

Natural Gas: ***Part of the Solution, Today and Tomorrow***

California Methane Symposium ***Policy Panel***

March 12, 2015

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Director, Gas Engineering

SoCalGas/SDG&E

Preview

- Reducing Methane Emissions
- SB1371: Natural Gas Leakage Abatement
- Being Part of the Solution: Renewable Methane and Storage

SoCalGas & SDG&E SERVICE TERRITORY



- Nation's largest natural gas distribution utility
- In business for 140+ years
- 13 counties, 500+ communities served
- 24.9 million customers
- 6.8 million gas meters
- 24,000+ square miles of service territory

Service Territory Stats

SOCALGAS AND SDG&E

Annual Deliveries

1 TRILLION CUBIC FEET

5%

of U.S. Deliveries

Four Storage Fields

136 BILLION CUBIC FEET

3%

of U.S. Storage Capacity

Transmission System

3,742

combined miles

3,508 SOCALGAS • 234 SDG&E

3.9 BILLION

CUBIC FEET/DAY
Receipt Capacity

13 COMPRESSOR STATIONS

205,662

Cumulative Horsepower

Distribution Network

57,930

miles of mains

49,953 SOCALGAS • 7,977 SDG&E

55,600

miles of services

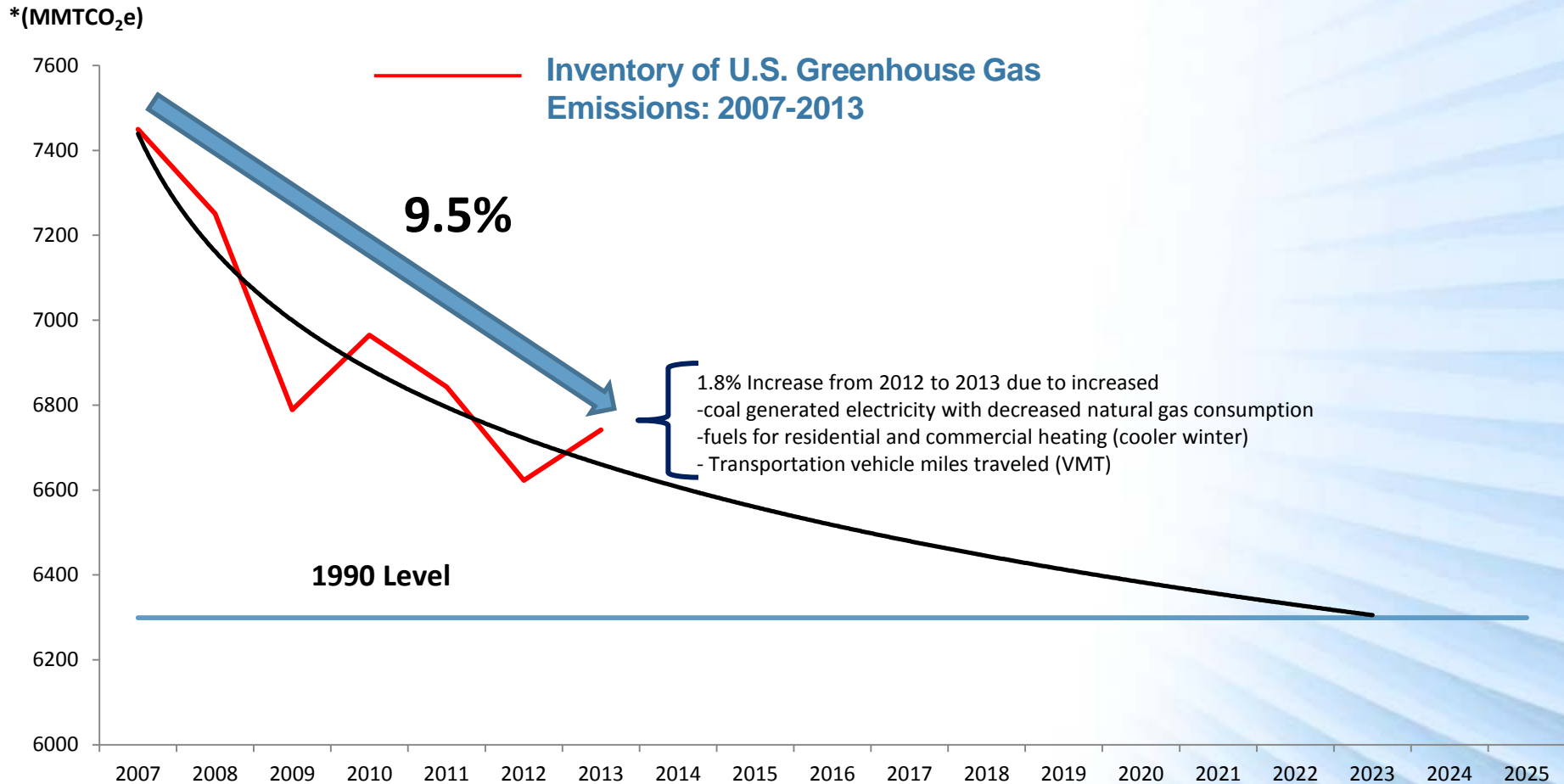
49,010 SOCALGAS • 6,590 SDG&E

1,969

REGULATOR STATIONS

PRESSURES OF ~60 LBS/SQ INCH OR LESS

Despite industry growth (600,000 miles of pipe; 17.5 million customers) EMISSIONS ARE DECREASING



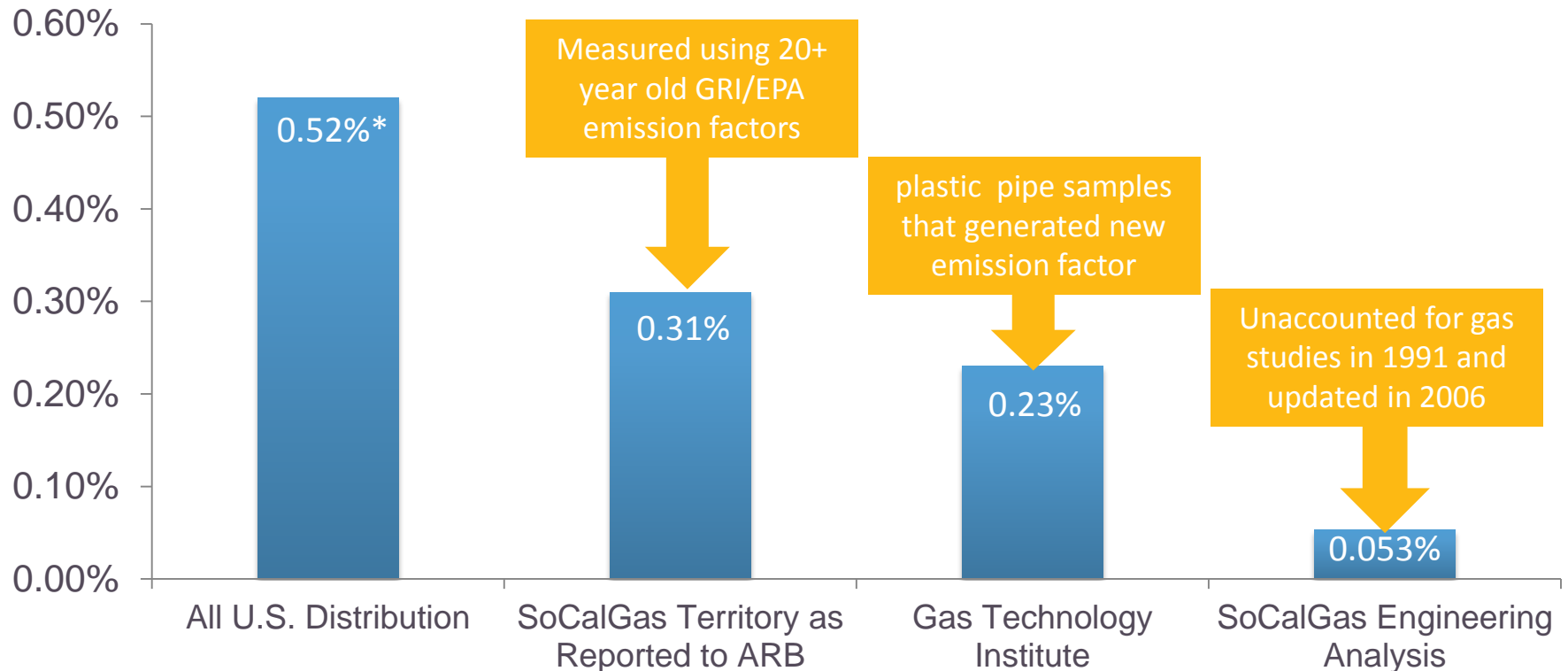
Graph Data Source: ES-4 DRAFT Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990–2013

*MMTCO₂e=million metric tons of carbon dioxide equivalent

NEW STUDIES SHOW LOWER LEAK RATES

primarily due to system modernization and better leak detection

Leak Rate Comparison 2013 (Reported Emissions from Leaks/Delivered Volumes)



* U.S. Distribution, EPA GHG Inventory 2013

WHAT HAS DRIVEN EMISSIONS RATES DOWN?

SoCalGas' modernization, voluntary & preventative measures



Original member of EPA's **Natural Gas STAR Program** and reduced more than ~800,000 metric tons of carbon dioxide equivalent (CO₂e)



Eliminated **cast iron pipe** more than 20 years ago



Perform leakage **surveys** on transmission, distribution and gas storage facilities



Implement **Safety & Integrity** programs



Comply with all Federal and State **regulations / requirements**

SoCalGas has deployed technology innovations for **EVEN BETTER LEAK DETECTION**



MOBILE

New Mobile methane detection,
deployed in 2013

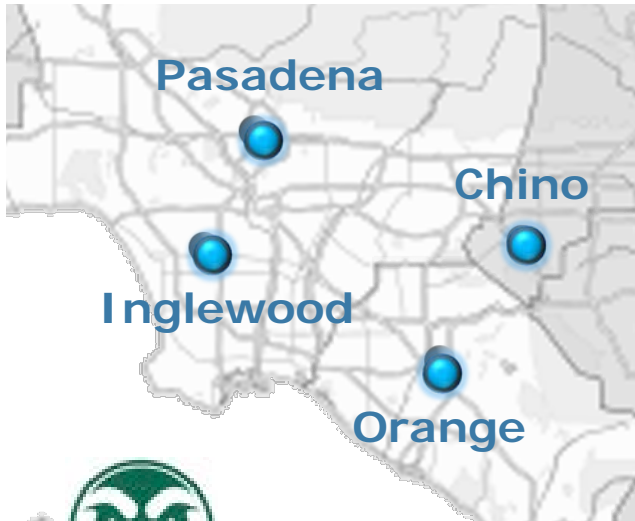


AERIAL SURVEYS

Future Technology: Unmanned aerial
vehicles (UAVs) to investigate emission
sources

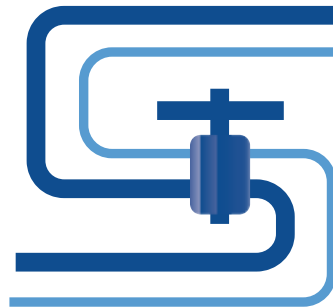
PARTNERING: NATURAL GAS VALUE CHAIN STUDIES AND MAPPING PROJECT

Mapping Four Cities in SoCalGas Service Territory



Local Distribution*

With Washington State University



WASHINGTON STATE UNIVERSITY



Pump to Wheels

With West Virginia University



**Release Date March 31, 2015*

SoCalGas Supported SB1371: Natural Gas Leakage Abatement to Optimize Safety and Environmental Goals

Utilities required to:

- Use best, most cost-effective technology
- Repair leaks as soon as possible after discovery
- Quantify, track, evaluate and report emissions
- Calculate and report annual leak rates + mitigation strategies

CPUC required to:

- Establish, Evaluate and Enforce best practices
- Develop implementing rules prioritizing safety, reliability, and affordability of service

BOTTOMLINE:

SoCalGas is working collaboratively and independently to reduce methane emissions even further



Collaborating with the CPUC to cost-effectively enhance infrastructure safety while yielding environmental benefits



Funding Research, Development & Demonstration (RD&D) for new technologies, and greater efficiencies



Investing in pipeline safety enhancements: ~\$1.5B over next five years



Proposed accelerating replacement of pipe and eliminating non-hazardous leaks backlog over 5 years in general rate case filing

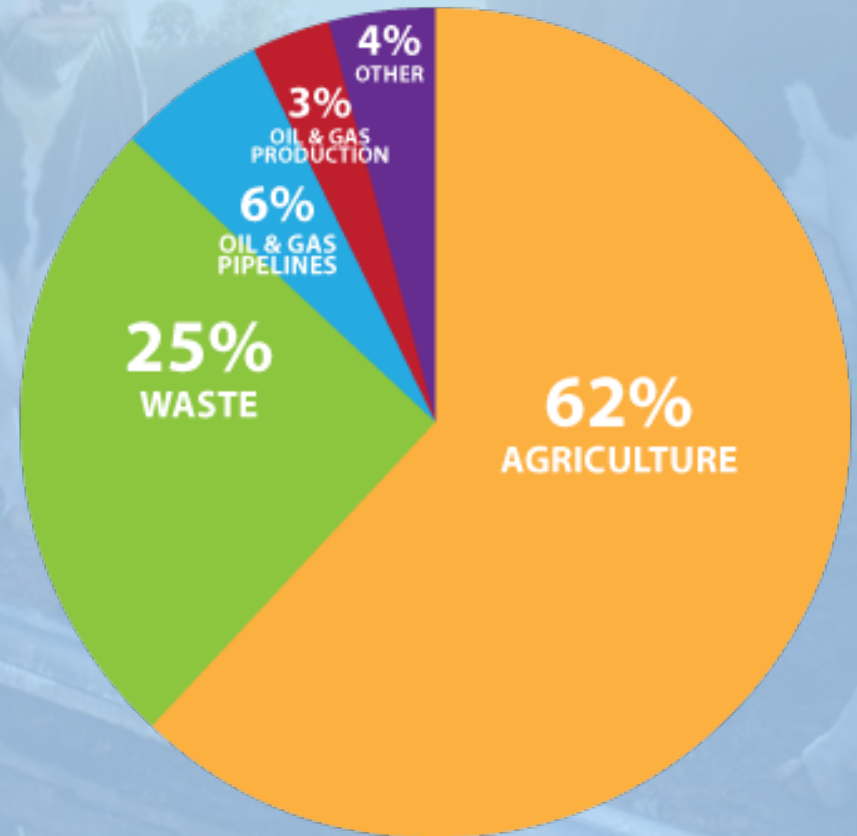


Partnering with academia, regulators and industry on studies and programs: Being Part of the Solution

Methane from Natural Gas is Dwarfed by the Agriculture & Waste Sources

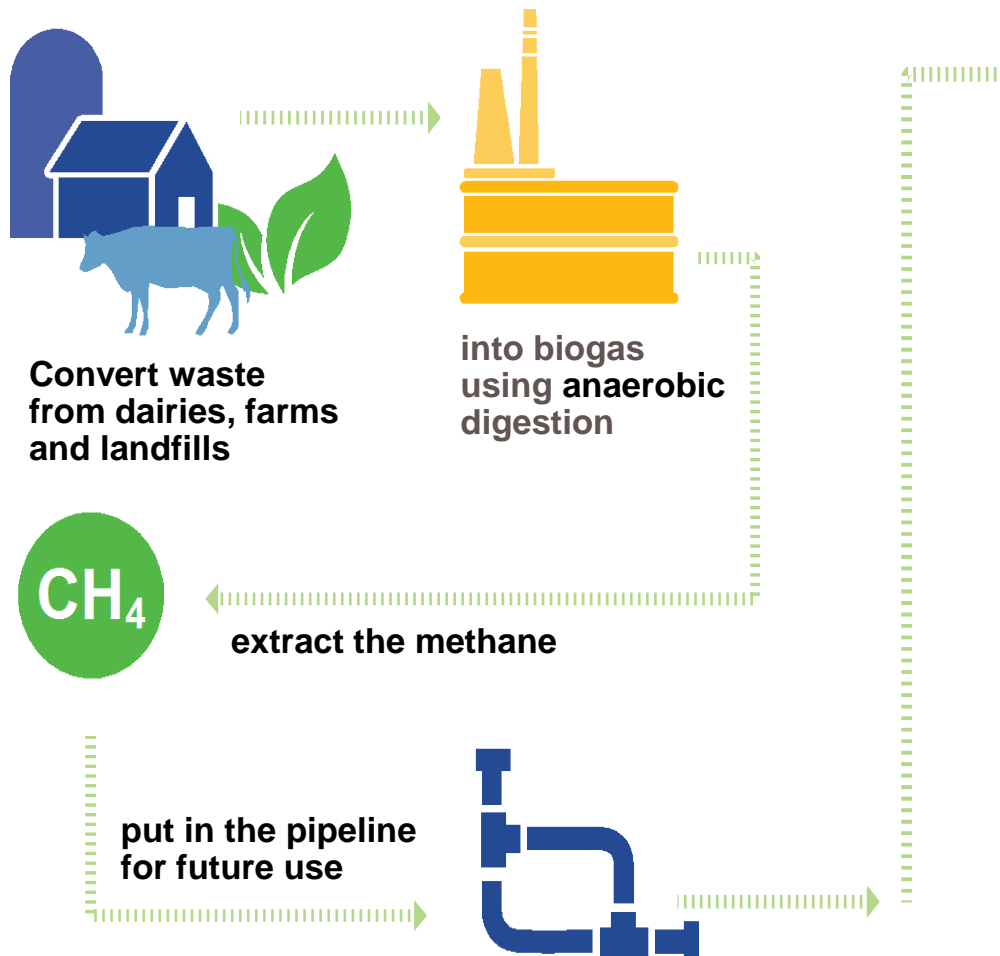


CA 2012 METHANE EMISSIONS*



*Source: California Air Resources Board (CARB) 2014 Greenhouse Gases Emissions Inventory

RENEWABLE Natural Gas Can Eliminate Methane Emissions from the Leading Sources



SOURCE: Bioenergy Association of California and CARB May 2014 Look-Up Table 30

WHAT'S POSSIBLE

GENERATE 2.5 quadrillion Btu annually – enough to meet the natural gas needs of **50%** of all US homes

REPLACE **75%** of all diesel used by CA vehicles

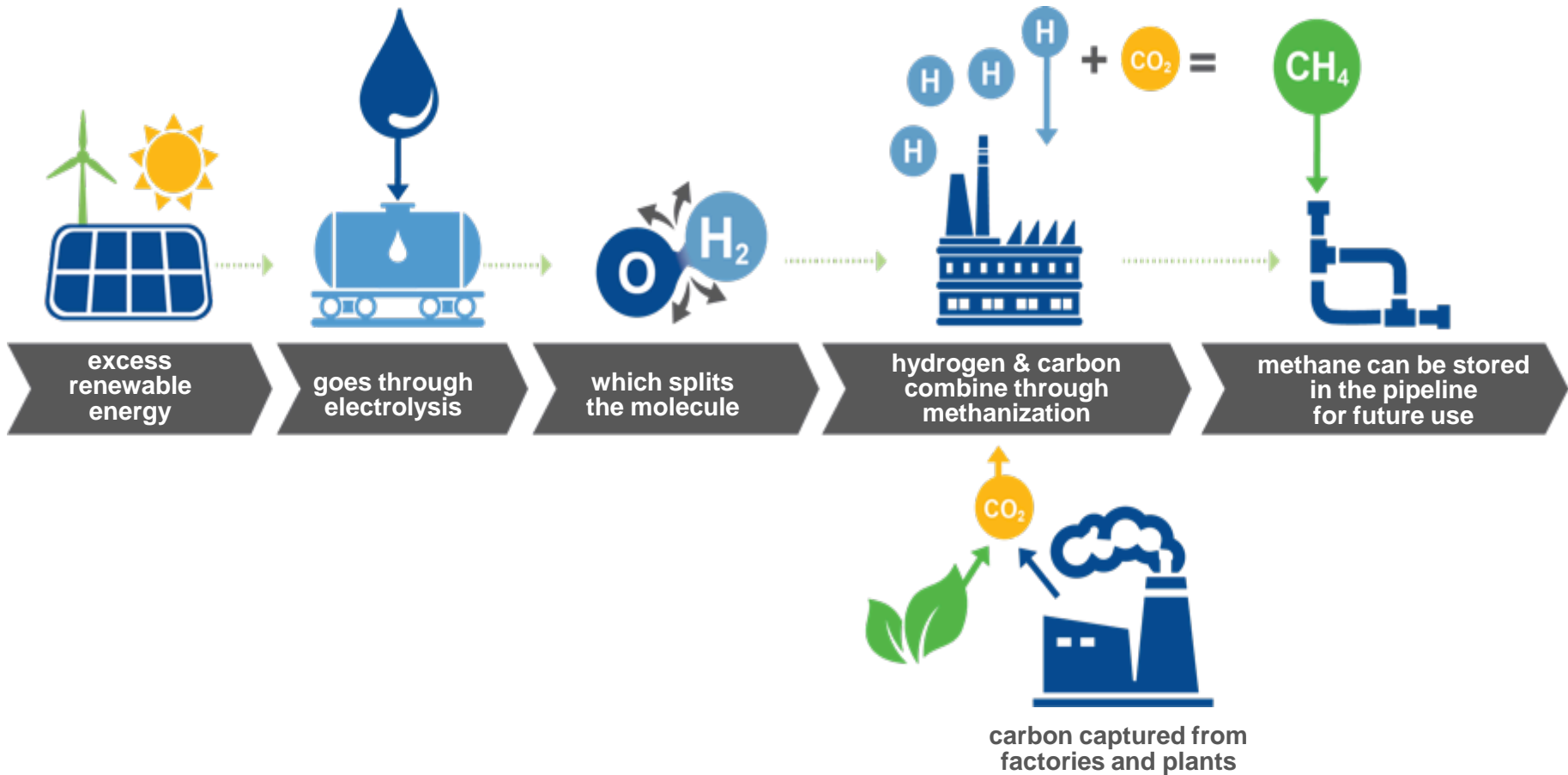
SUPPLY biogas as a transportation fuel from food and green waste with a **NEGATIVE** carbon intensity

Natural gas also gives California
a practical way to store

RENEWABLE ENERGY

POWER-TO-GAS

addresses the storage challenge



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

ENERGY SYSTEM

THANK YOU!