

DOCKETED

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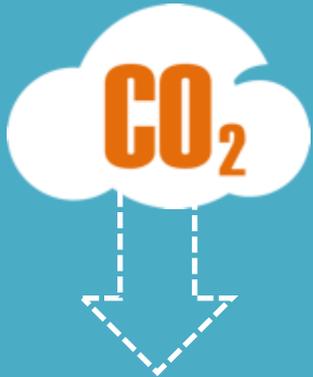
Natural Gas: A Part of the ZNE Solution

Sue Kristjansson

5/18/15



WE WANT THE SAME THING



REDUCE

GHG emissions and the carbon content of home fuels



DOUBLE

the efficiency of existing buildings to reach ZNE goals

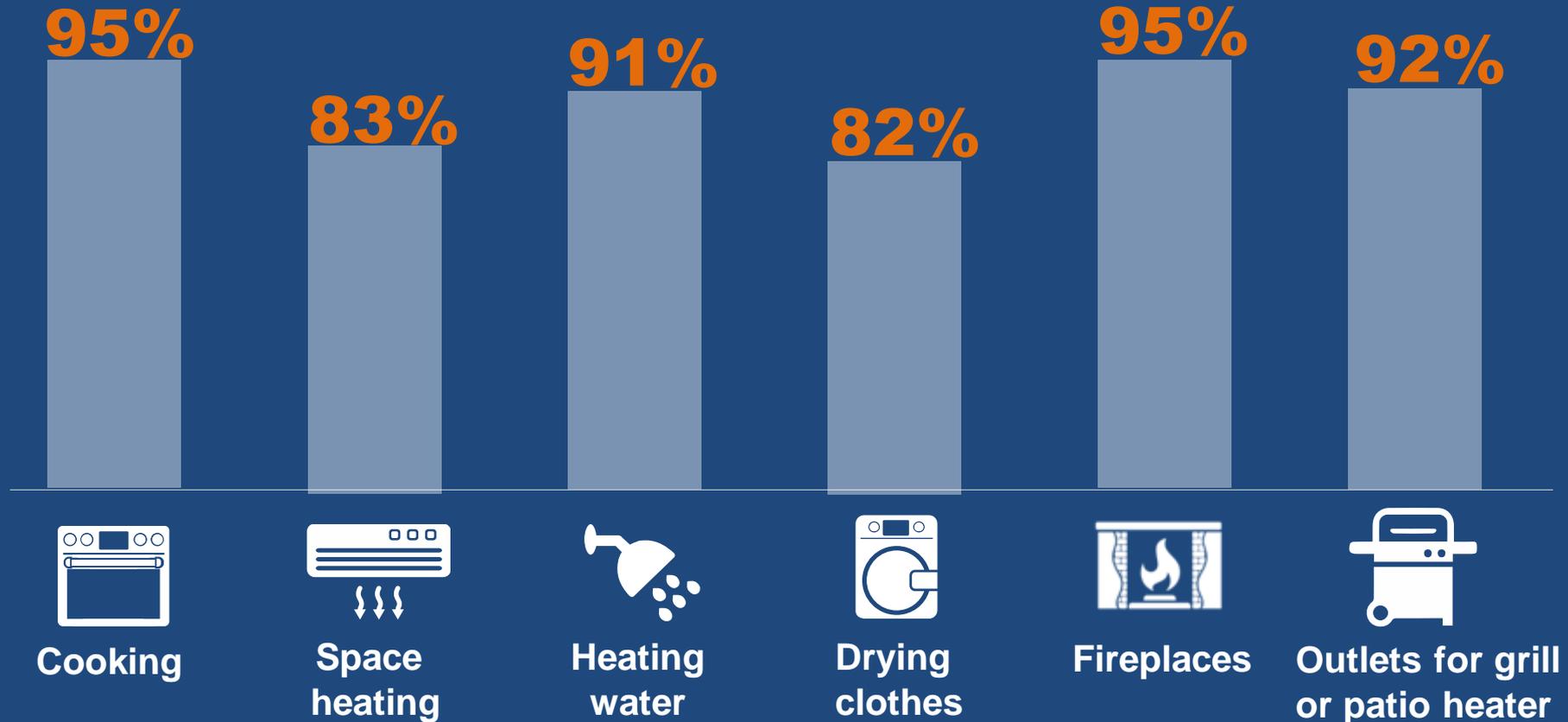


WIN SUPPORT

with reasonable, affordable and equitable solutions for all Californians

**NATURAL GAS IS PART
OF THE SOLUTION**

Natural gas is the **PREFERRED CHOICE**



Natural gas is **AFFORDABLE**

Cost savings compared to electric



Space Heating **\$60** / year



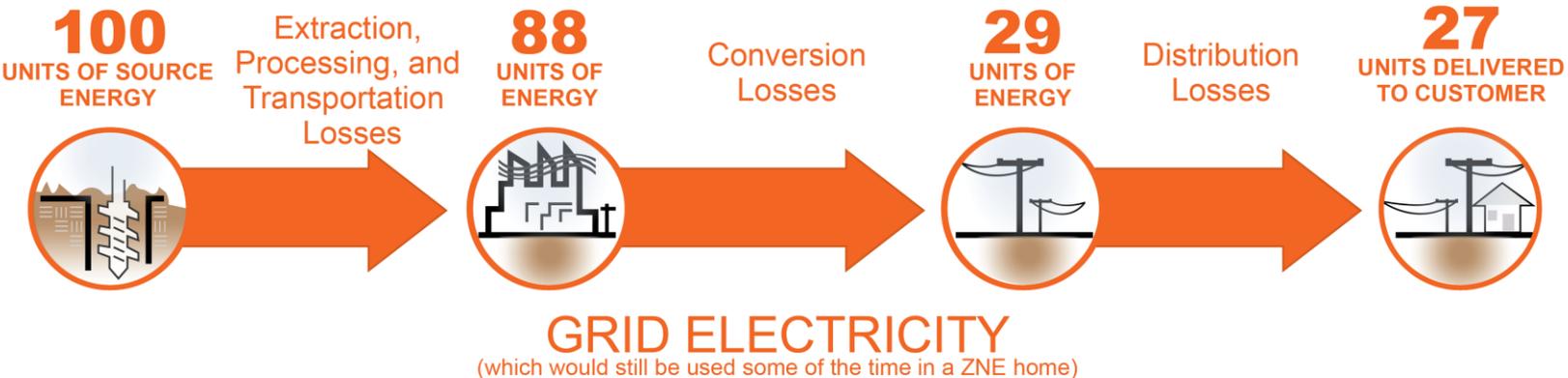
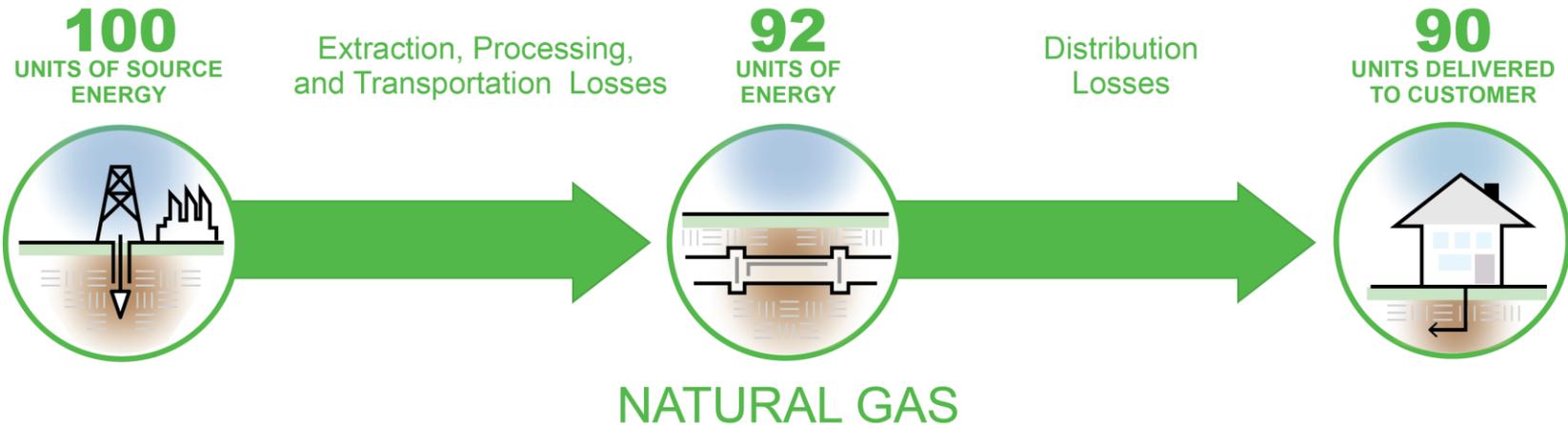
Laundry **\$76-\$160** / year



Water Heater **\$96-\$528** / year

Total: **\$232-\$748** / year

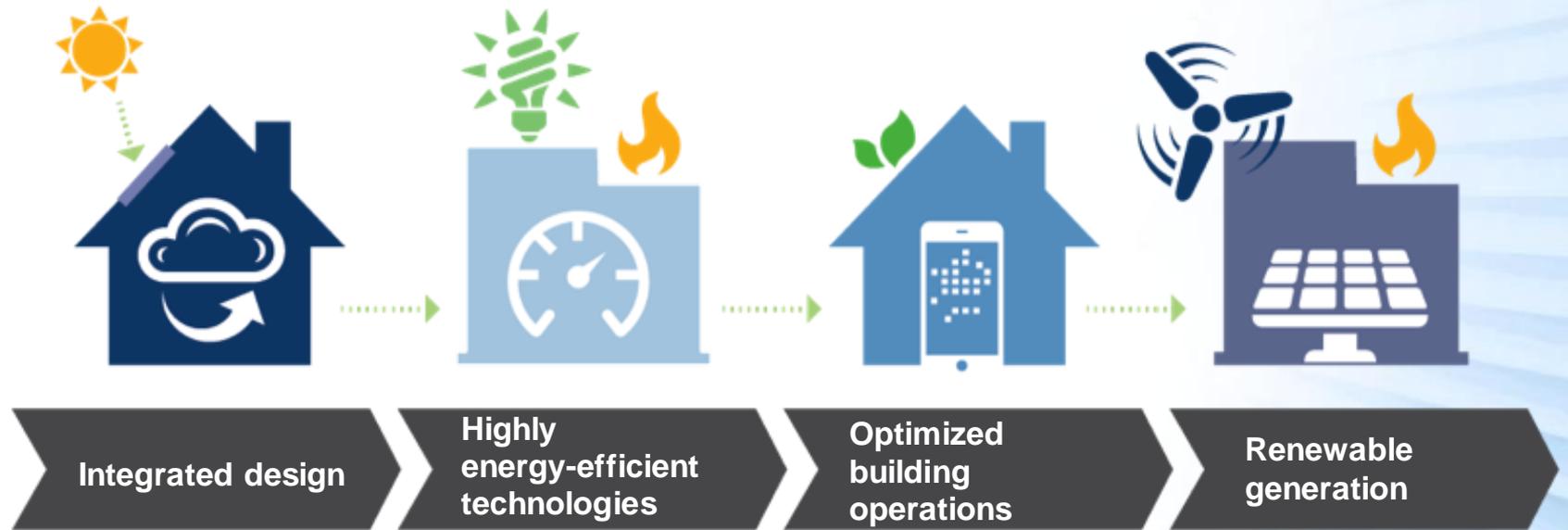
Natural gas is **MORE EFFICIENT**



Source: Energy Solutions Center

Navigant Consulting Study Findings

ZERO NET ENERGY



A mixed-fuel home gets us to **ZERO NET ENERGY**

Category	Location	Gross Annual Energy Consumption			Solar PV Production (kWh)	Net Annual Energy Consumption		
		Electricity (kWh)	Natural Gas (Therms)	TDV (MMBtu)		Electricity (kWh)	Natural Gas (Therms)	TDV (MMBtu)
Mixed-Fuel	Los Angeles	4,200	235	93	5,269	-1,069	235	0 (ZNE)
	Pasadena	4,341	211	91	5,211	-870	211	
	Riverside	4,537	235	98	5,666	-1,129	235	
	Bakersfield	4,968	292	116	6,599	-1,631	292	
	Palm Springs	6,169	171	120	7,008	-839	171	
Electric only	Los Angeles	7,588	-	104	5,914	1,674	-	0 (ZNE)
	Pasadena	7,570	-	104	5,930	1,640	-	
	Riverside	7,945	-	108	6,264	1,681	-	
	Bakersfield	7,579	-	108	6,171	1,408	-	
	Palm Springs	9,297	-	137	8,070	1,227	-	

A mixed-fuel home has significant **COST SAVINGS**

Characteristics to Meet Residential ZNE Goals

Efficiency Measures	Solar PV System Size	Incremental Costs	Utility Costs	TRC Values
<i>Mixed-Fuel ZNE Home</i>				
Building envelope, HVAC, and water heating measures	3.5-4.3 kW	\$20,500-\$24,600	Monthly utility costs of \$15 or less, and annual savings of \$1,000-\$2,100	Life-Cycle Cost (CEC): 0.42-0.46 Upfront Cost (Utility): 0.86-0.96
<i>Electric-Only ZNE Home</i>				
Building envelope and HVAC measures	3.8-5.0 kW	\$21,800-\$28,000	Monthly utility costs of \$20 or less, and annual savings of \$950-\$2,000	Life-Cycle Cost (CEC): 0.33-0.38 Upfront Cost (Utility): 0.57-0.74

Advanced technologies will **ADVANCE ZNE**

———— ZNE Homes 2015-2020 —————> ————— 2020-2030 —————>

Cost-Effective Efficiency Measures

- Efficiency measures targeting building envelope, HVAC and water heating including:
 - Advanced thermostats
 - Improved insulation
 - Advanced windows
 - Condensing furnaces
 - Tankless water heaters
 - Condensing pool heaters
- Mixed-fuel ZNE homes without efficiency measures require an additional 0.2-0.9 kW PV capacity, with 6-16% higher costs.

Solar PV System

- Solar PV systems offer the most cost-effective TDV energy savings by:
 - Offsetting grid-supplied electricity
 - Operating during high TDV hours
 - Requiring zero fuel consumption
 - Lowering costs in recent years
- Solar PV's attractiveness will only improve if recent cost trends continue.

Potentially Attractive Advanced Technologies

- Several technologies can provide TDV energy savings, but require further cost/performance breakthroughs
- Projected improvements over the next decade should improve the attractiveness of:
 - Fuel cell mCHP systems
 - Gas heat pumps for heating
 - On-site electric batteries

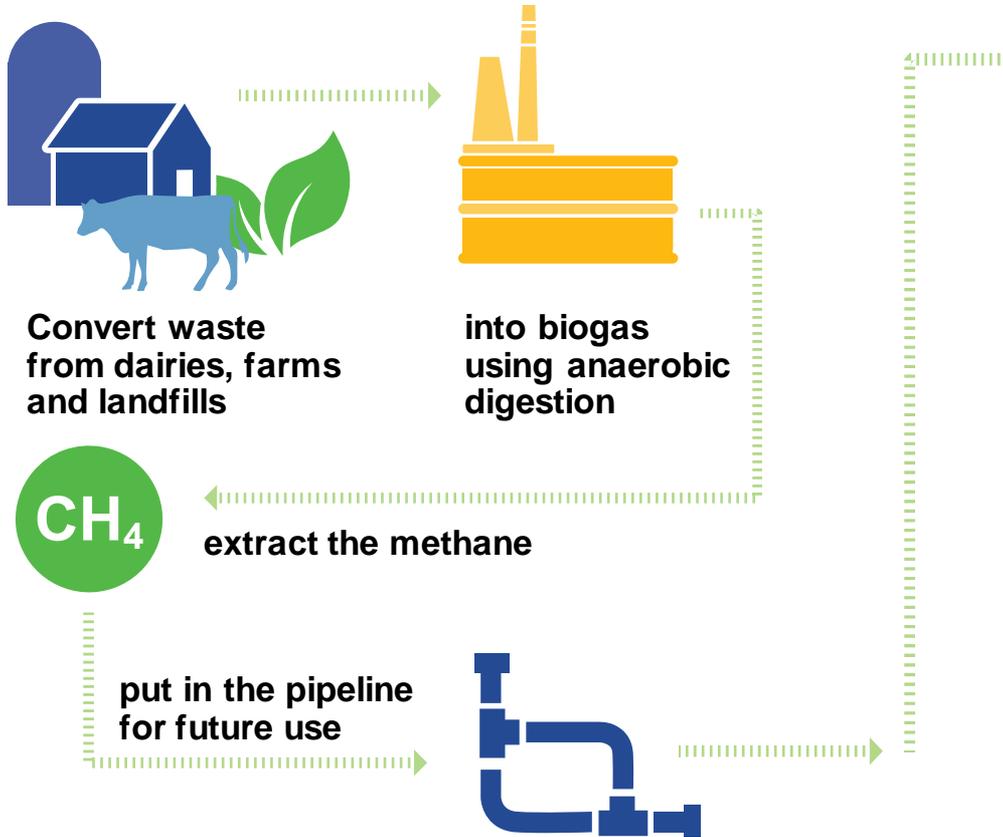
Limit technology and you limit the possibility.

**We need to think bigger and find
solutions across the entire**

ENERGY SYSTEM

RENEWABLE

Natural gas



WHAT'S POSSIBLE

POWER

2-3 million homes

REPLACE

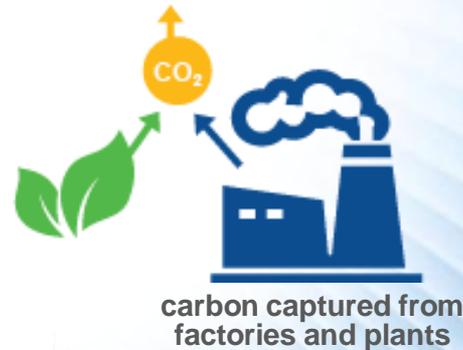
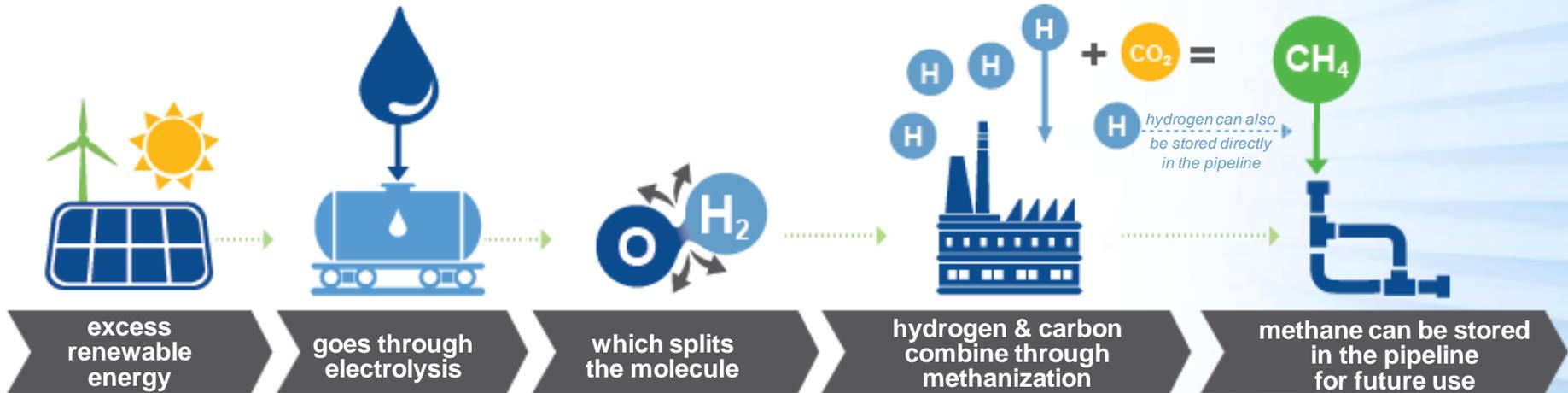
75% of all diesel
used by CA vehicles

When used for transportation,
Biogas from food and green
waste can actually

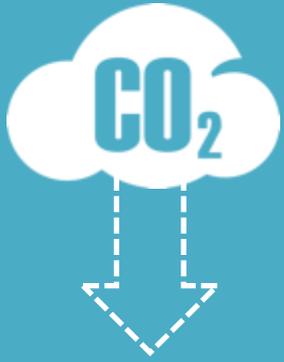
REMOVE GHGs
from the atmosphere

POWER-TO-GAS

addresses the storage challenge



Natural gas offers a practical path to meet **2050 GHG GOALS**



REDUCE
emissions from
sectors that are
difficult to electrify



INTEGRATE
variable renewable
generation



LEVERAGE
existing infrastructure



DIVERSIFY
technology and supply
risks

**THANK
YOU!**



A  Sempra Energy utility