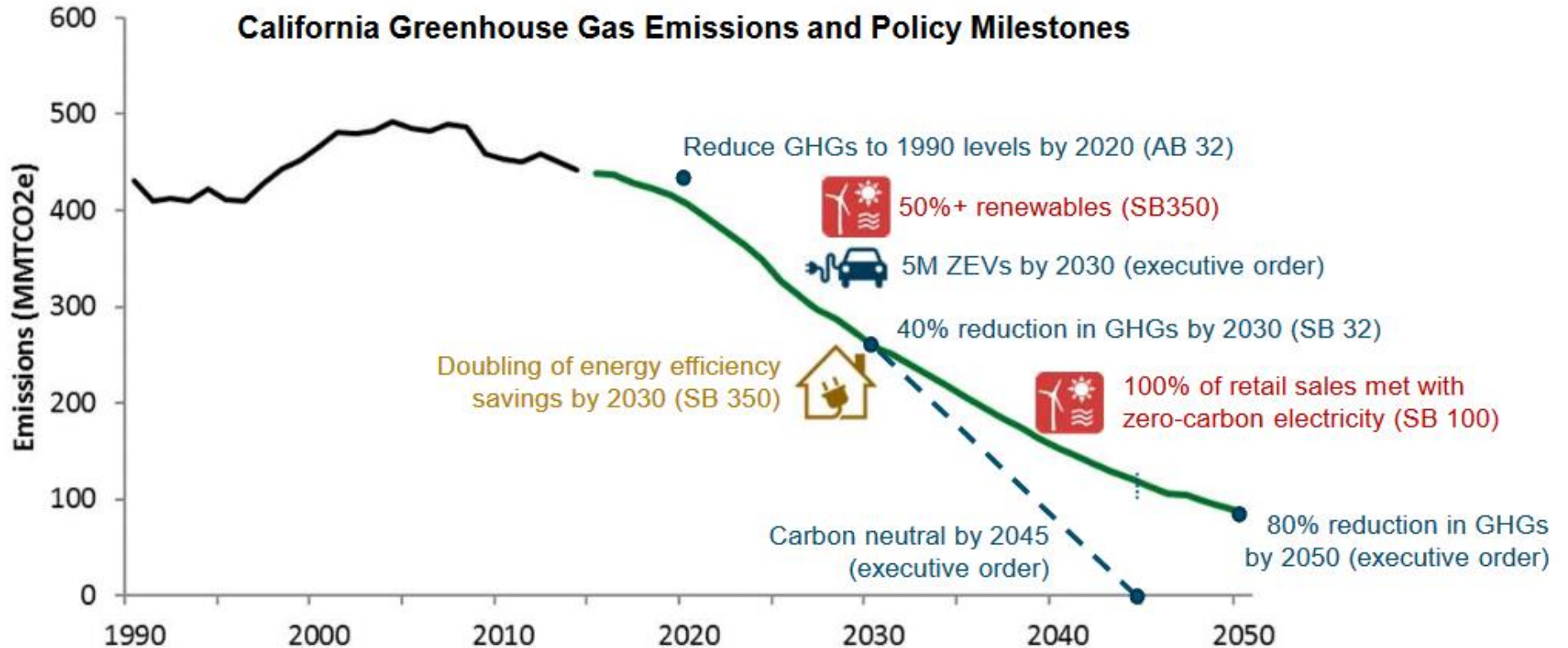
California's Pathway to Carbon Neutrality by 2045





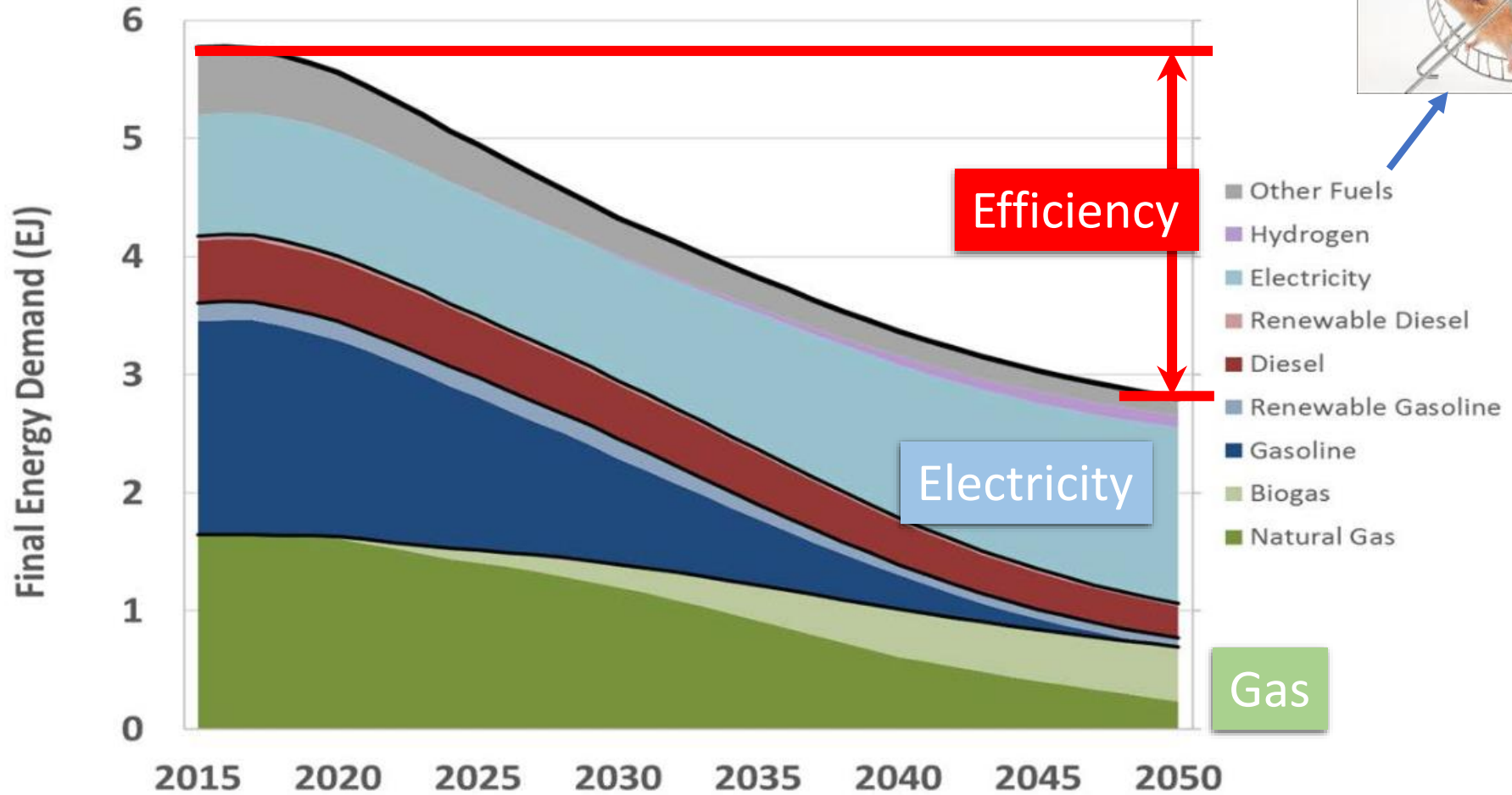
Meeting California's Ambitious Climate Goals

+ Achieving CA's climate goals will require at least a 40% reduction in building sector GHGs by 2030, and an 80% reduction by 2050 – achieving carbon neutrality will likely require deeper reductions



Source: E3 report on "Deep Decarbonization in a High Renewables Future" June 2018, CEC-500-2018-012

Energy Demand by Fuel Type



Source: E3

Source: "Deep Decarbonization in a High Renewables Future, CEC-500-2018-012, June 2018

“We’re going there. Accept it. What are you going to do tomorrow to prepare for it and make it a competitive advantage?”

**MICHAEL LASTORIA ON MINIMUM WAGE
& PIZZA**



Think Ahead

How Does all this affect Food Service?

Gas Bans

Appliance Regulations

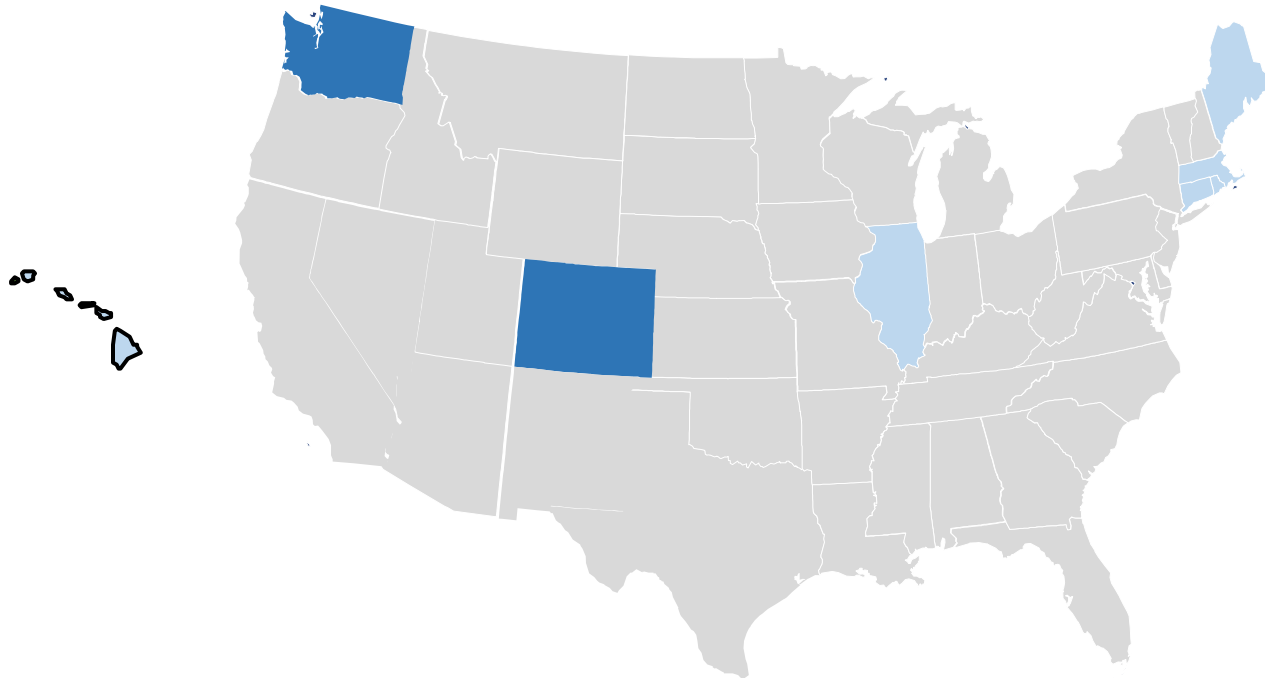
**Infrastructure and
Equipment Choices**

Fuel Costs

State Mandates for



Appliance Regulations



Undercuts ability to promote efficient appliances! 😞

Resource: www.NAFEM.org/advocacy/

Berkeley first city in California to ban natural gas in new buildings



Gas Bans

Hurts gas intensive small business

These San Gabriel Valley Restaurant Owners Think Giving Up Gas Stoves Will Make Their Food Mushy

BY JOSIE HUANG IN FOOD ON SEPTEMBER 20, 2019 4:05 PM



Chef Chun Lei dishes up shrimp over a gas stove in the kitchen of the Shanghailander Palace in Arcadia. (Josie Huang/LAist)

Gas Bans

Starting non-productive
fuel PR wars

Increasing Distrust and
Decreasing Cooperation

BIZ & TECH // BUSINESS

California regulators clear way for natural gas bans to take effect

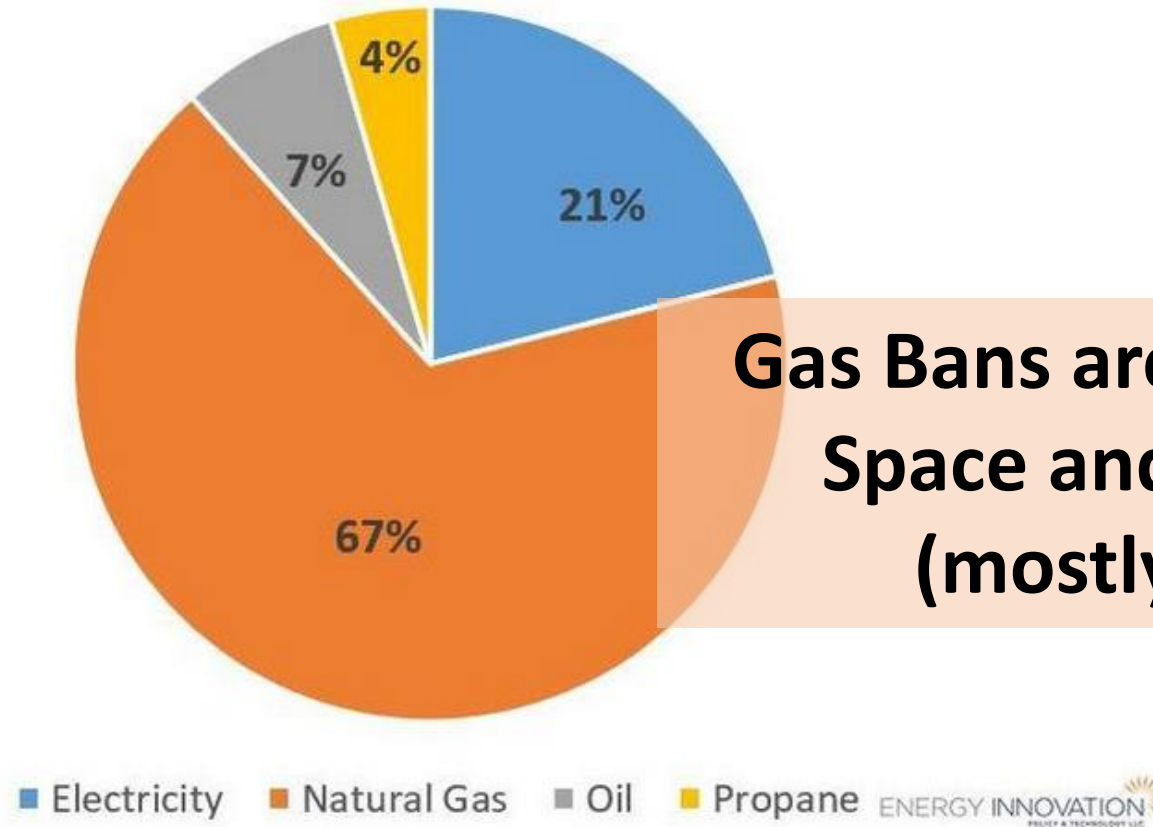


Mallory Moench | Dec. 11, 2019 | Updated: Dec. 11, 2019 8:13 p.m.



Gas Bans

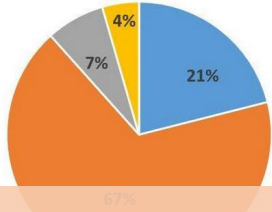
Total U.S. Fuel Consumption for Commercial & Residential Space Heating, Water Heating, and Cooking, Measured by Heat Output (EIA 2017)



Gas Bans are mostly targeting Space and Water Heating (mostly residential)

U.S. fuel consumption for buildings 2017 ENERGY INNOVATION USING DATA FROM THE U.S. ENERGY INFORMATION

Total U.S. Fuel Consumption for Commercial & Residential Space Heating, Water Heating, and Cooking, Measured by Heat Output (EIA 2017)



Gas Bans

Challenge: We have no field data on commercial heat pump water heaters (HPWH) in CFS and limited knowledge of heat pump heating & cooling



Gas Bans

Bottom Line:

More on the way, in all different flavors, some with compromises like extra efficiency and dual fuel connections

Good news: many will exempt commercial cooking

Hi Richard,

I just wanted to thank you again for advising us on our gas ban campaign in Brookline, MA. Last week, Brookline became the first community outside California to pass a fossil fuel ban - but thanks to your expertise, we included an exemption for restaurants. The restaurant exemption helped various boards and town meeting members know that we had really done our homework - and it will also help us keep our pizza places and bakeries! I'm so glad that I reached you, and truly appreciate your taking the time to answer all of the questions from our team.

Best,

Cora

Fuel Costs

Electricity and Gas will become more expensive

Driven by aging infrastructure, pollution control, risk management, uncertainty....

Electric utilities already requesting increases of 10% to 20%

Gas estimated to be 6 times more expensive by 2050 – with or without electrification

Call to Action:

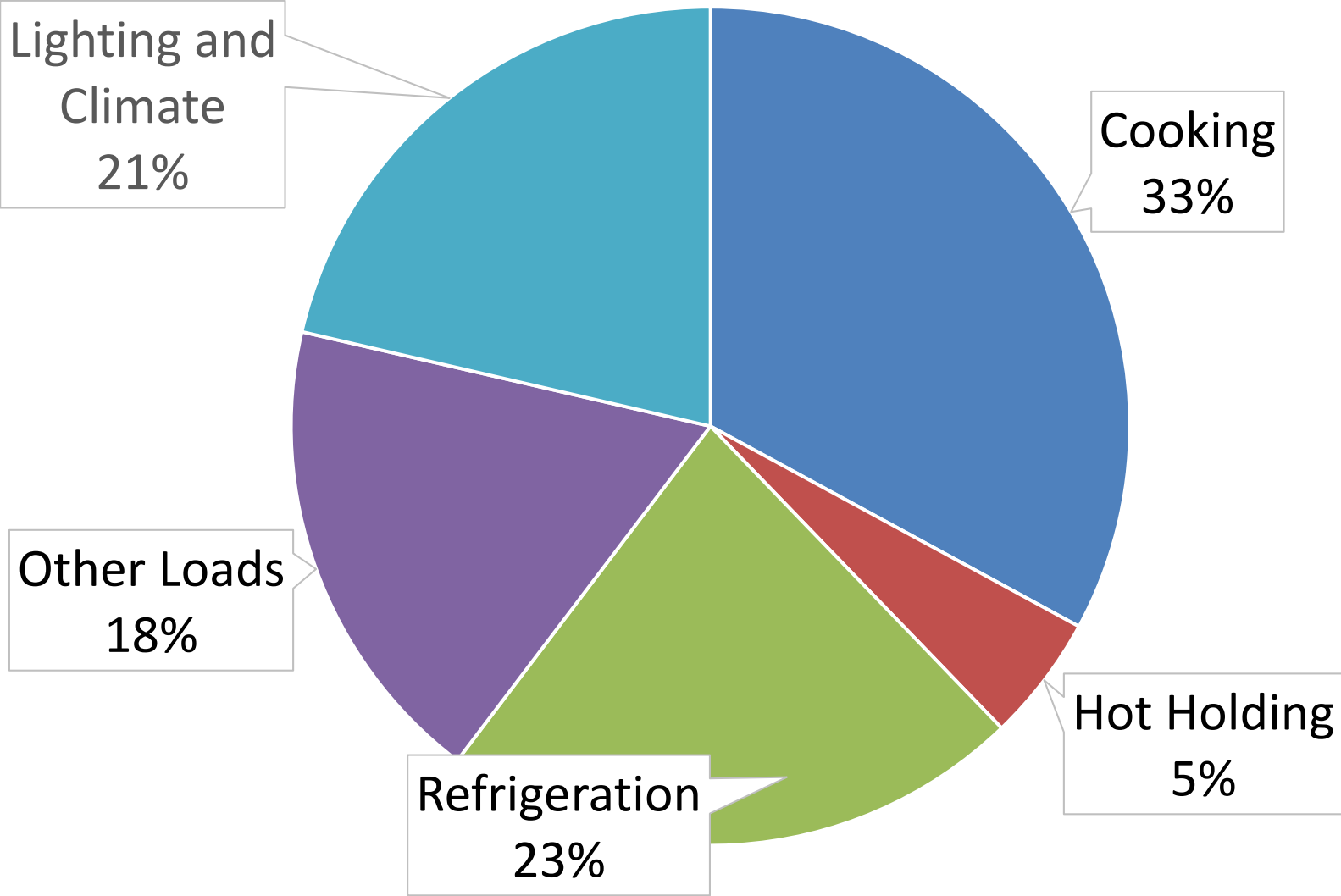
Review the energy breakdown/carbon generation of your kitchens

Perform Gas vs Elec cost analysis for equipment

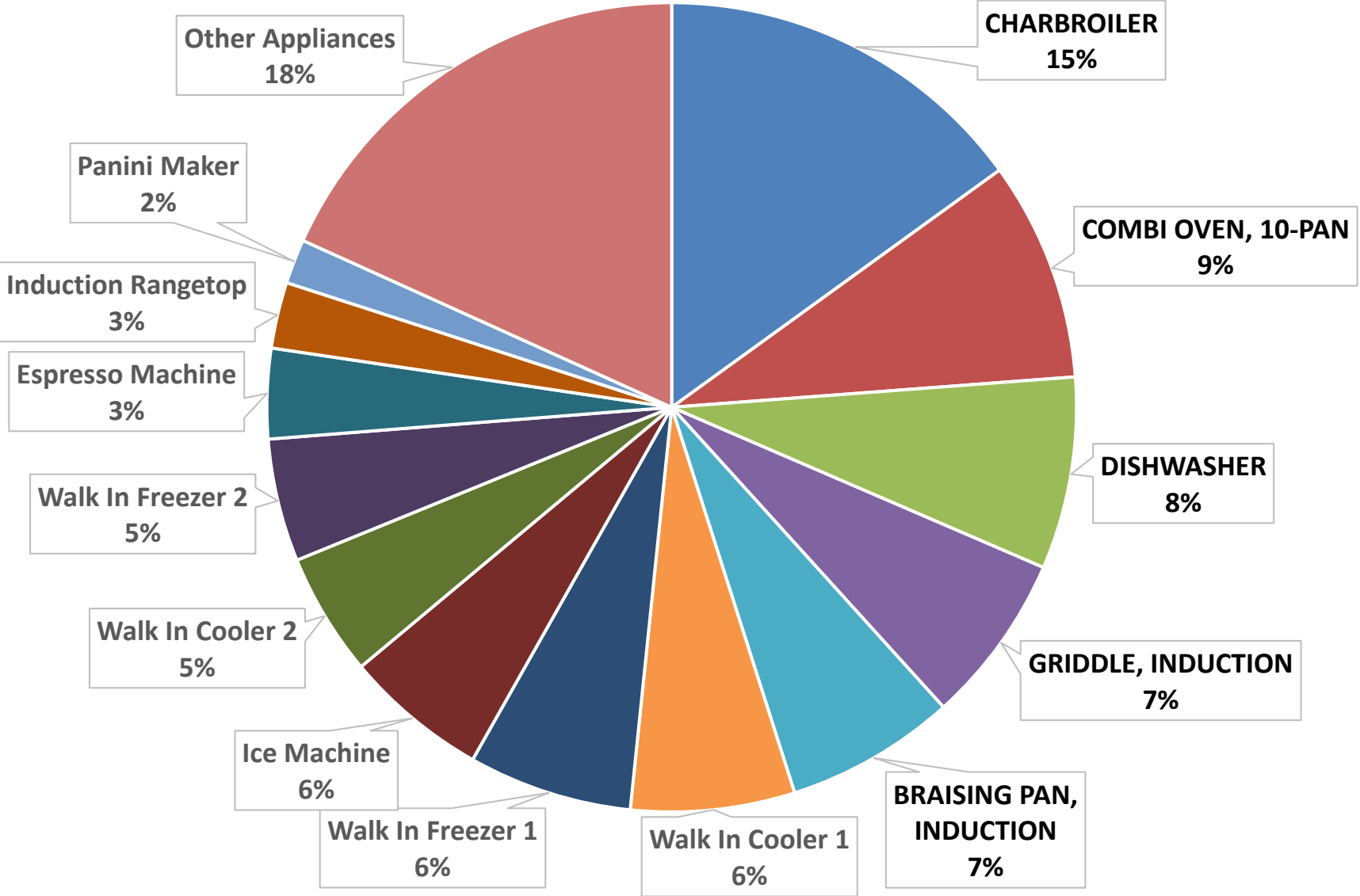
Investigate Deep Efficiency to lower utility costs

Install high efficiency gas equipment ASAP

Biggest contributors to your carbon footprint?



Biggest contributors to your carbon footprint?



Call to Action:

Review the energy breakdown/carbon generation of your kitchens

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~~Question: Can we create all-electric kitchens?~~

Question: Can we afford all-electric kitchens?

???

Example: Gas vs Electric Cost Analysis

“Which fuel option – gas or electric - has the lowest cost-to-operate in a quick service setting?”

Step One: Build an energy cost model based on actual energy costs, food cooked and hours of operation

Step Two: Rerun the model using different electric and gas rates

Step One: Cost Model

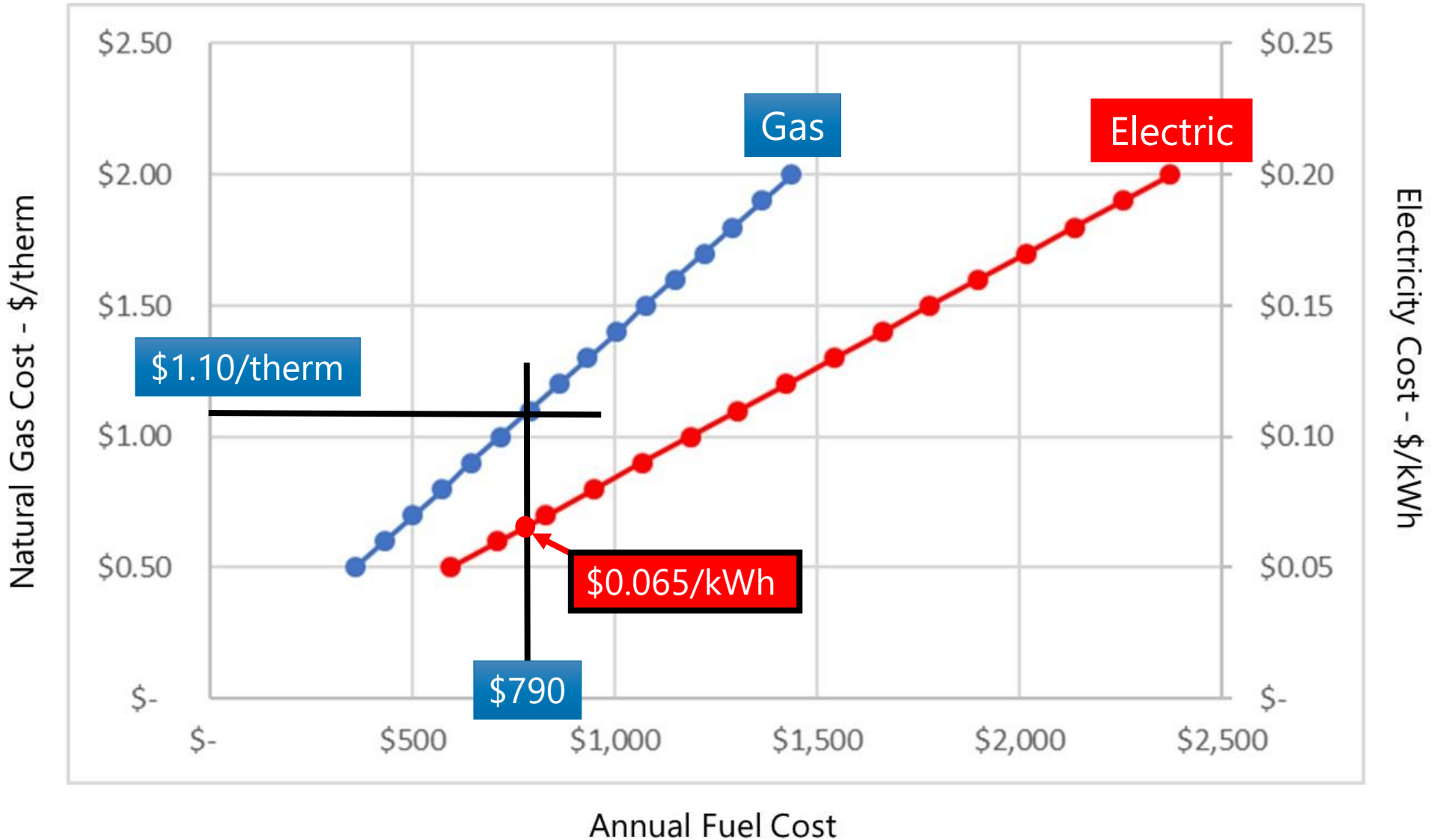
Based on fuel: An electric fryer costs \$400/vat/year more to operate than a gas fryer in this QSR example



+\$400 **+\$400** **+\$400** **+\$400**

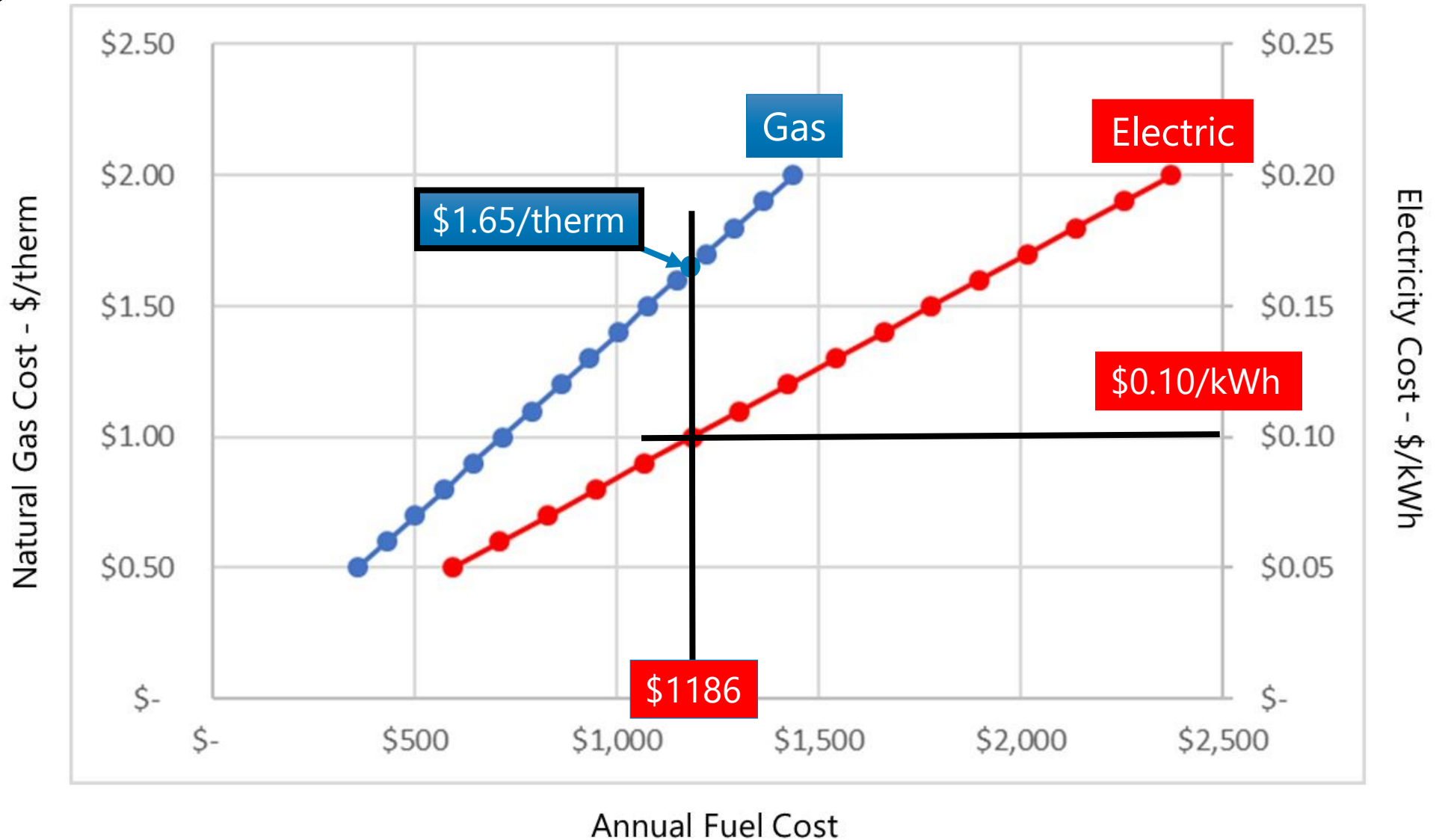
Model B

Electric fuel cost must be \$0.065/kWh (all costs included) to match gas operating cost.



Model B

Gas fuel cost can be as high as \$1.65/therm (all costs included) and still match electric operating cost.



Call to Action:

Review the energy breakdown/carbon generation of your kitchens

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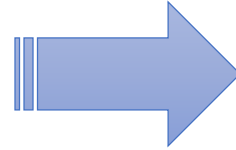
Install high efficiency gas equipment ASAP

The Not-So-Good News

Electric appliances can cost more to operate so, we need to “design smart” in order to achieve decarbonization.

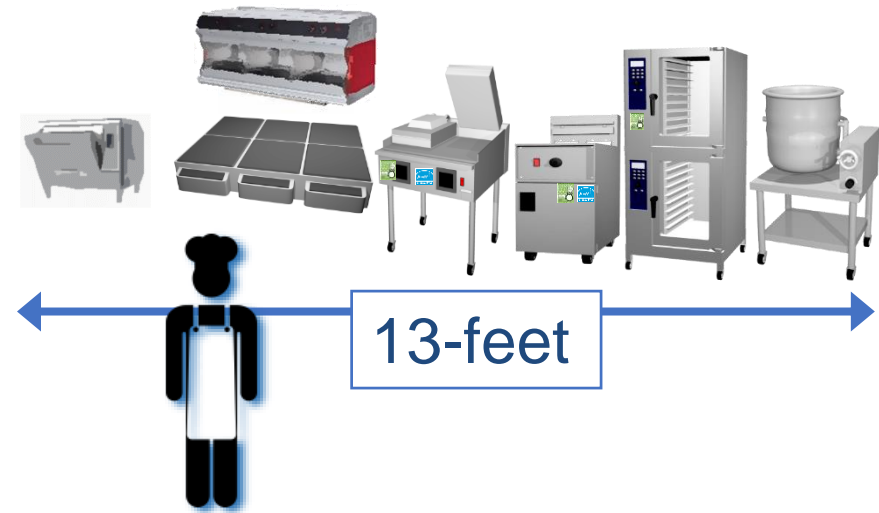
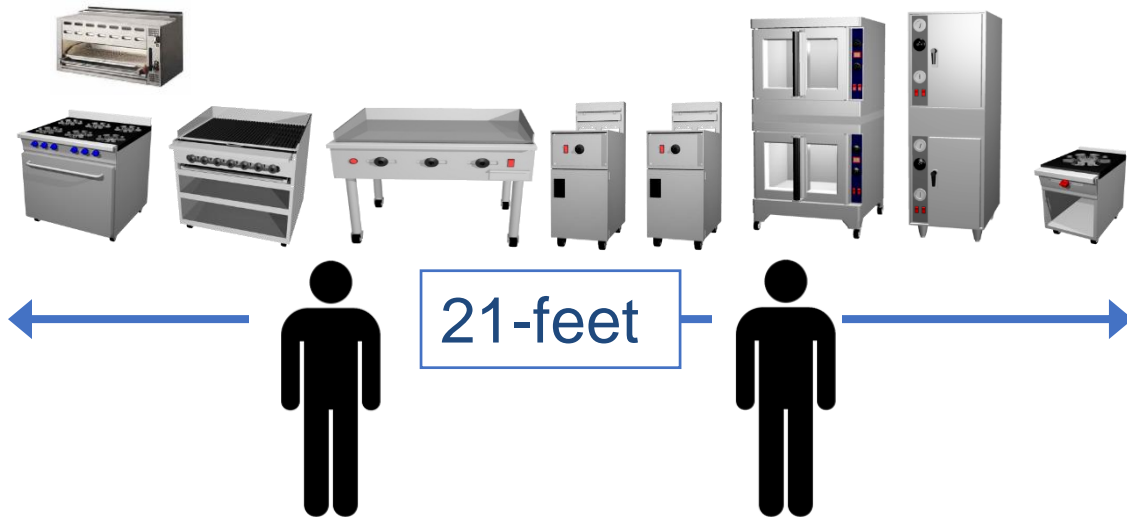
The Vision:

Replace...

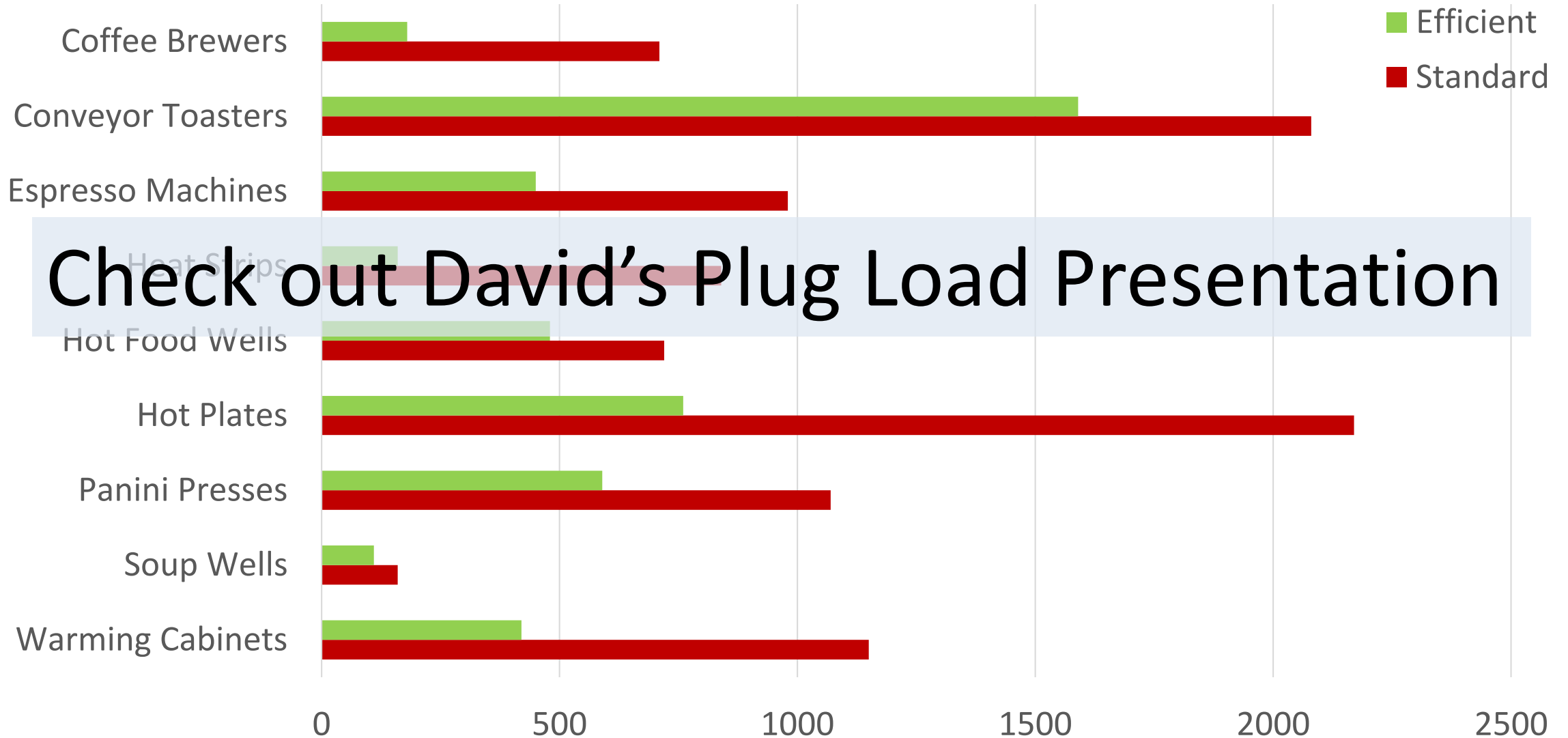


The traditional cookline

The Kitchen of the Future



Average Power - Watts





Use the Energy Wise Program and Website

www.CAEnergyWise.com

Reality #1:

Full Electrification is not currently economically feasible for many commercial kitchens.

Significant economic, policy, and grid-system changes are needed to create effective electrification

Where to Begin?

Every BTU of natural gas that you save = a direct carbon reduction!

Call to Action:

Review the energy breakdown/carbon generation of your kitchens

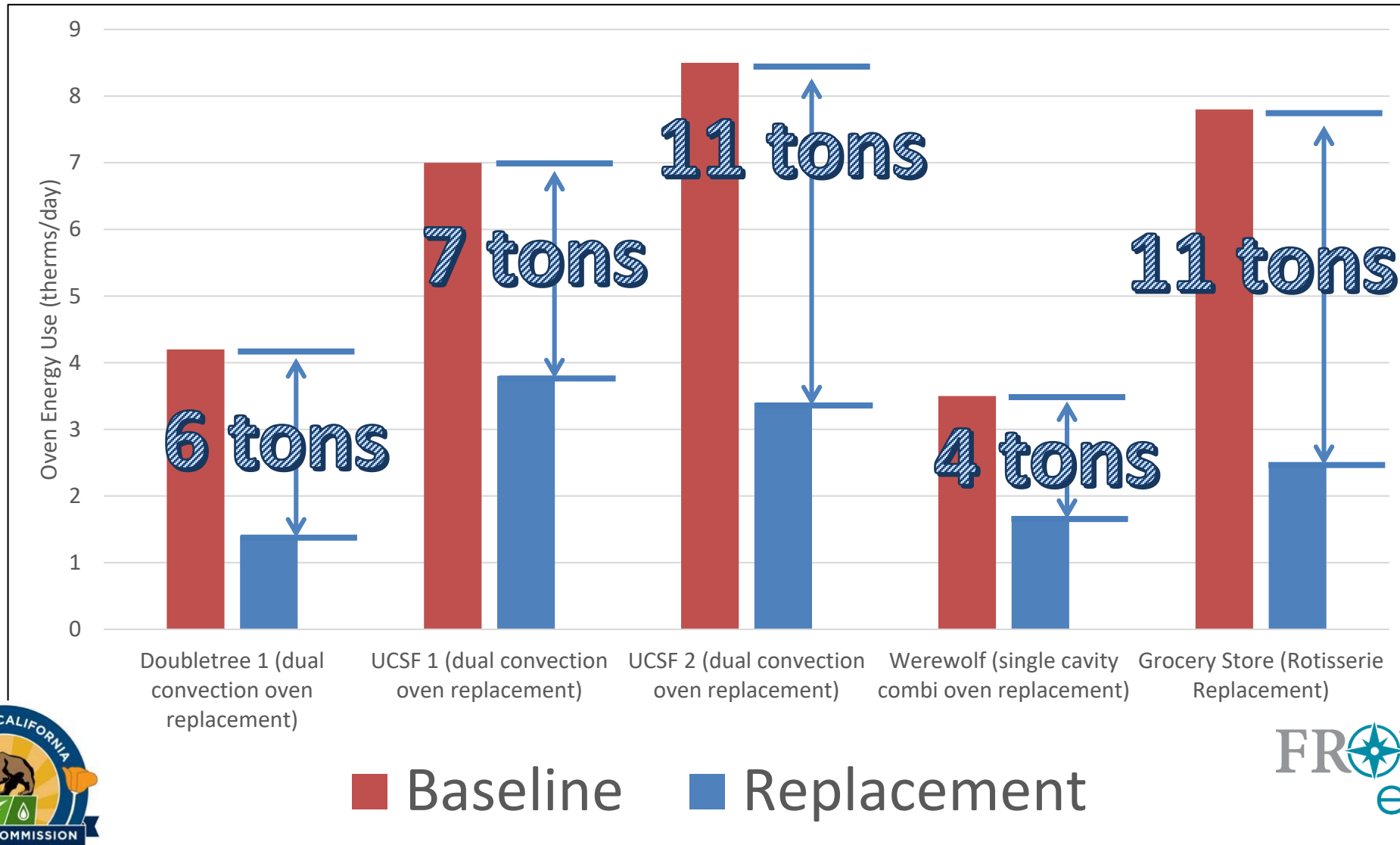
Perform Gas vs Elec cost analysis for equipment

Investigate Deep Efficiency to lower utility costs

Install high efficiency gas equipment ASAP

Annual CO₂ Reduction from Upgrading to an Efficient Gas Oven

Source: CEC Cookline Study - <https://fishnick.com/ceccook/>



Reality #2:

Significant decarbonization is achievable immediately by upgrading to energy-efficient gas equipment.

Chapter Two: Trash

Background and perspective

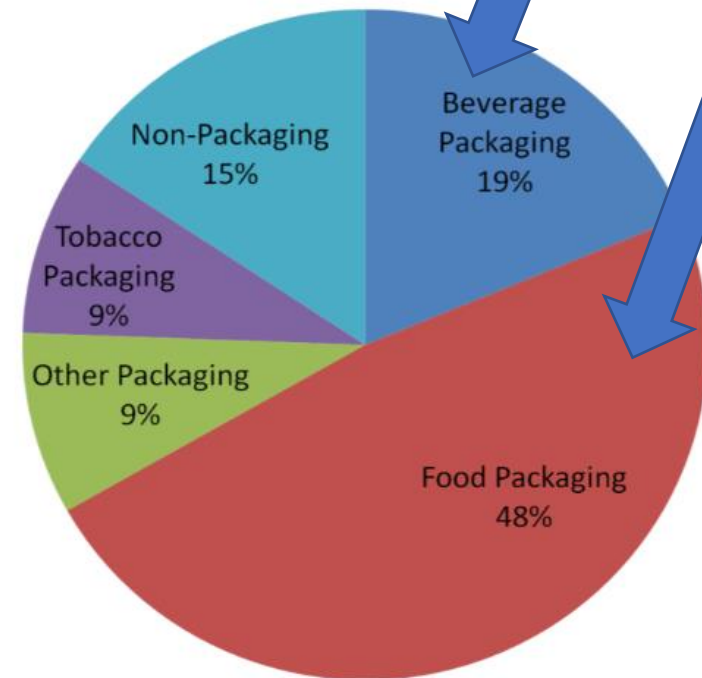
Taking Out the Trash:

Identifying Sources of Trash in the Bay Area



 CLEAN WATER FUND
December 2011

Figure 4: Litter by Product Use



What's Happening:

- Reusables Ordinances and Take-Out Charges



- Single Use Bans/Items by Request Only

sfenvironment.org/reduceplastic



- Strict Biodegradable/Compostable Standards



- Compostable/Recyclable Solid Waste Management Laws



Reusable Foodware Model Ordinance




YOUR CITY COULD BE THROW-AWAY-FREE

PLASTIC POLLUTION POLICY PROGRESSION

Bag Ban Styrofoam Ban Straws on Request Foodware

THE MODEL SINGLE-USE FOODWARE AND LITTER REDUCTION ORDINANCE

THE BASICS



REUSABLE FOODWARE ORDINANCE

THE DETAILS

I. Accessory Items
A. Accessory items (straws, stirrers, lids, napkins, etc.) available only on request or at a self-serve station, EXCEPT for take-out beverage container tops, spill plugs, and sleeves.
B. Prepared food vendors serving customers take-out via online orders use "opt-in" to provide accessory items (e.g. don't provide them automatically).
C. Straws - vendors keep a small supply of plastic straws made available on request.
D. Condiments - vendors are encouraged to use dispensers rather than individually wrapped servings.

II. Reusable Cups

THE BASICS

1. Makes on-site ("sit-down") dining disposable-free, and creates environmental standards for take-out disposables.
2. Phases in 25 cent fee on disposable to-go cups and containers.
3. Incentivizes BYO (bring-your-own) and supports businesses in developing reusable take-out foodware systems.

The Model Single-Use Foodware and Litter Reduction Ordinance would apply to all vendors of prepared food, which includes brick and mortar food service (carryout, quick service, full-service), temporary food facility, bakeries, cafeterias, grocery stores, restaurants, drugstores, theaters, bars and other similar establishments that sell prepared food to be consumed on or off premises. Ordinance also applies to foodware purchased by the city for use at city facilities and sponsored events. Prepared food means prepared on vendor's premises by cooking, processing, slicing, mixing, squeezing, or other processing which requires no further preparation to be consumed.



UPSTREAM
There's a better way than throw-away
upstreamolutions.org

A. Vendors must have a three-bin system for landfill, recycle, and compost that is easily accessible placed together in the same location.
B. City shall identify materials for collection on its website. Color coding required.

VII. Waivers - Process to obtain
Waivers may be granted by City Manager for up to two years. During this term, Prepared Food Vendor shall make diligent efforts to become compliant. Additional waivers of up to two years can be granted. All waivers expire automatically in the event of a significant remodel or renovation.



UPSTREAM
There's a better way than throw-away
upstreamolutions.org

How this affects Store Design and Operations:

Will your kitchens need dishmachines?

- Dishmachines drive energy and water use
- Will you reduce or increase in-house dining?
- Will you change your serving style?

Will the Take-Out charges impact transactions?

- How will you handle reusable To-Go containers?

Will organic waste digestors or dehydrators become common in kitchens?

Call to Action:

Run a planning exercise: What is the affect on your business?

Specify only high efficiency heat-recovery dishmachines

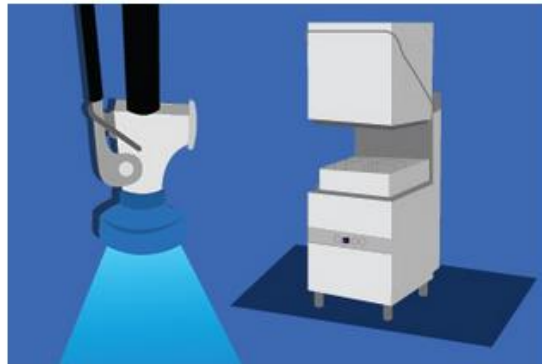
Design for high efficiency hot water delivery systems

DESIGN GUIDES

ACHIEVE OPTIMUM PERFORMANCE AND ENERGY EFFICIENCY



COMMERCIAL KITCHEN VENTILATION



DESIGN GUIDE
Sizing Dishroom Ventilation

RACK CONVEYOR DISHWASHERS



DESIGN GUIDE
Improving Efficiency of Rack
Conveyor Dishwashers

HOT WATER SYSTEMS



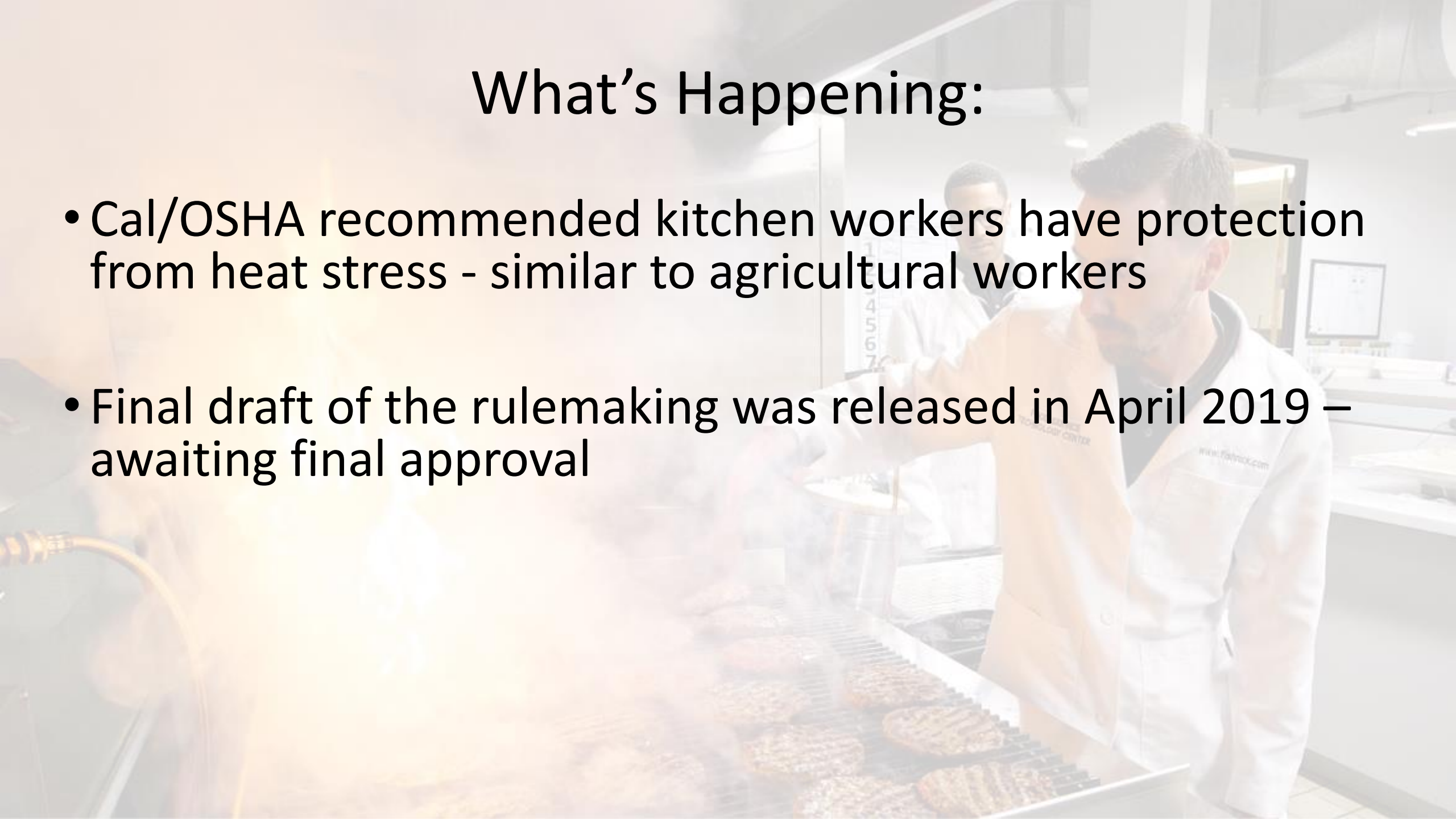
DESIGN GUIDE
Improving Commercial Kitchen Hot
Water System Performance

www.CAEnergyWise.com

Chapter Three: Heat

What's Happening:

- Cal/OSHA recommended kitchen workers have protection from heat stress - similar to agricultural workers
- Final draft of the rulemaking was released in April 2019 – awaiting final approval



CalOSHA – Heat Illness Prevention Draft 4/19/19

- (2) Conditions under which an indoor work area is subject to subsection (e):
- (A) The temperature equals or exceeds 87 degrees Fahrenheit when employees are present; or
 - (B) The heat index equals or exceeds 87 degrees Fahrenheit when employees are present; or
 - (C) Employees wear clothing that restricts heat removal and the temperature equals or exceeds 82 degrees Fahrenheit; or
 - (D)) Employees work in a high radiant heat work area and the temperature equals or exceeds 82 degrees Fahrenheit.

“Heat index” means a measure of heat stress developed ~~used~~ by the National Weather Service for outdoor environments that takes into account the dry bulb temperature and the relative humidity. For purposes of this standard, heat index refers to conditions in indoor work areas. Radiant heat is not included in the heat index.

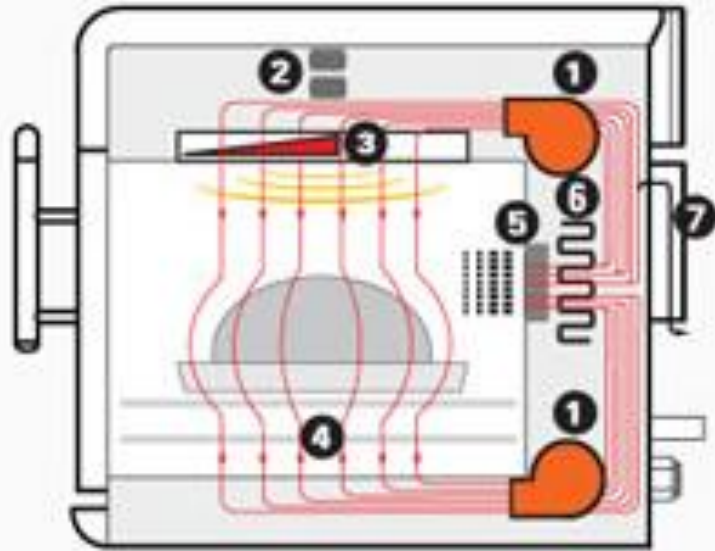
“High radiant heat work area” means a work area where the globe temperature is at least 5 degrees Fahrenheit greater than the “temperature,” as defined in this subsection.

“Administrative controls” means a procedure that limits exposure to a hazard by adjustment of work procedures or work schedules. Examples of administrative controls that may be effective at minimizing the risk of heat illness in a particular work area include, but are not limited to, acclimatizing employees, rotating employees, scheduling work earlier or later in the day, using work-rest schedules, reducing work intensity or speed, changing required work clothing, and using relief workers.

“Engineering controls” means an aspect of the work area or a device that removes or reduces hazardous conditions or creates a barrier between the employee and the hazard. Examples of engineering controls that may be effective at minimizing the risk of heat illness in a particular work area include, but are not limited to, isolation of hot processes, isolation of employees from sources of heat, air conditioning, cooling fans, cooling mist fans, evaporative coolers (also called swamp coolers), natural ventilation where the outdoor temperature or heat index is lower than the indoor temperature or heat index, local exhaust ventilation, shielding from a radiant heat source, and insulation of hot surfaces.

What About “Ventless” (Unhooded)

- Grease cooking with Catalyst 500°F+
- Grease cooking with an integrated hood
- Non-Grease cooking



Ventless: All Heat Gain Ends up in the Space



Call to Action:

Analyze your cooking platforms – remove unnecessary heat gain

Reduce heat gain to space with high-efficiency appliances

Use exhaust hoods to ventilate as much equipment as possible

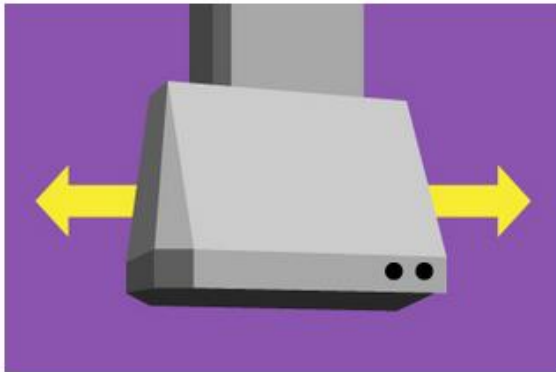
Design Optimized Commercial Kitchen Ventilation systems

DESIGN GUIDES

ACHIEVE OPTIMUM PERFORMANCE AND ENERGY EFFICIENCY



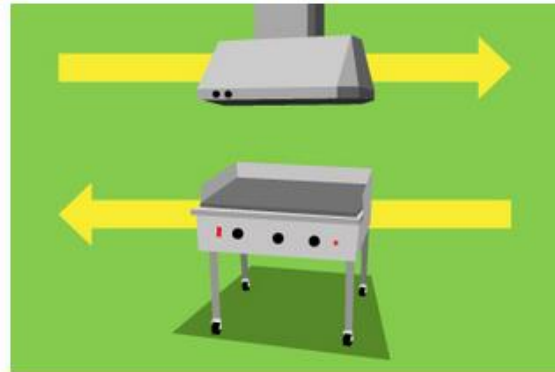
COMMERCIAL KITCHEN VENTILATION



DESIGN GUIDE 1

Selecting and Sizing Exhaust Hoods

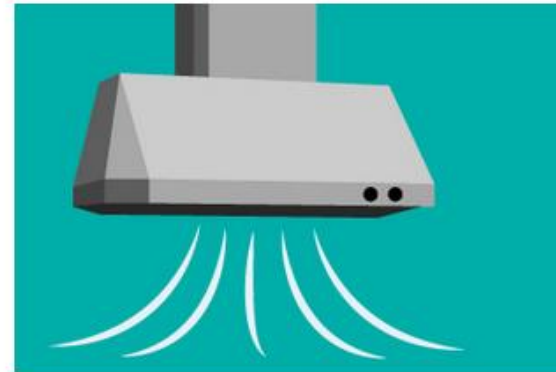
COMMERCIAL KITCHEN VENTILATION



DESIGN GUIDE 2

Optimizing Appliance Position and Hood Configuration

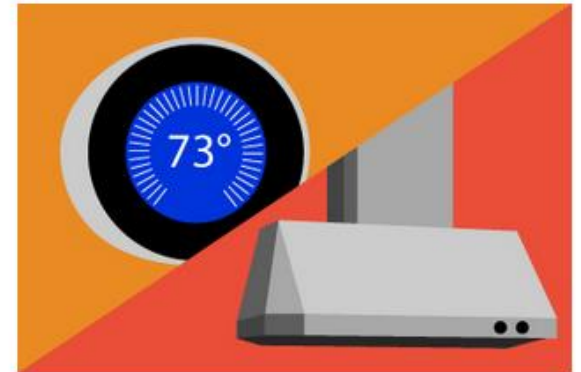
COMMERCIAL KITCHEN VENTILATION



DESIGN GUIDE 3

Optimizing Makeup Air

COMMERCIAL KITCHEN VENTILATION



DESIGN GUIDE 4

Integrating Kitchen Exhaust Systems with Building HVAC

www.CAEnergyWise.com

Foodservice Professionals,
WE'VE SAVED YOU A SEAT
So you can save some energy.



caenergywise.com/seminars/

MAR 19 

Webinar: Control the Flow: A
Comprehensive Look at Demand
Controlled Commercial Kitchen
Ventilation for the Decarbonized
Kitchen

Thursday 10:00 am - 11:00 am

APR 30 

Decarbonizing the Commercial Kitchen
with Energy Efficient Equipment

Thursday 10:00 am - 12:00 pm

JUL 9 

Webinar: Cool It: How to Create More
Comfortable Kitchens

Thursday 10:00 am - 11:00 am

OCT 15 

Webinar: Effective Hot Water Design for
Commercial Kitchens

Thursday 10:00 am - 11:00 am

Thanks!



**Food Service
Technology Center** 