Pacific Gas & Electric Company Gas Research & Development

2024 Public Workshop

April 29, 2024

Safety Orientation

Earthquake

Know the safest places to drop, cover, and hold, such as under sturdy desks and tables.

Fire

Know your exits, escape routes, and evacuation plan. If safe to do so, use your compliant fire extinguisher. Exit the house and call 911.

Active Shooter

Get out, hide out, take out, and call 911.

Medical Emergency

Know who can perform first aid and CPR. Call 911 if you're alone or share your location with the call leader to send help. If you have an AED, ensure you and others in your household know where it's located and how to use it.

Psychological Safety

- ✓ We care for each other.
- ✓ Look out for one another.
- ✓ Create a safe space for all.
- ✓ Welcome new ideas from everyone.
- ✓ Practice self-care.

Ergonomics

- ✓ Practice ***30/30*** (every 30 minutes, move & stretch for 30 seconds).
- ✓ Ensure proper ergonomics.

Emergency Planning

- ✓ Create/update a personal emergency preparedness plan.

COVID-19

- ✓ Wash hands frequently.
- ✓ No mask is required outside.
- ✓ Follow current CAL-OSHA regulations and local county health orders.
- ✓ Visit COVID-19 employee site for latest updates and tips.

Workshop Logistics

- Each major topical session will end with time for questions and comments. We will also dedicate 10 minutes at the end of the day for additional questions and comments.
- A recording of today's workshop as well as other related materials will be available for download at **pge.com/innovation**.
- To pose a question, please use the Q&A function in the Zoom controls.
- We encourage you to provide written comments following the workshop. Please submit them to **innovation@pge.com** by Friday, May 10, 2024.

Agenda

Start Time	Duration	Topic
9:00	10 minutes	Introduction
9:10	10 minutes	PG&E Gas R&D
9:20	30 minutes	2023 in Review
9:50	10 minutes	Project Selection Process
10:00	10 minutes	Q&A
10:10	5 minutes	BREAK
10:15	15 minutes	Proposed 2025 Plan
10:30	30 minutes	Operations and Maintenance (includes 10 minutes Q&A)
11:00	30 minutes	Reducing Methane Emissions (includes 10 minutes Q&A)
11:30	30 minutes	Decarbonizing the Gas Pipeline (includes 10 minutes Q&A)
12:00	10 minutes	General Q&A
12:10	N/A	Close

Presenters

Jeannette Lindemann

Senior Manager
Gas R&D
PG&E

Aaron Rezendez

Gas Engineer
Gas R&D
PG&E

Dedrick Roper

Director, ZEV Transition
Momentum

Monique Montague

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Stephen Ramos, PE, PMP

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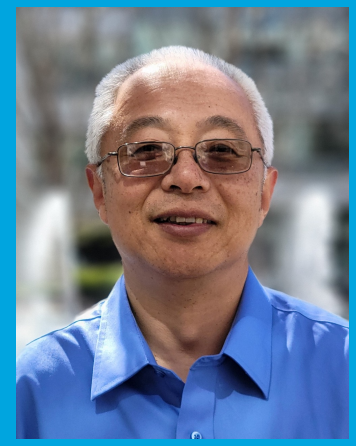


David Xu

Gas Engineer
Gas R&D
PG&E

Introduction

Our True North Strategy

PG&E's True North Strategy is a 10-year enterprise plan focused on:

- Rebuilding trust
- Delivering excellent service
- Architecting a decarbonized, safe, and reliable energy system.

In alignment with California environmental policy, PG&E has committed to achieve a net-zero energy system by 2040—five years ahead of California's current carbon neutrality goal.

PG&E

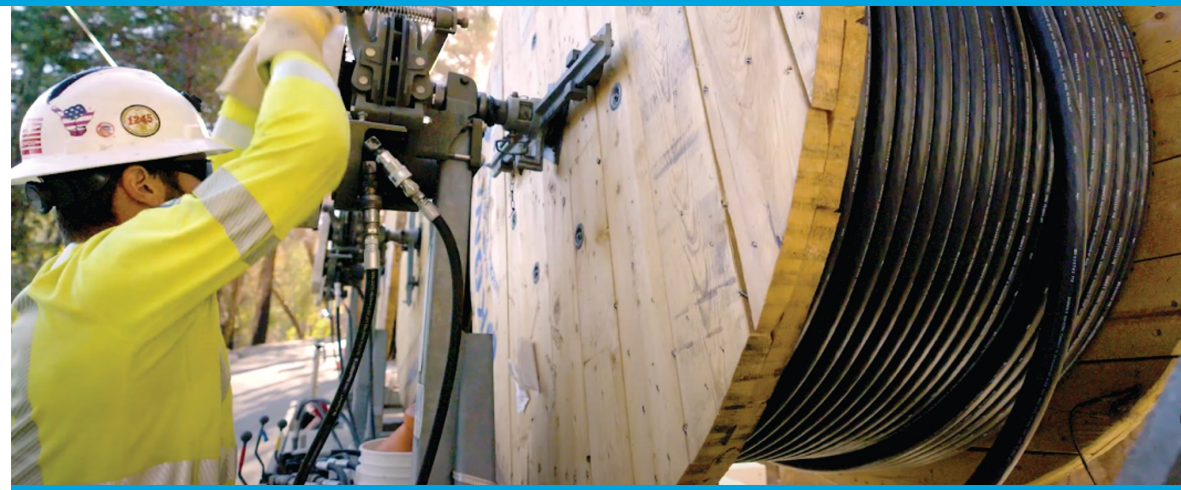
95% **greenhouse gas-free energy** in 2022

NEARLY

40% **renewable energy** in 2022

On track to meet California's goal:

60% **renewable energy by 2030**



Providing safe, reliable, clean, and affordable natural gas and electricity.

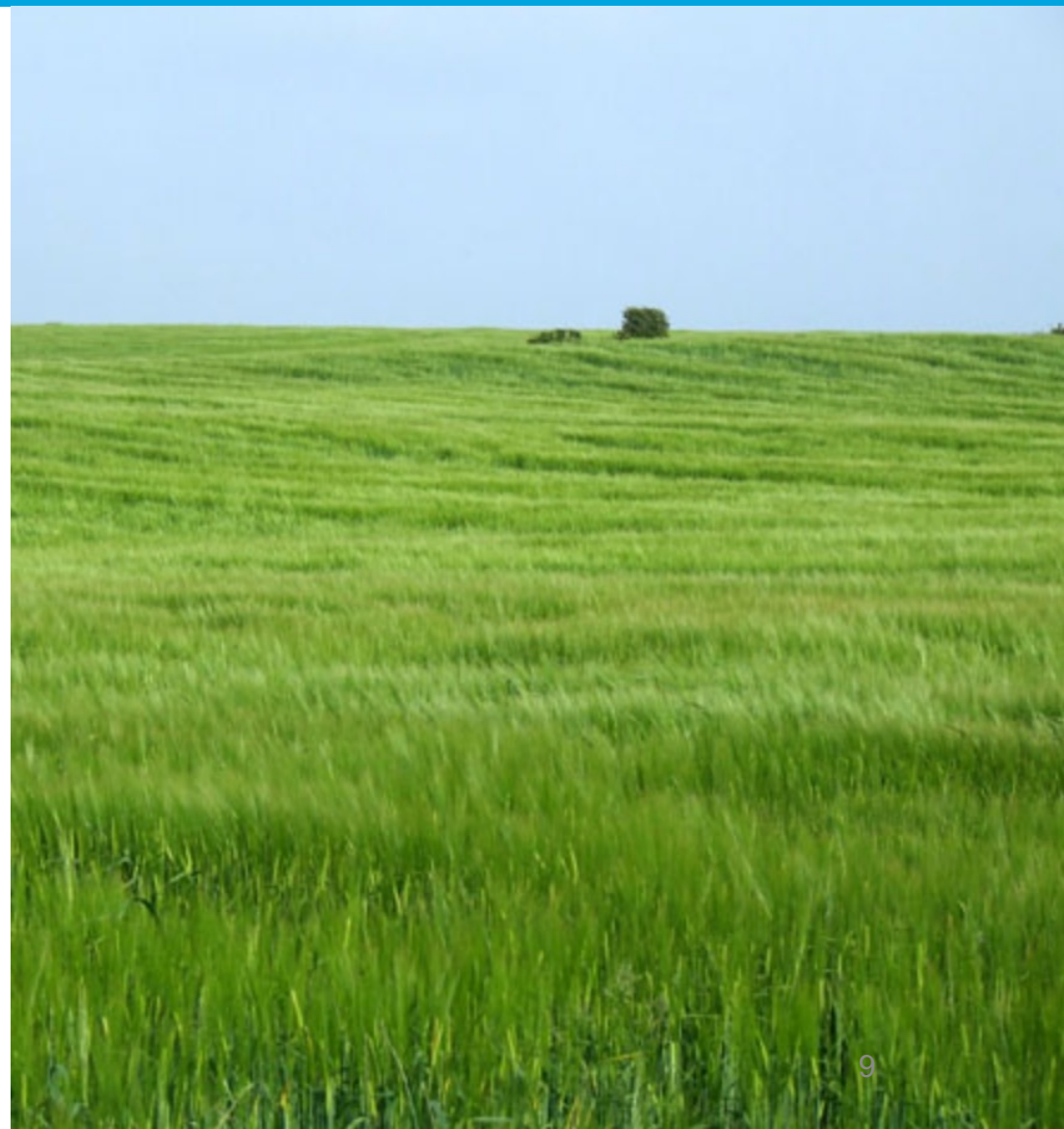
- 50,000 miles of combined transmission and distribution pipeline.
- Approximately 4.5 million customer accounts.
- 25,000 employees who live and work in the communities we serve.
- Total 2022 procurement spend of $4.79B in goods and services with diverse-certified firms.

PG&E

Greening the gas supply

A critical piece of our True North Strategy and achieving a net-zero energy system is greening the gas supply and shifting away from fossil-based methane to cleaner fuels:

- Renewable Natural Gas (RNG)
- Synthesis gas
- “Green” hydrogen



PG&E

Significant progress

In April 2023, we announced that we have **already achieved our 2025 target of reducing pipeline emissions by 20%—two years ahead of schedule.**

Other successes:

- Between 2021 and 2023, we began accepting RNG from 36 dairies across our service territory.
- By the end of 2024, we anticipate growing that number to **48 dairies**.
- Plan to procure RNG to serve 15% of its residential and commercial demand by 2030.


PG&E Gas R&D

PG&E Gas R&D

Bridging the gap

To bridge the gap between where we are today and the ambitious future that we envision requires R&D.

Since 2013, PG&E's Gas R&D team has focused on breakthrough technologies and processes to improve:

- Gas system performance
- Customer satisfaction
- Cost effectiveness
- Environmental impact
- Regulatory compliance
- Communication

PG&E Gas R&D

PG&E's Gas R&D Team

- **Operations & Maintenance (O&M):** Supports R&D aimed at maintaining and increasing the safety and reliability of the gas system while reducing O&M costs.

- **Reducing Methane Emissions:** Supports R&D that, if deployed widely, would reduce methane emissions from PG&E's gas system.

- **Decarbonizing the Gas System:** Supports R&D that develops or advances technologies that, if deployed widely, would decarbonize the gas system.

General

POLL

Which of the following best describes your professional role?

- Academia
- Community-Based Organization
- Consulting
- General Public
- Government Agency
- National Lab
- Tribal Nation
- Utility
- Other

2023 in Review

Results of the 2023 R&D Program

Summary of Active and Completed Projects

Portfolio Category	Active during 2023	Completed in 2023
Operations & Maintenance	65	29
Reducing Methane Emissions	25	10
Decarbonization	81	22
TOTAL	171	61

Financial Highlights

2023 Funds Expended

FUNDING CATEGORY	2023 SPENDING	CUMULATIVE SPENDING
Operations & Maintenance	$173,955	$3,371,499
Reducing Methane Emissions	$789,405	$1,178,336
Decarbonizing the Gas System	$196,315	$2,363,405
TOTAL	$1,159,675	**$6,913,240**

45 **R&D projects funded in 2023 across the three research areas:**

O&M, reducing methane emissions, and decarbonizing the gas system.

$1,159,675 **Invested in projects**

that improve gas system performance, environmental impact, customer satisfaction, and communication.

Financial Highlights

2023 Leveraged Funding

	2023 CY Spend	PG&E Cumulative Spend	Co-Funding	Total Value of Projects	Leverage Ratio
O&M	$173,955	$3,371,499	$45,625,238	$48,996,737	14.5
Reducing CH4 Emissions	$789,405	$1,178,336	$5,848,730	$7,027,066	6.0
Decarbonizing the Gas System	$196,315	$2,363,405	$90,274,169	$92,637,574	39.2
TOTAL	$1,159,675	$6,913,240	$141,748,137	$148,661,377	21.5

$148,661,377 **Total value of projects**

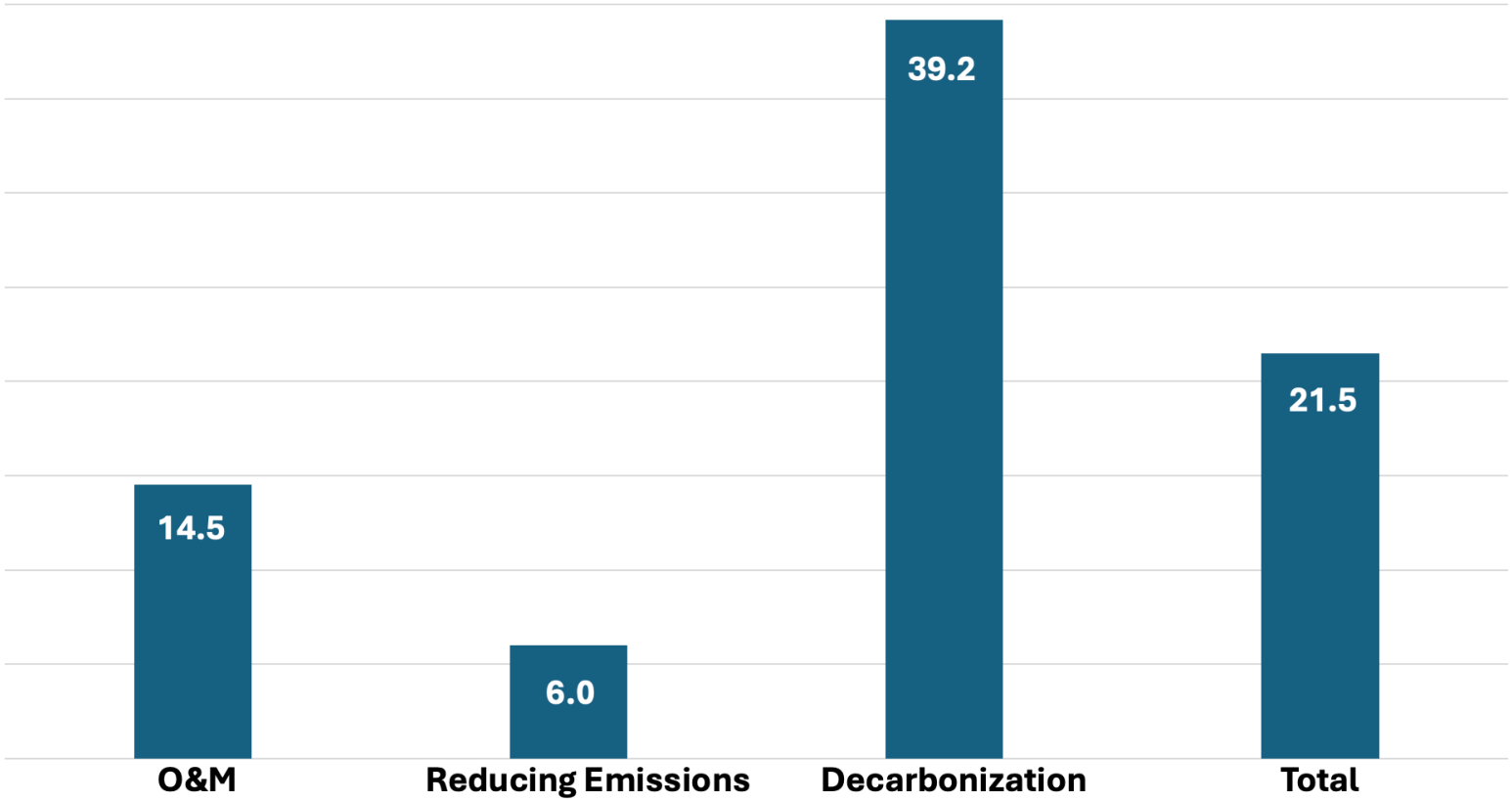
supported with time, resources, and PG&E funding.

$141,748,137 **Leveraged funds**

provided by public agencies, national labs, research consortia, and private industry.

Financial Highlights

2023 Leveraged Funding



Financial Highlights

2023 Research Consortia

RESEARCH CONSORTIUM	2023 DUES
Colorado State University Methane Emissions Technology Center	$10,000
NYSEARCH/NGA	$72,250
OTD	$750,000
PRCI (general membership)	$159,569
PRCI (Emerging Fuels Institute membership)	$100,000
UTD	$350,000
TOTAL	**$1,441,819**

METEC

OTD Operations Technology Development

PRCI

NYSEARCH Natural Gas RD&D

UTD Utilization Technology Development

EFI Emerging Fuels Institute

Financial Highlights

2023 Leveraged Funding

17 Projects Won Awards from the CEC

7 Projects Won Awards from the DOE

5 Projects Won Awards from PHMSA

$115,494,926 **Awarded to projects**

from public agencies, including the CEC, DOE, NSF, and PHMSA.

$39,550,822 **Awarded to projects**

from the California Energy Commission.

$70,603,733 **Awarded to projects**

from the DOE through the National Renewable Energy Lab, ARPA-E, and National Energy Technology Laboratory.

$3,840,371 **Awarded to projects**

from the Pipeline and Hazardous Materials Safety Administration.

Financial Highlights

2023 Funding Recipients





Equity

Diversity. Equity. Inclusion. Belonging.

We are focused on representing the broad diversity of the communities we serve by living up to our DEIB Stands:

- **Diversity Matters:** PG&E has a workforce that reflects the hometowns we serve.
- **Equity Delivers:** PG&E removes barriers to level the playing field for all coworkers.
- **Inclusion Bonds:** All coworkers and their ideas matter at PG&E.
- **Belonging Sustains:** Coworkers are known, valued, respected, supported and connected.

These DEIB Stands reinforce PG&E's Purpose of delivering for our hometowns and leading with love as well as our Stands that everyone and everything is always safe and it's enjoyable to work with and for PG&E.

AT PG&E
Employee Resource Groups
have been at the forefront of D&I

FOR NEARLY
50 YEARS

Employee Resource Groups (ERGs) and Engineering Network Groups (ENGs):

- Foster employee belonging
- Support an environment of inclusion that values and respects diversity in our workforce
- Promote positive relationships with the communities and customers we serve

Equity

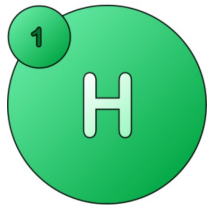
Supporting projects that matter

The energy transition can have short-term, negative impacts on ESJ communities and people underrepresented in STEM. That's why we evaluate every project we consider for its potential to benefit these groups.

Site projects in ESJs

Hire scientists from diverse backgrounds

Work with Minority Serving Institutions



Support tech that benefits ESJs

27 **R&D projects in ESJ communities**

received support from PG&E in 2023.

$130,013 **Committed to projects**

located in Environmental and Social Justice Communities.

Equity

Diversity. Equity. Inclusion. Belonging.

Operations & Maintenance

- Cost savings
- Reduced emissions and improved air quality
- Increased reliability
- Job opportunities
- Community engagement

Reducing Methane Emissions

- Improved air quality
- Climate change mitigation
- Health benefits
- Job creation
- Environmental justice

Decarbonizing the Gas System

- Reduced GHG emissions
- Health improvements
- Economic opportunities
- Diversified energy mix
- Customer benefit programs

General

POLL

PG&E is very interested in environmental and social justice (ESJ) as it relates to our research. Can you recommend any community-based organizations (CBOs) or Tribal nations we should be engaging to help us in this effort?

Project Selection Process

Project Selection Process

Identifying critical technology gaps

As part of our work on the PG&E R&D Strategy Report, we conducted a gap analysis and identified 32 technology gaps related specifically to gas R&D. Based on these findings, Gas R&D organized its efforts into three main research categories.

Operations & Maintenance

Reducing Methane Emissions

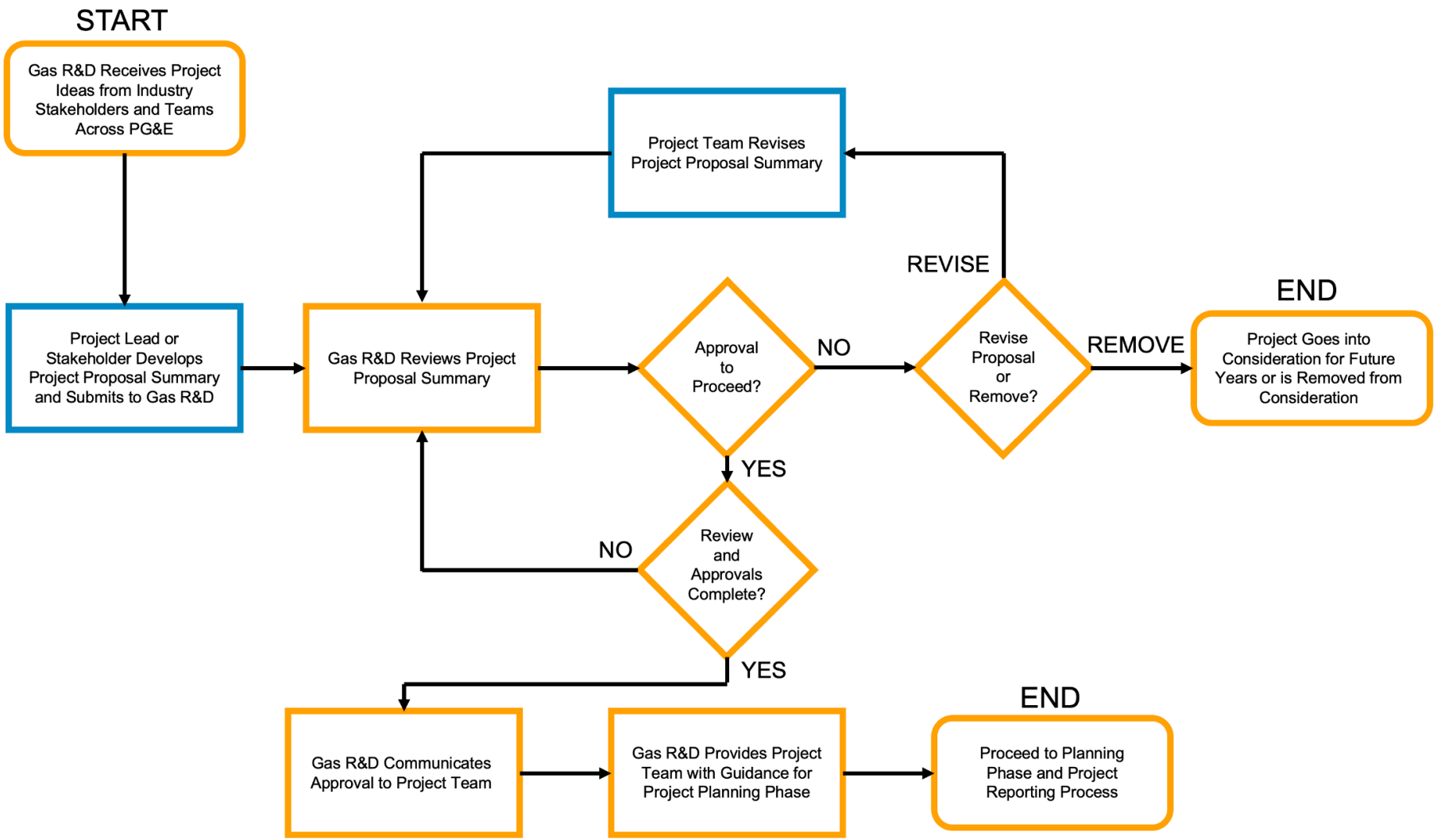
Decarbonizing the Gas System

Project Selection Process

32 critical technology gaps

O&M	Reducing Methane Emissions	Decarbonizing the Gas System
Crack Assessment and Monitoring for Small Pipes	Revised Emission Calculation Methodologies	Costly and Unstandardized Interconnection Skids
Material Properties Verification for Existing Pipe	Transmission Pipeline Blowdown Methane Emissions	Uncertainty about Risks and Impacts from Trace RNG Chemicals
Toughness Assessments for Existing Pipe	Meter Set Leak Repairs	Hydrogen Embrittlement
Crack Assessment Technologies	T&D Leak Detection	Safety Risks of Hydrogen Blend Leaks
Well Inspection and Monitoring	Reducing False Positive on Leak Detection Surveys	Metering Accuracy with Hydrogen Mixtures
Corrosion Inspections	Above Ground Leak Detection and Monitoring	Optimal Decarbonization Pathway
Manual Customer Shutoffs		Compatibility of Customer Applications with Mixed Gas
Accuracy of Well-Life Estimation		Uncertainty of Storage Facility Performance for Hydrogen Blends
Geohazard Risk Assessment		Limited RNG Capacity from Traditional Sources
Accuracy of Pipeline Locating Technologies		Woody Biomass as an Energy Source
Meter Set Corrosion Inspections		Gas Appliance Combustion Emissions
Distribution Saddle Leak Repairs		Lack of Operational Data for Hydrogen Effects on Gas System
Plastic Insert Detection		Need to Develop Cost-Effective and Safe Deblending Technologies

Project Selection Process



General

QUESTIONS

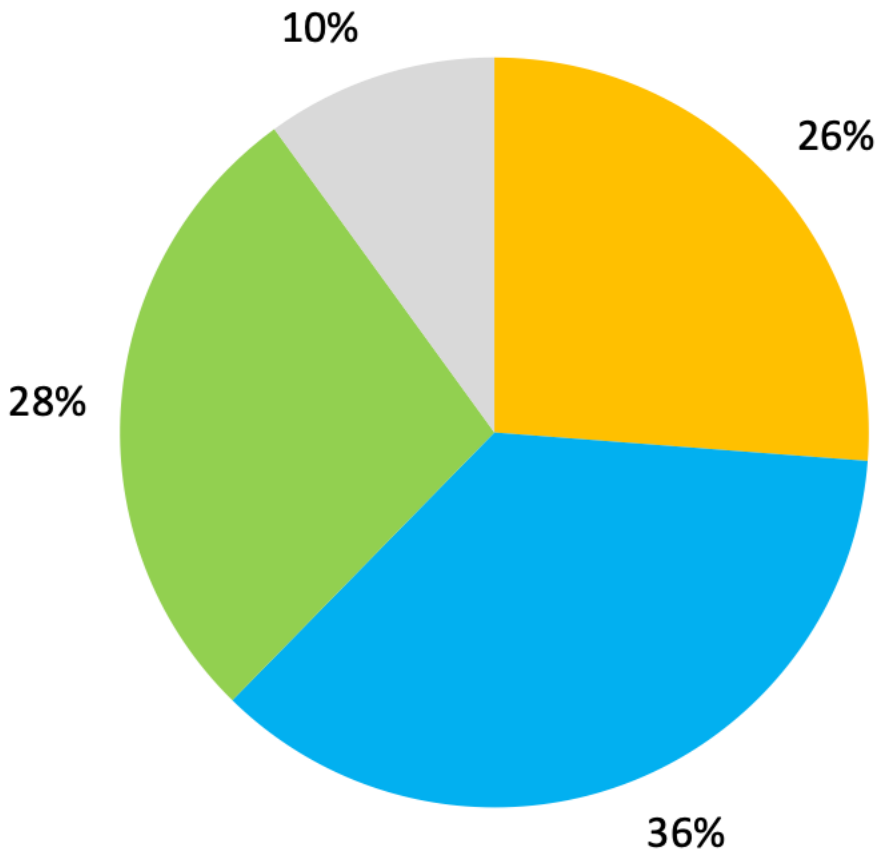

Five-Minute
Break


Proposed 2025 Plan

Estimated 2025 Plan Spending

2025 Planned Spend at $8.0 Million Budget

- Operations & Maintenance
- Reducing Methane Emissions
- Decarbonizing the Gas System
- Administration (10%)



Stakeholder Input

Operations & Maintenance

Key stakeholder input (as of April 29, 2024)

- Fund a consortium to conduct a **field study of hydrogen injection** into the natural gas pipeline and to perform a technoeconomic analysis.
- Study the use of **hydrogen for long-duration energy storage**.
- Explore **monitoring underground storage** using fiber optic technology.
- Continue to look at **3rd-party damage prevention**, particularly through use of **artificial intelligence** (AI) and proactive monitoring.
- Seek to better understand the impacts of **integrating hydrogen blending and 100% hydrogen** on new and existing infrastructure.
- Research **utility-scale underground storage of hydrogen**.
- Emphasize **energy efficiency**, especially in the short term.
- The role of **AI** in gas system O&M.
- Importance of **collaboration** in R&D ecosystem.
- Explore how to tap into and utilize the **vast amounts of data**.

Operations & Maintenance

Presenters

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Operations & Maintenance

A changing gas system

Gas throughput expected to decline with increased electrification

Ongoing investments in safety and reliability may create rate pressures for fewer remaining customers

Increased O&M efficiencies can enable PG&E to reduce rate pressure over time

Operations & Maintenance

Safety, Reliability, Reduced O&M Costs

Compliance with New Regulations
- Crack detection, assessment, and mitigation
- Toughness verification

Geohazard Risk Management
- Monitoring, assessment, and mitigation
- Pipeline strain

Storage Wells
- Integrity monitoring
- Advanced data processing using AI/ML

POLICY DRIVERS

Pipeline and Hazardous Materials Safety Administration's (PHMSA) Mega Rule: Safety of Gas Transmission Pipelines: Repair Criteria, Integrity Management Improvements, Cathodic Protection, Management of Change, and Other Related Amendments (federal)

49 CFR Part 192 Transportation of Natural and Other Gas by Pipeline: Minimum Federal Safety Standards (federal)

General Order No. 112-F Rules Governing Design, Construction, Testing, Operation, and Maintenance of Gas Gathering, Transmission, and Distribution Piping Systems (state)

R.20-01-007 Order Instituting Rulemaking to Establish Policies, Processes, and Rules to Ensure Safe and Reliable Gas Systems in California and perform Long-Term Gas System Planning (CPUC)

PG&E's Gas Operations Asset Management Plans

Operations & Maintenance

2023 in Review

FUNDING CATEGORY	2023 ACTUALS
Operations and Maintenance	$173,955
Reducing Methane Emissions	$789,405
Decarbonization	$196,315
TOTAL	**$1,159,675**

65 Active Projects in 2023

11 Projects Initiated in 2023

29 Completed Projects in 2023

$173,955

Operations & Maintenance

2023 in Review—Case Study

Distributed Fiber Optic Sensor Monitoring of Pipeline Strain and Integrity for Cost-Effective Safe Operation under Geohazard Conditions

- First pilot of full-profile strain direct monitoring under geohazard conditions in the industry.
- First winner of PRCI Photo Contest in 2024.
- Field installation on a backbone transmission pipeline at a Calaveras fault-crossing and landslide mitigation project.
- On-demand monitoring from August 2023
- Funded by DOT/PHMSA University grant and SBIR funds

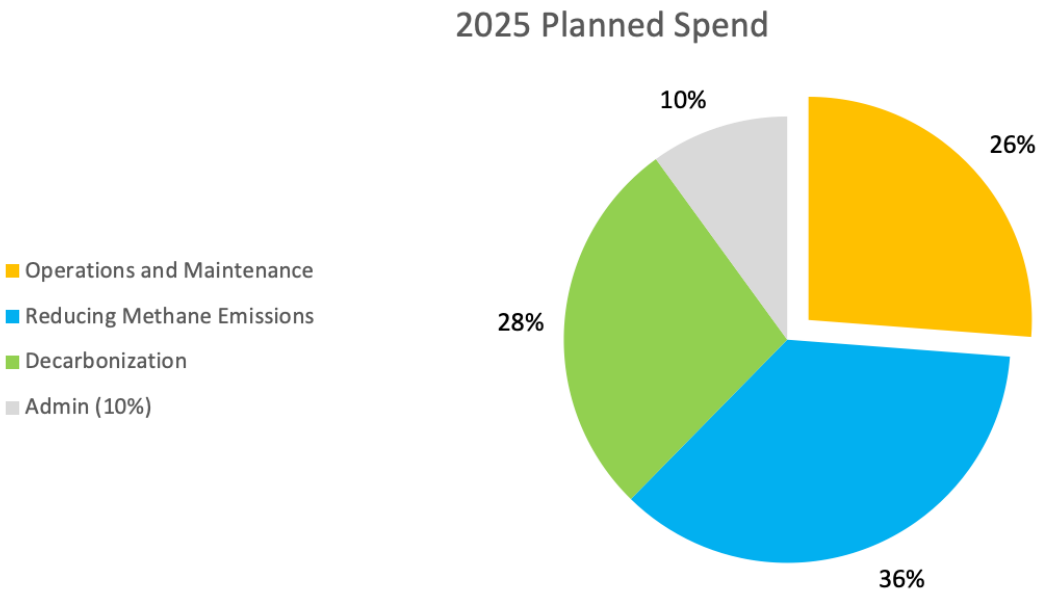
Operations & Maintenance

Benefits

Reliability	57
Safety	63
Equity	38
Operational Efficiency	62
Improved Affordability	52
Reduced GHG Emissions	12
Improved Air Quality	2

Operations & Maintenance

Planned 2025 Spending: ~$2.1M



Compliance with Regulations: 65%

- Hard spot detection and assessment
- Stress corrosion crack and selective seam weld corrosion detection/characterization
- Inline and/or in-ditch material grade verification and toughness measurement
- Field pilot of thermal compression repair of crack-like seam defects
- Pilot run of detecting/locating mechanical impacts/3rd-party damages through real-time CP Current Monitoring
- Non-intrusive/above-ground anomaly screening

Storage Wells: 5%

- AI/ML data analytics of underground storage well integrity
- Monitoring using fiber optic sensor systems

Geohazard Risk Management: 30%

- Non-intrusive/above-ground pipeline strain assessment using manual cart and/or drone platform
- Inline and above-ground measurement of transmission pipeline depth of cover
- On-demand monitoring of the pipelines with fiber optic sensor systems at two fault-crossing sites

Operations & Maintenance

POLL

What types of benefits should we be seeking in the O&M projects we support?

Operations & Maintenance

QUESTIONS

Reducing Methane Emissions

Presenters

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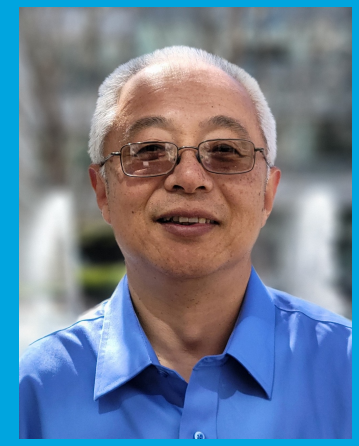

David Xu

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Reducing Methane Emissions

CH_4 A changing gas system

PG&E has set **ambitious goals** for decreasing emissions over the next 25 years as part of our broader climate strategy.

We have committed to reducing Scope 1 and 2 emissions from natural gas operations by 45% by 2030.

In April 2023—two years ahead of schedule—we announced that **we had achieved our 2025 target of reducing pipeline emissions by 20%**.

Definition	PG&E 2030 Goal/Initiative
SCOPE 1 EMISSIONS **Direct** emissions from PG&E's operations	Reduce Scope 1 & 2 emissions from natural gas operations **by 45%**
SCOPE 2 EMISSIONS **Indirect** emissions from facility electricity and electric line losses	
SCOPE 3 EMISSIONS Emissions resulting from **value chain activities** now owned or controlled by PG&E but that can be **indirectly** impacted through PG&E actions	• Reduce Scope 3 emissions from natural gas supply **by 20%** • Reduce cumulative carbon emissions **by 2.5MMT** by converting commercial and industrial (C&I) customers unable to electrify from dirtier fuels to natural gas • Deliver **15% RNG** in PG&E's core throughput • Operationalize hydrogen pilot by 2024 to inform safe levels of blending into the system **by 2030** • Pledge **$25M** towards sustainable uses for woody biomass with other partners
SCOPE 4 EMISSIONS An emerging term for categorizing emissions reductions enabled by a company. PG&E can make significant contribution by enabling these emission reductions in our service area	

Reducing Methane Emissions

Safety, Reliability, Reduced O&M Costs

Revised Emissions Calculations
- Direct measurements
- Continuous monitoring

Efficient Leak Repairs
- Compression-style adhesives
- Clamp
- Sealant

Advanced Leak Detection
- Satellite
- Helicopter
- Drones
- Advanced Mobile Leak Detection

POLICY DRIVERS

SB 1371 (Leak Abatement OIR)

PG&E's Compliance Plan, Ch. 15

GHG Emissions Standards for Crude Oil and Natural Gas Facilities (DOGGR, CARB Oil and Gas Rule)

PG&E's Climate Strategy Report

Reducing Methane Emissions

2023 in Review

FUNDING CATEGORY	2023 ACTUALS
Operations and Maintenance	$173,955
Reducing Methane Emissions	$789,405
Decarbonization	$196,315
TOTAL	**$1,159,675**

25
Active Projects in 2023

6
Projects Initiated in 2023

10
Completed Projects in 2023

$789,405

Reducing Methane Emissions

2023 in Review

OTD 7.24.c Near Field Fixed Monitoring

The purpose of this project is to test the technical specifications and leak detection capabilities of various methane sensors for continuous monitoring of wellheads at underground storage facilities.

- Continuous monitoring can improve both customer and coworker safety.
- Incorporating fixed methane monitors can reduce operating risks though early detection of high-risk methane leaks, potentially preventing loss of containment.
- Continuous monitoring can be used in lieu of daily wellhead leak surveys to reduce O&M costs.

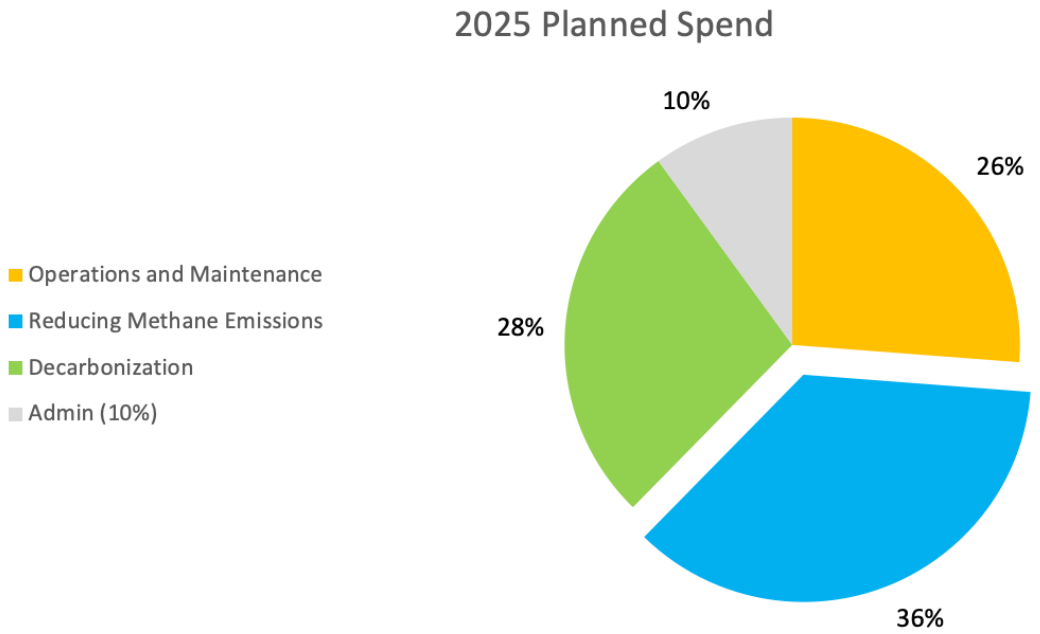
Reducing Methane Emissions

Benefits

Reliability	16
Safety	22
Equity	2
Operational Efficiency	18
Improved Affordability	5
Reduced GHG Emissions	25
Improved Air Quality	20

Reducing Methane Emissions

Planned 2025 Spending: ~$2.9M



Revised Emissions Calculations: 35%

- Evaluate emissions from transmission M&R stations through direct measurements and piloting continuous monitoring technologies.

Efficient Leak Repair: 15%

- Evaluate the use of innovative leak repair methods such as mechanical clamps, epoxy sealants, and compression-style adhesives to reduce methane emissions, decrease O&M costs, and improve safety by repairing leaks quickly and more efficiently.

Advanced Leak Detection: 50%

- Refine existing, advanced leak detection methods within PG&E operations for efficiency, safety, and lower operating costs.
- Evaluate the use advanced mobile leak detection systems and aerial leak detection platforms, including satellite technology, helicopter, and drone-based sensors.

Reducing Methane Emissions

What new trends or technologies in reducing gas system methane emissions are you aware of that you would recommend we explore further?

Reducing Methane Emissions

QUESTIONS

Decarbonizing the Gas System

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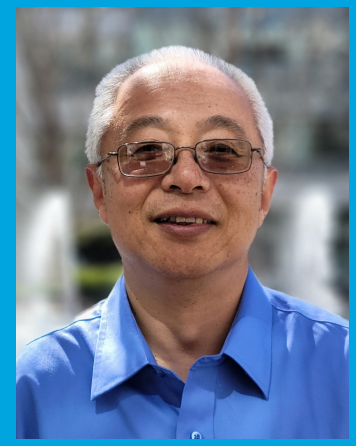

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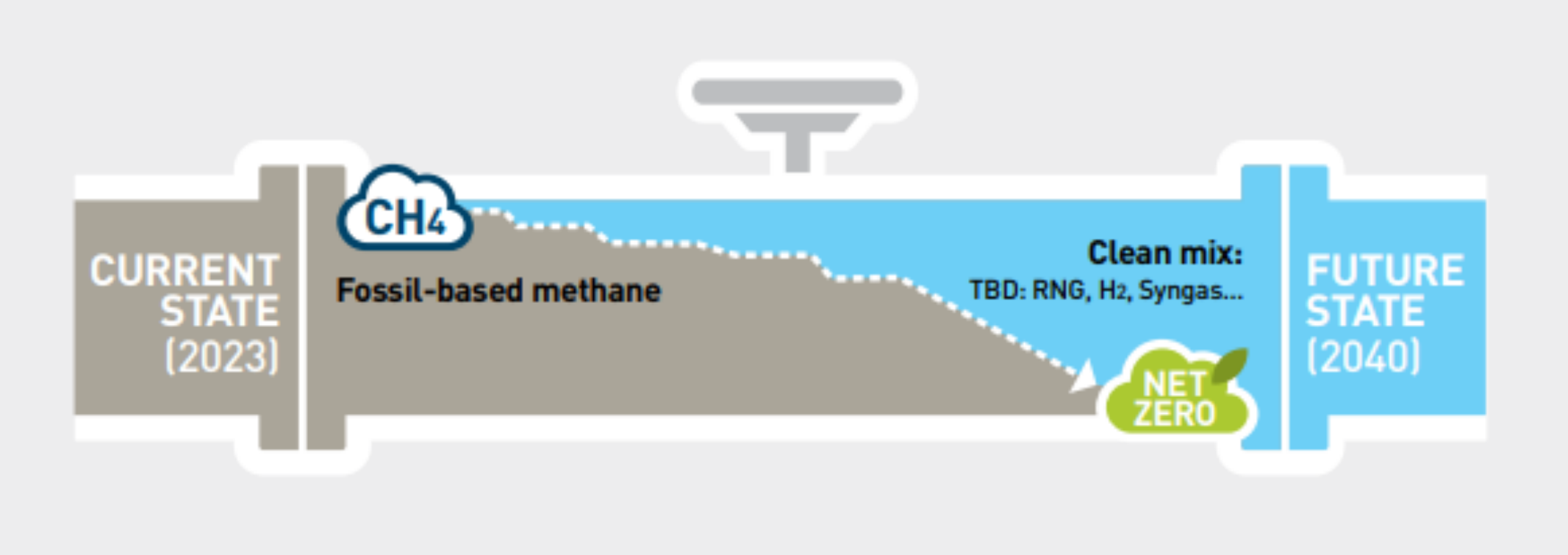
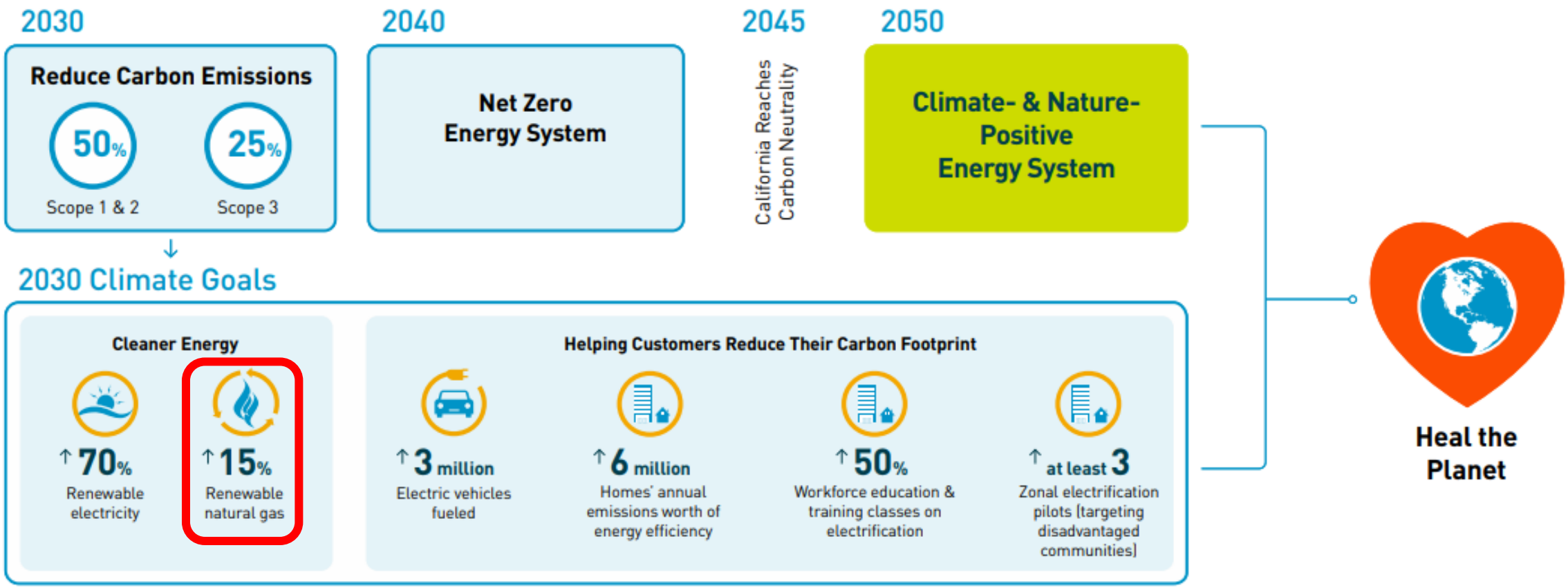
Decarbonizing the Gas System

Introduction



Decarbonizing the Gas System

Ambitious goals



Decarbonizing the Gas System

Cleaner fuels

Integrate Cleaner Fuels
- Traditional RNG
- Non-traditional RNG
- Syngas

Impact of Hydrogen
- Material testing
- Measurement
- Hydrogen leak detection
- Hydrogen production
- Storage
- Industrial end uses (hard-to-electrify or –decarbonize sectors)

POLICY DRIVERS

- California Climate Commitment
- EO B-55-18: 2045 Carbon-neutral California economy
- Assembly Bill (AB) 32: Reduce CO2 emissions 40% below 1990 levels by 2030.
- Clean Air Act: Air quality standards for NOx and PM
- SB 1383: CH4 emissions from organic waste
- LCFS: Reduce carbon intensity of fuels
- SB 1440: Authorizes a state procurement program for biomethane
- Injection of renewable hydrogen into gas pipelines (OIR) R.13- 02-008
- Joint H2 Blending Demonstration Projects (A.22-09-006)

Decarbonizing the Gas System

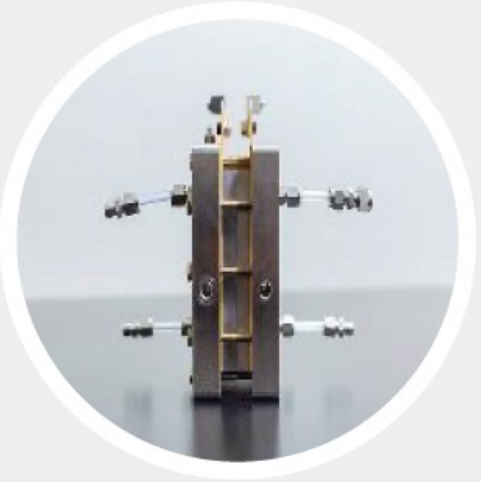
Integrating cleaner fuels

Traditional RNG

RNG created from **traditional organic sources:** livestock, landfills and wastewater treatment

Non-Traditional RNG

RNG created from **non-traditional organic sources:** woody biomass, food waste, etc.



Synthetic Methane

RNG created from **other sources:** power-to-methane, etc.

Decarbonizing the Gas System

The impact of hydrogen

Effects on existing system components and operations

1. Pipeline integrity
2. Storage well integrity
3. Safety characteristics
4. Metering accuracy

Effects on existing customer end uses and appliances

1. Compatibility with various customer end uses and appliances
2. Deblending at customer sites

Decarbonizing the Gas System

Varied projects

Hydrogen to Infinity

A comprehensive, full-scale, real-world study to establish parameters for safe and low-cost production, transmission, storage, and use of hydrogen as a fuel to reduce greenhouse gas emissions

Research, development and demonstration

Full-Scale Pipeline Loop
Built and operated as real-world gas transmission pipelines

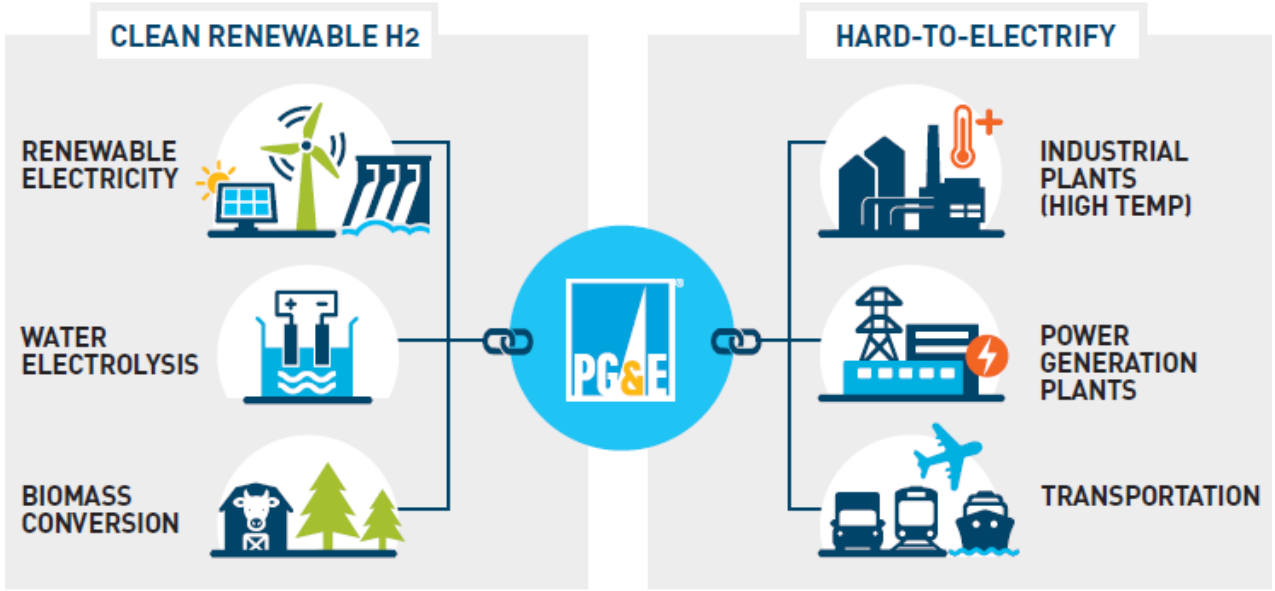
Alignment with California climate goals

- Accelerates transition to clean energy, supports California leadership
- Synergy with California Energy Commission hydrogen solicitations, HyBlend and PHMSA R&D

QUICK FACTS

5-20% H_2 by volume
720 psi (ANSI 300)
Vintage infrastructure
Industry test bed
130-acre City of Lodi, CA
10 yr+ operations (>2027)

Contact us at **hydrogen@pge.com** or visit our website at **pge.com/hydrogen**



Decarbonizing the Gas System

2023 in Review

FUNDING CATEGORY	2023 ACTUALS
Operations and Maintenance	$173,955
Reducing Methane Emissions	$789,405
Decarbonization	$196,315
TOTAL	$1,159,675

81 Active Projects in 2023

13 Projects Initiated in 2023

22 Completed Projects in 2023

$196,315

Decarbonizing the Gas System

2023 in Review

Decarbonizing Large Commercial and Industrial Equipment with Hydrogen

This project will result in a study that will identify the impact of hydrogen-natural gas blends on existing and new appliances and the maximum concentration of hydrogen that can be handled by these appliances with and without modification.

The result will inform policymakers and the private sector of the technical and economic feasibility of this strategy and identify additional research and infrastructure necessary to enable large-scale deployment.

STATE OF CALIFORNIA ENERGY COMMISSION

UCLA

Graniterock

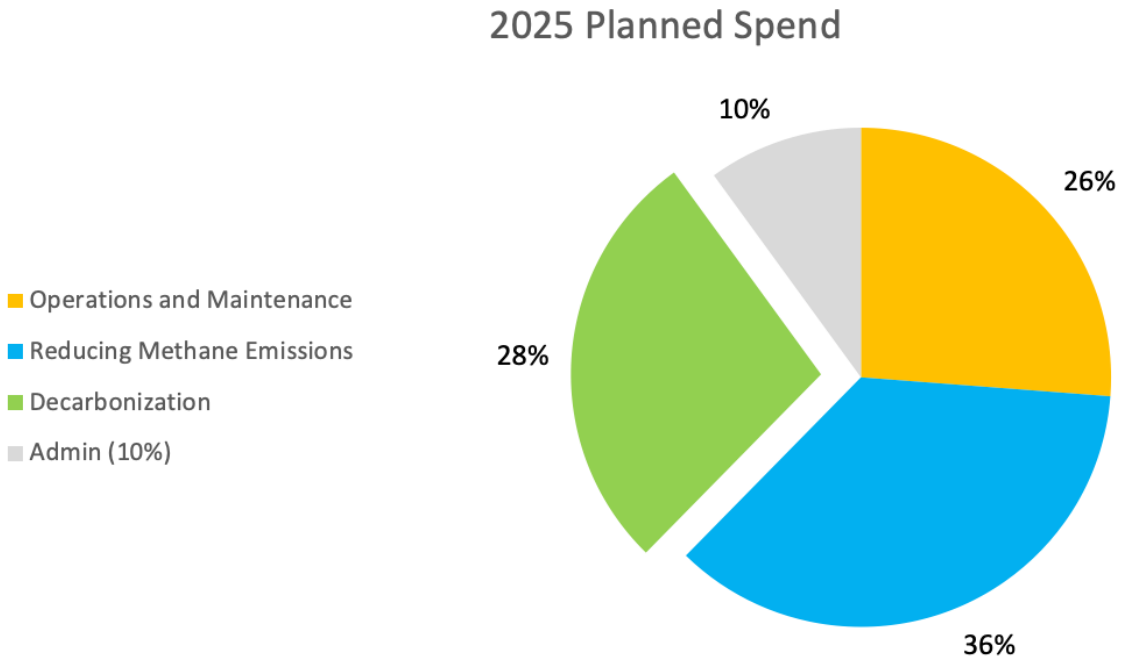
Decarbonizing the Gas System

Benefits

Reliability	34
Safety	23
Equity	1
Operational Efficiency	38
Improved Affordability	12
Reduced GHG Emissions	55
Improved Air Quality	54

Decarbonizing the Gas System

Planned 2025 Spending: ~$2.2M



Integrating Clean Fuels: 25%

- Renewable Natural Gas (RNG) trace constituents
- RNG impact to the existing gas system
- Woody biomass to RNG
- Power-to-methane

Impact of Hydrogen: 75%

- Hydrogen Blending (HyBlend, targeted blending in existing gas network)
- Hydrogen to Infinity (H2 Infinity) R&D Support
- Hydrogen Leak Detection
- Hydrogen Storage
- Hydrogen impact and changes to Integrity Management Programs
- Safe operation and maintenance of hydrogen blended systems
- Hydrogen measurement
- Hydrogen and gas quality, including NOx emissions

Decarbonizing the Gas System

POLL

What new technology developments related to decarbonization excite you?

Decarbonizing the Gas System

QUESTIONS

General Questions

General

Now that you know more about the types of projects we support, how do you see these positively impacting ESJ? How could we measure success in this area?

General

QUESTIONS

Thank You

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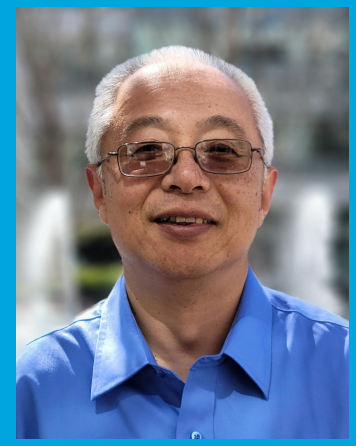

David Xu
Gas Engineer
Gas R&D
PG&E

Submitting follow-up questions

Please email any additional questions or comments about PG&E's Gas R&D program by Friday, May 10, 2024, to innovation@pge.com.

To view a recording of this workshop and other related materials, please visit pge.com/innovation.