Pacific Gas & Electric Company Gas Research, Development, and Demonstration

2025 Public Workshop

April 15, 2025

Safety Orientation

Everyone and everything is always safe

Psychological Safety

- Practice transparency and vulnerability
- Avoid blame; learn from mistakes
- Show care and appreciation
- Invite new ideas from all
- Disagree respectfully and with curiosity
- Prioritize mental health by encouraging self-care

Fire

- Exits, escape routes, evacuation
- Fire ext.

Earthquake

- Drop, cover, hold

Medical Emergency

- 911/share location
- First aid/CPR
- AED

Security:

Active shooter—get out, hide out, take out, call out

- Maintain situational awareness to mitigate hazards

Ergonomics

- Use proper ergo
- 30/30: move 30 secs every 30 min

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 Tuesday, April 29, 2025.

Agenda

Start Time	Duration	Topic
9:00	5 minutes	Introduction
9:05	10 minutes	PG&E Gas RD&D
9:15	30 minutes	2024 in Review
9:45	10 minutes	Project Selection Process
9:55	5 minutes	Q&A
10:00	5 minutes	BREAK
10:05	10 minutes	Proposed 2025 Plan
10:15	30 minutes	Gas System Integrity—Integrity Management (includes 10 minutes Q&A)
10:45	5 minutes	BREAK
10:50	30 minutes	Gas System Integrity—Emissions (includes 10 minutes Q&A)
11:20	30 minutes	Decarbonization (includes 10 minutes Q&A)
11:50	10 minutes	General Q&A
12:00	N/A	Close

Presenters

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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

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

- 28,000 coworkers who live and work in the communities we serve.
- Total 2024 procurement spend of approximately $4.1B in goods and services with diverse-certified suppliers.
- 50,000+ miles of combined transmission and distribution pipeline.
- Approximately 4.6 million customer accounts.

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:

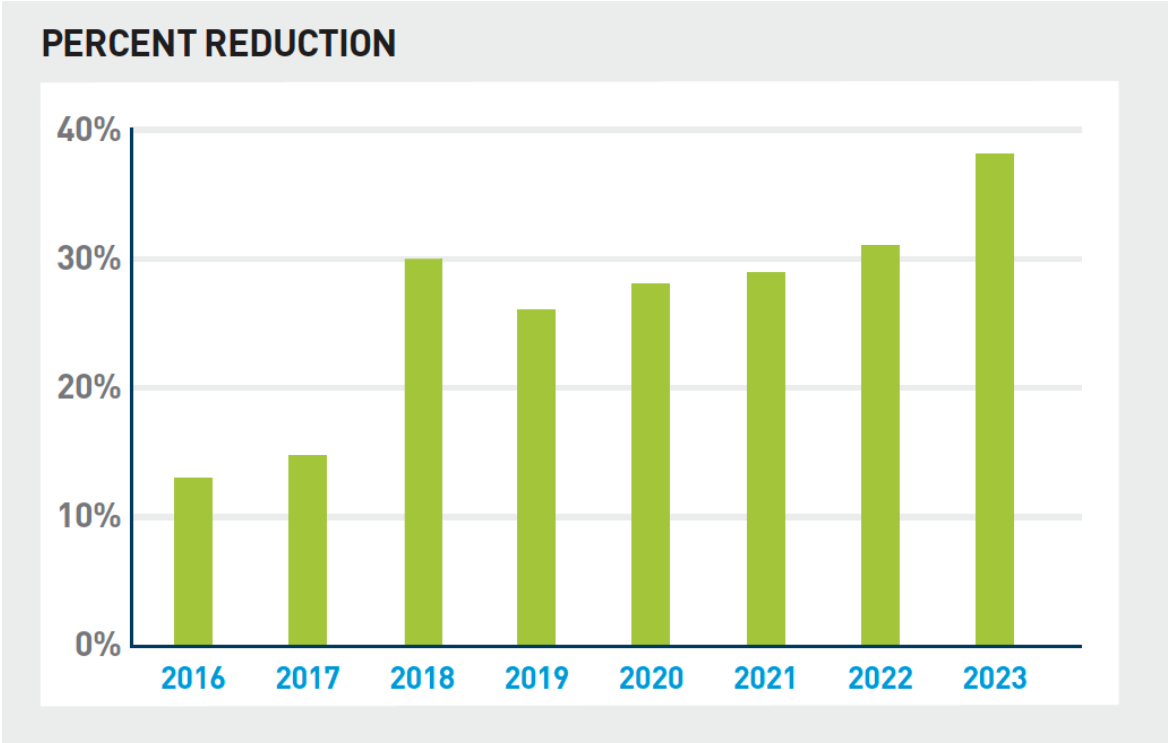
- Renewable Natural Gas (RNG)
- Clean, renewable hydrogen
- Synthetic gas (syn-gas)

PG&E

Significant progress

At the end of reporting year 2023, PG&E had achieved 38% emissions reductions in comparison to those in 2015, the baseline year.

Between 2021 and 2023, PG&E began accepting RNG from 36 dairies across its service territory via seven interconnections with its gas infrastructure. By 2024, that number had grown to 48.



PG&E Gas RD&D

PG&E Gas RD&D

Bridging the gap

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

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

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

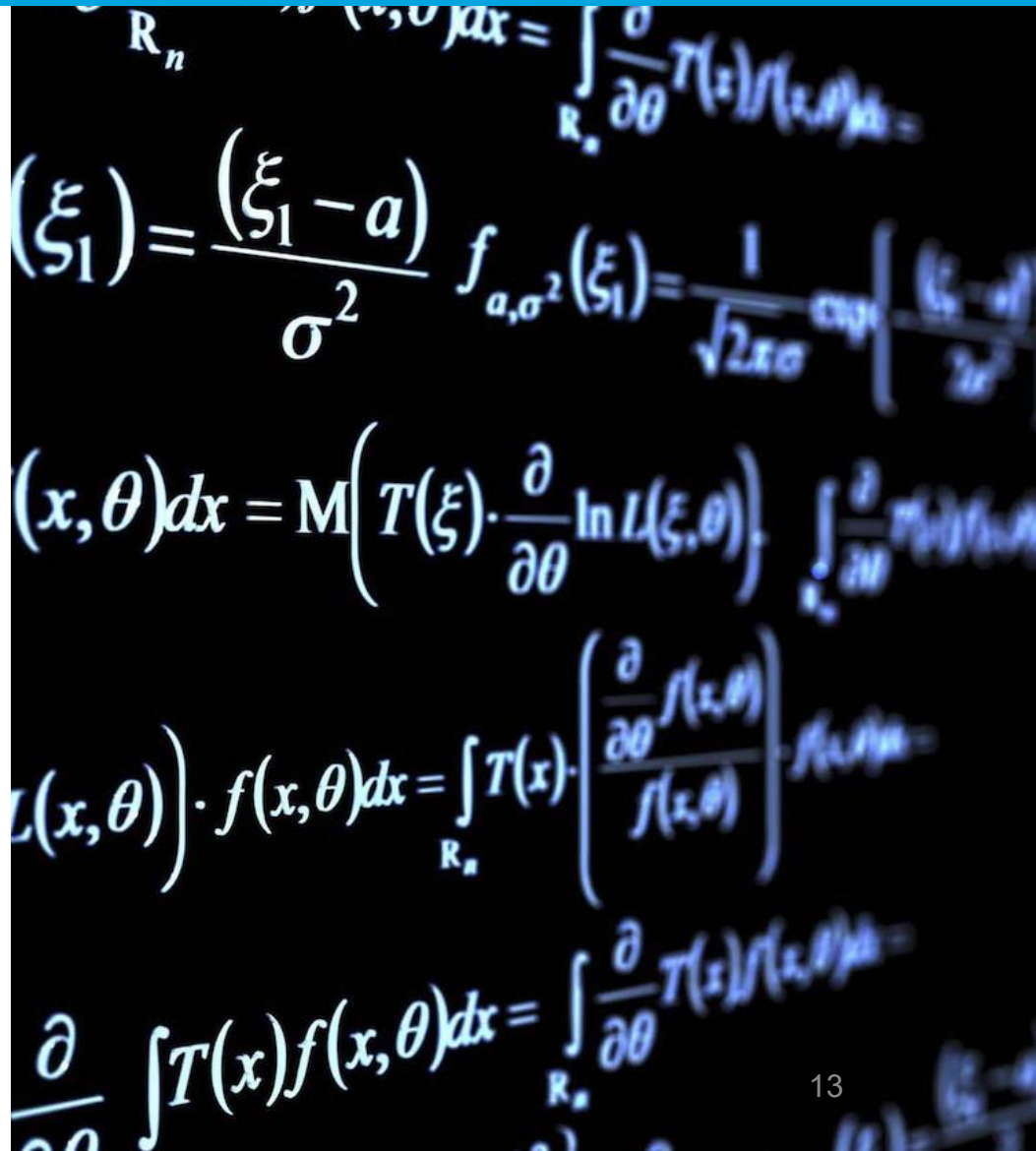
PG&E Gas RD&D

PG&E's Gas RD&D Team

- **Gas System Integrity:** Supports RD&D activities aimed at geohazard risk management, compliance with new regulations, storage wells, methane emission reduction activities and reporting, revised emission calculation methodologies, and methane leak detection and repair.

- **Decarbonization:** Supports RD&D activities that develop or advance technologies that, if deployed widely, would decarbonize the gas system. Investment initiatives include networked geothermal, the impact of hydrogen, energy efficiency, and integrating cleaner fuels.

Feedback can be sent to innovation@pge.com
To learn more about our program visit us at pge.com/innovation



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

2024 in Review

Results of the 2024 RD&D Program

Summary of Active and Completed Projects

Portfolio Category	Active during 2024	Initiated in 2024	Completed in 2024
Gas System Integrity	98	21	33
Decarbonization	81	19	21
TOTAL	179	40	54

Financial Highlights

2024 Funds Expended

In 2024, PG&E's Gas RD&D team provided time, resources, and funding to 179 projects across two research themes. The team also spent funds on management and administration.

Funding Category	2024 Actuals
Gas System Integrity	$773,662
Decarbonization	$191,696
Subtotal	**$965,359**
Management & Administration	$898,280
TOTAL	**$1,863,639**

Financial Highlights

2024 Funds Expended

Per guidance from the CPUC and to increase transparency, Gas RD&D staff further tracked $898,280 across 12 spending categories.

Activities Category	Activity Totals
Administrative Activities	$194,826
Intellectual Property Coordination	$0
Internal Management Coordination	$1,011
Investment Plan Development	$115,375
Post-Initiation Vendor Sourcing	$18,840
Program and Process Coordination Improvements	$3,032
Project Initiation	$3,609
Project Oversight & Governance	$78,400
Project Planning	$46,031
Regulatory Support and Compliance	$278,651
Stakeholder Comms Engage Outreach	$107,254
Tech Implementation & Knowledge Transfer	$51,251
GRAND TOTAL	**$898,280**

Financial Highlights

2024 Leveraged Funding

	2024 Actual Spend	Total PG&E Budget	Co-Funding	Total Value of Projects	Leverage Ratio
Gas System Integrity	$773,662	$3,878,583	$35,447,924	$161,181,815	9
Decarbonization	$191,696	$3,141,536	$118,713,772	$121,855,308	38
TOTAL	$965,359	$7,020,119	$154,161,696	$161,181,815	22

Co-Funders Included:

California Energy Commission

U.S. Department of Energy

National Science Foundation

Pipeline and Hazardous Materials Safety Administration

Emerging Fuels Institute

Operations Technology Deployment

Utilization Technology Deployment

NYSEARCH

GTI Energy

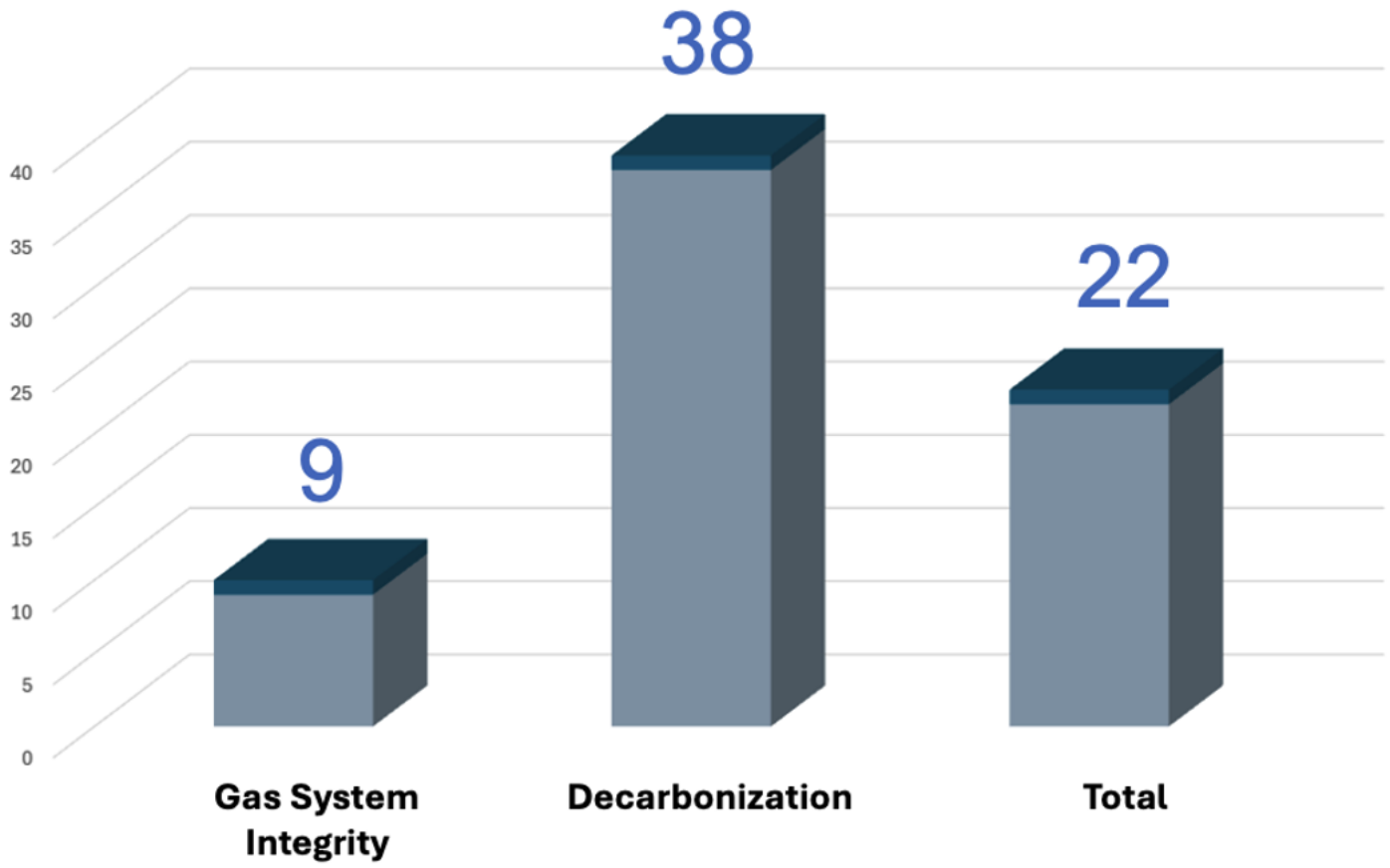
Methane Emissions Technology Evaluation Center

Pipeline Research Council International

Financial Highlights

2024 Leveraged Funding

On average, every dollar committed by PG&E's Gas RD&D program was matched by $22 in funds committed by research consortia, public agencies, and private organizations.



Financial Highlights

2024 Public Funding Awards

In 2024, projects supported by PG&E's Gas RD&D program had received commitments of **$70,137,396** from state and federal public agencies, including:

- California Energy Commission (CEC)
- Pipeline Hazardous Materials Safety Administration (PHMSA)
- National Science Foundation (NSF)
- Department of Energy
  - National Energy Technology Laboratory (NETL)
  - National Renewable Energy Laboratory (NREL)
  - Advanced Research Projects Agency, Energy (ARPA-E)

Lead Investigator	Research Theme	PG&E Funding Committed	Funding Awarded	Agency
UTD	Decarbonization	$120,000	$404,000	DOE
UTD	Decarbonization	$70,000	$1,400,000	CEC
UTD	Decarbonization	$144,712	$1,400,000	CEC
UTD	Decarbonization	$153,200	$100,000	DOE
UTD	Decarbonization	$29,167	$2,599,733	DOE
UTD	Decarbonization	$8,333	$300,000	DOE
UTD	Decarbonization	$58,000	$2,200,000	DOE
UTD	Decarbonization	$50,000	$2,000,000	CEC
UTD, CEC	Decarbonization	$71,123	$2,735,000	CEC
UTD	Decarbonization	$37,500	$3,800,000	DOE
UTD	Decarbonization	$37,500	$4,000,000	DOE
UTD	Decarbonization	$42,691	$3,300,000	DOE
UTD	Decarbonization	$87,000	$5,500,000	CEC
OTD	Gas System Integrity	$350,000	$1,000,000	PHMSA
OTD	Gas System Integrity	$7,000	$1,056,000	CEC
OTD, HyBlend	Decarbonization	$150,000	$10,000,000	DOE
OTD	Gas System Integrity	$0	$383,725	PHMSA
OTD	Decarbonization	$50,000	$1,700,000	DOE
OTD	Gas System Integrity	$129,060	$1,500,000	DOE
OTD	Gas System Integrity	$12,554	$1,821,631	CEC
OTD	Gas System Integrity	$45,000	$1,738,436	CEC
Brimstone	Decarbonization	$25,000	$500,000	DOE
GTI Energy	Decarbonization	$0	$3,999,971	CEC
CEC	Decarbonization	$50,000	$1,770,000	CEC
CEC	Decarbonization	$0	$5,658,000	CEC
GTI Energy	Decarbonization	$37,500	$800,000	DOE
Scripps	Gas System Integrity	$0	$1,363,550	CEC
CEC	Gas System Integrity	$440,000	$1,500,000	CEC
PHMSA	Decarbonization	$0	$1,241,000	PHMSA
NYSEARCH	Gas System Integrity	$49,610	$427,052	PHMSA
UC Berkeley, LBNL	Decarbonization	$0	$1,500,000	NSF
Eagle Rock Analytics	Gas System Integrity	$0	$1,000,704	CEC
PHMSA, PRCI	Gas System Integrity	$85,200	$788,594	PHMSA
	TOTAL	$ 2,340,157	$ 70,137,396	--

Financial Highlights

2024 Research Consortia

Research consortia led 159 of the 179 projects in PG&E's Gas RD&D portfolio.

For those projects supported by OTD and UTD, PG&E did not provide direct funding. Instead, PG&E paid annual dues and then determined how these dues were allocated across projects.

For projects led by the other consortia and R&D groups, PG&E paid annual dues and/or paid additional funding in support of specific projects.

Funding Category	2024 Dues
Colorado State University-METEC	$10,000
NYSEARCH Membership	$76,500
OTD Membership	$751,864
PRCI Membership	$161,316
PRCI Emerging Fuels Institute	$100,000
UTD Membership	$350,000
TOTAL	**$1,449,680**

Financial Highlights

2024 Funding Recipients

- Acuren
- Ballard Marine Construction
- BLV Tech
- Brimstone
- California Energy Commission
- Campos Engineering
- DNV
- Eagle Rock Analytics, Inc.
- EMPIT
- G4 Insights Inc.
- GTI Energy
- HyBlend
- Jomar Valve
- Lawrence Berkeley National Laboratory
- NYSEARCH
- OTD
- Paulsson, Inc.
- Pipeline and Hazardous Materials Safety Administration
- Pipeline Research Council International
- QLM Technology Ltd.
- ROSEN Group
- SENSIT Technologies
- Scripps Research Institute
- University of California, Berkeley
- University of California, Riverside
- UTD
- White River Technologies

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. Some of the ways we do this include:

- **Siting Projects in ESJ Communities:** Engages communities as advisors, builds capacity, educates, supports workforce development.
- **Working with Minority-Serving Institutions:** Expands the scientific talent pipeline, builds trust in ESJ communities, speeds up technology validation.
- **Supporting Technology that Benefits ESJ Communities:** Addresses the environmental, health, and economic burdens faced by ESJs.

32 **RD&D projects in ESJ communities**

received support from PG&E in 2024

$275,119 **Spent on projects**

located in Environmental and Social Justice Communities.

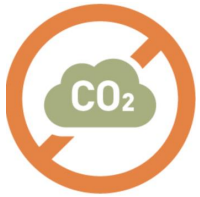
Equity

Diversity. Equity. Inclusion. Belonging.

Gas System Integrity

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

- 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

PG&E is very interested in environmental and social justice (ESJ) as it relates to our research. Can you recommend how we can best support and engage with people and community-based organizations in these communities?

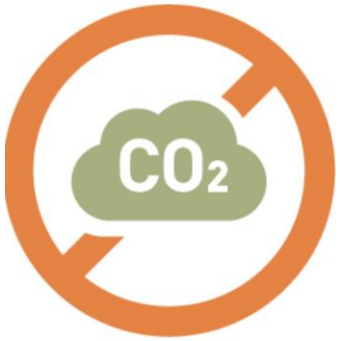
Project Selection Process

Project Selection Process

Identifying critical technology gaps

PG&E's 2024 R&D Strategy Report detailed 67 problem statements, including 28 related directly to gas RD&D. In 2024, Gas RD&D staff explored answers to these problems across two broad investment themes.

Gas System Integrity



Decarbonization

Project Selection Process

Problem Statements

The 2024 R&D Strategy Report includes 28 problem statements directly related to gas RD&D, as well as an additional six related to the role of RNG and clean hydrogen in net-zero energy systems.

In 2024, Gas RD&D staff explored answers to these problems across two broad investment themes.

Gas System Integrity Problem Statements

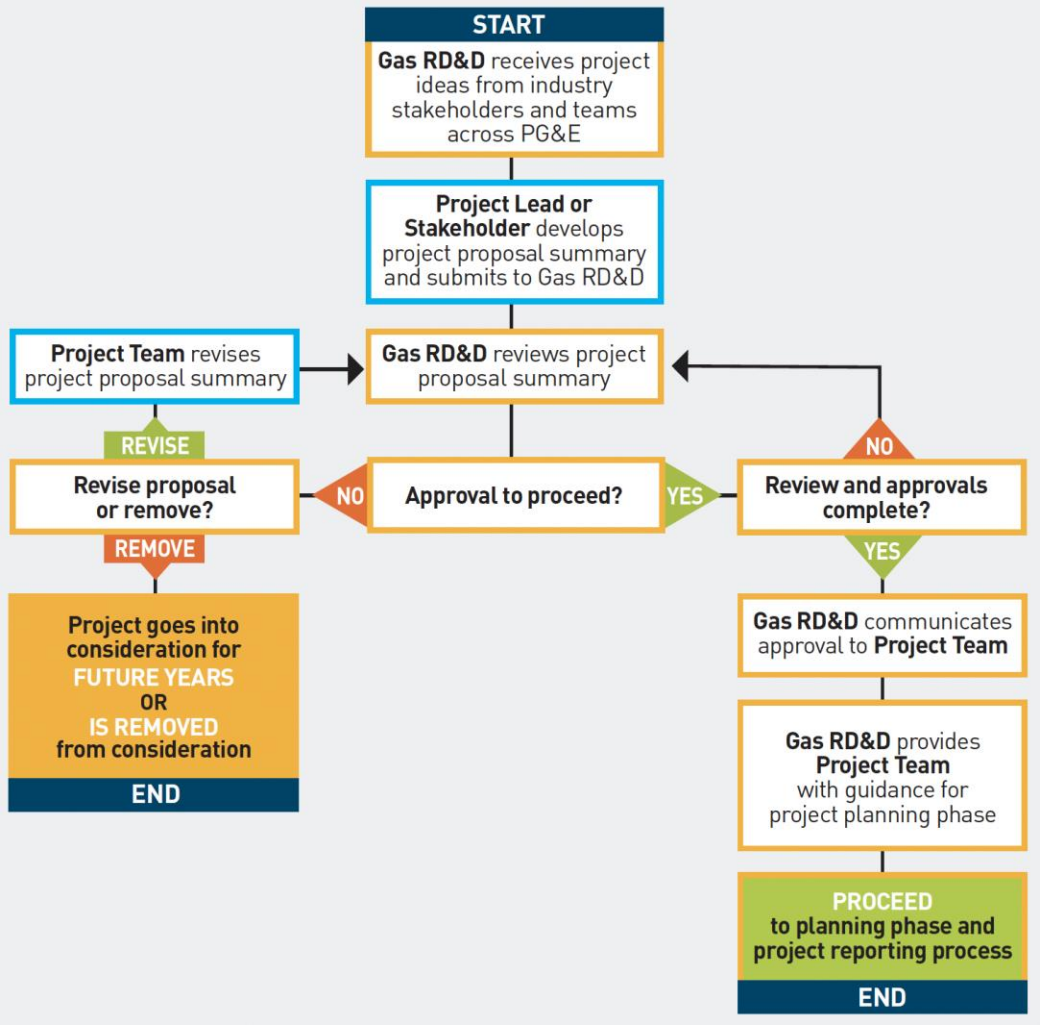
- Improving Pipeline Crack Assessment Technologies
- Verifying Material Properties for Existing Pipeline Cost-effectively
- Reducing Cost of Well Inspection and Monitoring
- Enabling Corrosion Inspections for Difficult to Access Spans
- Streamlining Aboveground Leak Repairs
- Reducing the Cost of T&D Leak Detection
- Reducing False Positives on Leak Detection Surveys
- Enabling Remote Meter Set Corrosion Inspections
- Improving Accuracy of Well Life Estimations
- Increasing Accuracy of Geohazard Risk Assessment and Monitoring
- Improving Pipeline Locating Technologies
- Reducing Cost of Pipeline Integrity Inspection and Monitoring
- Enhancing Scalability of Aboveground Leak Detection and Monitoring
- Improving Emissions Calculation Methodologies
- Eliminating Methane Emissions from Transmission Pipeline Blowdowns

Decarbonization Problem Statements

- Understanding Risks and Impacts from Trace RNG Chemicals
- Increasing Availability of Operational Data for Hydrogen Effects on Gas System
- Mitigating Hydrogen Embrittlement at Scale
- Understanding Safety Risks of Hydrogen Blend Leaks
- Improving Metering Accuracy with Hydrogen Mixtures
- Ensuring Compatibility of Customer Applications with Mixed Gas
- Reducing Uncertainty of Storage Facility Performance for Hydrogen Blends
- Eliminating Gas Appliance Combustion Emissions
- Facilitating Cost-effective and Safe Deblending
- Enhancing Gas Quality Analysis
- Reducing Costs of Interconnection Skids
- Identifying Cost-effective and Scalable Sources for RNG Production
- Eliminating 100% of Carbon Emissions Cost-Effectively

Project Selection Process

These problem statements serve as the framework that Gas RD&D staff use when identifying potential projects to support, evaluating them, and making final selections.



General

QUESTIONS

General

5 MINUTE BREAK


Proposed 2025 Plan

Changes to RD&D

In 2024, Gas RD&D was organized into three investment themes and eight research initiatives.

2024	
Investment Themes	**Investment Initiatives**
Operations & Maintenance	Geohazard Risk Management
	Compliance with New Regulations
	Storage Wells
Reducing Methane Emissions	Revised Emissions Calculations Methodologies
	Meter Set Leak Repair
	Transmission and Distribution Leak Detection
Decarbonizing the Gas System	Integrating Cleaner Fuels
	The Impact of Hydrogen

In 2025, per guidance from the CPUC, Gas RD&D reorganized itself into two investment themes and 10 research initiatives.

2025	
Investment Themes	**Investment Initiatives**
Gas System Integrity	Geohazard Risk Management
	Compliance with New Regulations
	Storage Wells
	Revised Emissions Calculations Methodologies
	Efficient Methane Leak Repair
	Advanced Methane Leak Detection
Decarbonization	The Impact of Hydrogen
	Integrating Cleaner Fuels
	Energy Efficiency
	Networked Geothermal

Estimated 2025 Plan Spending

2025 Plan Spending

Theme	2024 Plan	2025 Plan*
Gas System Integrity	$4,794,740	$5,091,348
Decarbonization	$2,191,660	$2,291,965
Gas RD&D Database Development	$0	$56,987
Program Evaluation	$296,400	$0
Administration	$809,200	$826,700
TOTAL	$8,092,000	$8,267,000

* The 2025 plan is for work and funds that will be used in calendar year 2026.

Outreach & Engagement

Engagement and Budget Requirements

Engagement with Stakeholders	Engagement with Gas RD&D Administrators	Administrative Budget
Gas RD&D conducted engagement with stakeholders from 10 leading organizations for the 2025 plan: • California Energy Commission • California Public Utilities Commission, Energy Division • Lawrence Livermore National Laboratory • Pipeline Research Council International • SoCalGas RD&D • University of California, Irvine	Gas RD&D staff: • Conducted stakeholder interviews or discussions with individuals from other Gas RD&D programs at IOUs and the CEC. • Participated in bi-weekly meetings with administrators from other Gas RD&D programs at IOUs and the CEC. • Presented to other RD&D Administrators on March 5, 2025, *Geohazard and Compliance with New Regulation* to ensure research is complementary and not duplicative.	2024 was the first year we tracked our administrative activities using the EPIC Administrative Budget Template (Slide 18). We anticipate similar distributions for 2025.

Integrating Stakeholder Input

Key stakeholder-identified knowledge gaps and research priorities

- **Real-time monitoring** of pipelines and infrastructure would be valuable, as would computational tools that could use the data to help make decisions in real time.
- **AI and machine learning** for data interpretation and decision-making.
- **Transparency** and open sharing of information and data is “very appreciated.”
- **Hydrogen leak detection** and blending/deblending of hydrogen in pipelines are critical knowledge gaps.
- Need to bridge gap between high-level **techno-economic analysis** and actual **energy transition dynamics**.
- Need better technologies for **monitoring and inspecting storage wells** and **geohazard risk management**.
- Potential of **hydrogen in industrial applications** and need for clear methodology for evaluating its climate benefit.
- Need to include **community-based organizations** (CBOs) in project teams and budgets.
- RD&D technologies need clear **pathways to commercialization**.
- Integrity issues with **hydrogen in vintage pipelines** and the need for research on **hydrogen embrittlement**.
- Challenges of **crack detection in hydrogen pipelines** and the need for better smart pigging technology.
- **Linear generators**.

Investment Theme I: Gas System Integrity

Presenters

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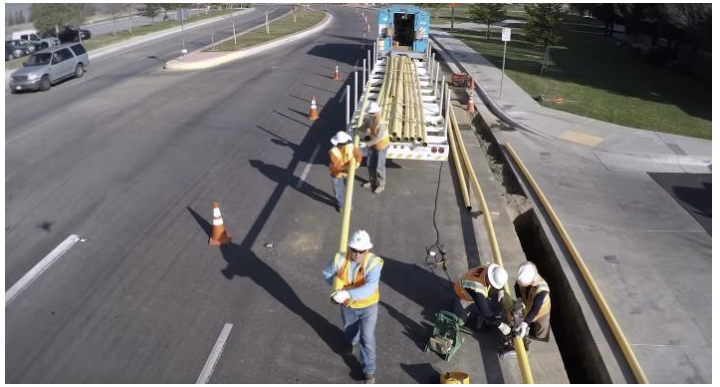
Gas System Integrity

Summary & Goals

Projects in the Gas System Integrity investment theme seek to develop or advance technologies that, if deployed widely, could **improve gas system integrity** and **reduce methane emissions**.

Projects in this investment theme seek solutions that could help **automate**, **optimize**, and **improve existing processes** based on a more comprehensive and real-time understanding of conditions across the system. If deployed widely, these technologies—including AI—could proactively address emerging challenges and efficiently direct resources based on risk level or other factors. Potential benefits include:

- Reduced need for systemwide inspections
- Increase the safety and reliability of PG&E's existing gas system
- Reducing emissions
- Lowering unitized costs of work and improving affordability for all ratepayers



Gas System Integrity

Gas System Integrity Budget Breakdown

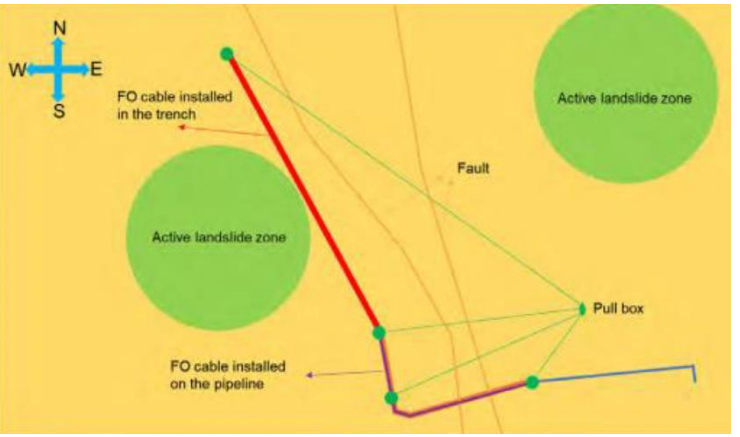
INITIATIVE	2024 BUDGET	2025 BUDGET
Geohazard Risk Management	$594,126	$639,127
Compliance with New Regulations	$1,330,498	$1,391,424
Storage Wells	$68,146	$101,772
Advanced Methane Leak Detection	$1,419,510	$1,482,361
Revised Emission Calculation Methodologies	$982,542	$1,035,943
Efficient Methane Leak Repair	$399,918	$440,719
TOTAL	**$4,794,740**	**$5,091,348**

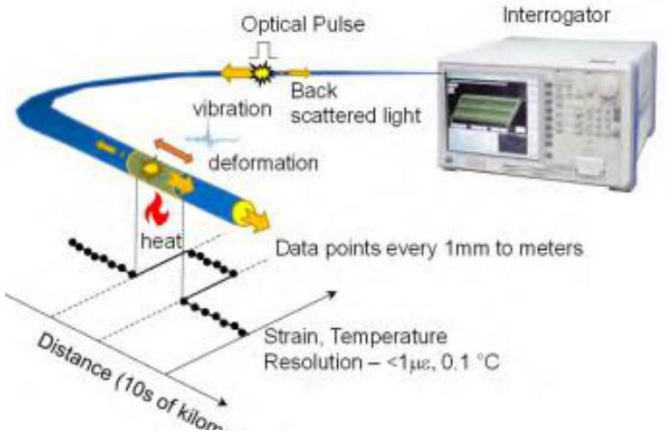
Gas System Integrity

Geohazard Risk Management

These projects support RD&D efforts to maintain and increase the safety and reliability of the gas system while reducing costs and improving affordability for all customers, including those from ESJ communities.

This is particularly important as gas throughput is expected to decline due to the transition toward non-fossil clean energy in the future.





Gas System Integrity

Geohazard Risk Management

CHALLENGE

The industry's current ability to understand, predict, and model changing risk levels is insufficient for proactive identification of emerging geohazards.

Assessments are conducted by costly inline inspection with limited capability or more costly digging to expose the pipe and conduct assessments.

SOLUTION

- Provide better ongoing, non-intrusive or less-intrusive options, and/or less-frequent but more-capable inline inspection to increase visibility into the integrity of assets subject to increasing geohazard risks.
- Enhance understanding of how developing geohazards may impact PG&E assets, including the ability to more accurately model these impacts
- Increase the ability to optimize the deployment of geohazard monitoring resources; and reduce O&M costs.

Gas System Integrity

Geohazard Risk Management

Affordability	Anticipated Ratepayer Benefit	Ratepayer Fund Justification	CPUC Policies and Proceedings
Avoid costly digging while gaining better insight into the integrity of assets subject to enhanced geohazard risk. More accurately model the impact of developing geohazards.	• Equity • Safety • Reliability	Loss of containment from natural gas infrastructure is listed as one of the top 12 safety risks in PG&E's RAMP Report. Earthquakes and land movements are identified as risks requiring mitigation.	R.13-11-006's Risk-Based Decision-Making Framework General Order No. 112-F R.20-01-007 R.24-09-012 D.20-01-0022

Gas System Integrity

Geohazard Risk Management

Quantifiable Benefits

Cost Savings: Reduction in maintenance and repair costs due to proactive geohazard mitigation.

Improved Reliability: Decrease in number of service interruptions caused by geohazard events.

Enhanced Safety: Reduction in number of incidents and accidents related to geohazards.

Non-quantifiable Benefits

Improved Customer Satisfaction: Enhanced reliability and safety of gas infrastructure can lead to higher customer satisfaction.

Environmental Benefit: Mitigating geohazards can prevent environmental damage caused by gas leaks and infrastructure failures.

Stakeholder Agreement: Engage with stakeholders, including IOUs, regulatory bodies, and CBOs, to discuss and agree on anticipated benefits.

Gas System Integrity

Compliance with New Regulations

The planned projects focus on innovative, cost-effective gas asset inspection and monitoring solutions, efficient risk assessment, and mitigation and maintenance practices.

The resulting savings can be passed on to all customers, including ESJ communities, lowering their energy bills and improving affordability.

Gas System Integrity

Compliance with New Regulations

CHALLENGE

Per the Federal PHMSA New Mega Rule requirements, PG&E needs to expand the scope of many existing inspection and monitoring processes and deploy entirely new processes across many of our assets.

This drives increasing O&M costs, resulting in significant impact on affordability.

SOLUTION

- Maintain or improve gas system safety and reliability to meet compliance requirements.
- Proactively reduce costs and improve affordability, which is particularly important as gas throughput is expected to decline due to the transition toward non-fossil clean energy in the future.

Gas System Integrity

Compliance with New Regulations

Affordability	Anticipated Ratepayer Benefit	Ratepayer Fund Justification	CPUC Policies and Proceedings
Federal PHMSA Mega Rule requires PG&E to expand scope of many existing inspection and monitoring processes and deploy entirely new processes across many of our assets. Developing innovative, cost-effective inspection and monitoring solutions and efficient mitigation and maintenance practices can reduce OPEX costs.	• Equity • Safety • Reliability • Improved Air Quality • Reduced GHG Emissions	Increased requirements of PHMSA Mega Rule are creating upward pressures on rates for customers, disproportionally impacting disadvantaged communities. This initiative focuses on cost-effective gas asset inspection, monitoring and mitigation to enhance safety and reliability, reduce costs, and support GHG emission reduction.	R.13-11-00G General Order No. 112-F R.20-01-007 R.24-09-012 D.20-01-0022

Gas System Integrity

Compliance with New Regulations

Quantifiable Benefits

Cost Savings: Reduction in maintenance and repair costs due to proactive compliance with new regulations.

Improved Reliability: Decrease in number of service interruptions caused by pipeline issues.

Enhanced Safety: Reduction in number of incidents and accidents related to pipeline operations.

Operational Efficiency: Increase in the efficiency of pipeline operations, measured by reduced downtime and improved performance metrics.

Regulatory Compliance: Number of compliance issues resolved and adherence to regulatory standards.

Non-quantifiable Benefits

Improved Customer Satisfaction: Enhanced reliability and safety of pipeline operations can lead to higher customer satisfaction.

Environmental Benefit: Effective compliance with new regulations can prevent environmental damage caused by gas leaks and infrastructure failures.

Stakeholder Agreement: Engage with stakeholders, including IOUs, regulatory bodies, and CBOs, to discuss and agree on anticipated benefits.

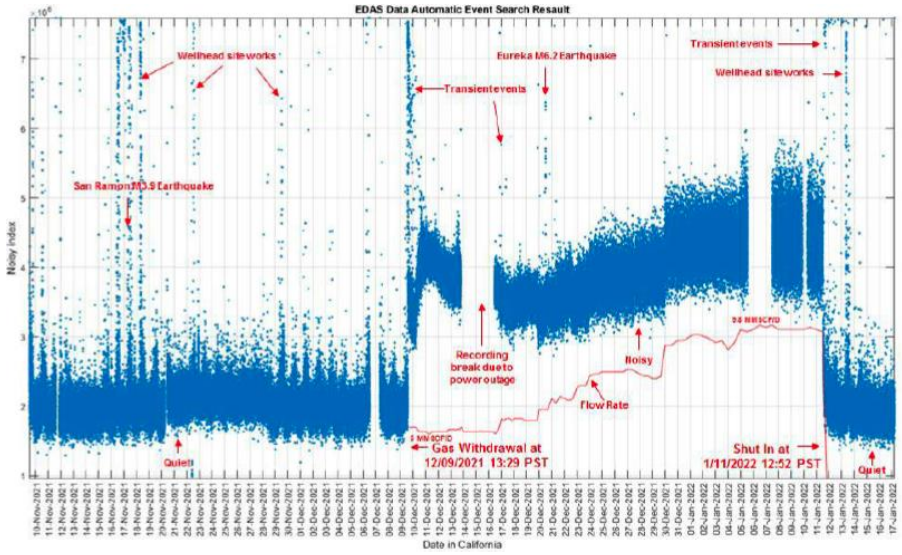
Regulatory Justification: Demonstrate the necessity and benefits of using ratepayer funds for compliance projects by providing detailed cost-benefit analyses and risk assessments.

Gas System Integrity

Storage Wells

These projects seek continuous development of technoeconomic fiber optic sensor monitoring solutions focusing on AI/ML field data analytics and transmission toward commercial deployment.

By optimizing O&M via continuous monitoring of well integrity, the resulting savings can be passed on to all customers, ESJ communities, lowering their energy bills and improving affordability.



Continuous real-time monitoring of well integrity using distributed fiber optic acoustic sensing.

Gas System Integrity

Storage Wells

CHALLENGE

Per CalGEM and PHMSA Regulations on underground storage well integrity inspection and testing, current practices rely on periodic high-resolution, in-line technologies that are intrusive and may cause damage or introduce additional risk from frequent rig intervention activities.

This can result in very costly inspections—up to $3 million per well for in-line methods.

SOLUTION

- Maintain and increase the safety and reliability of underground gas storage wells integrity.
- Reduce costs and improve affordability for all customers—including those from ESJ communities.

Gas System Integrity

Storage Wells

Affordability	Anticipated Ratepayer Benefit	Ratepayer Fund Justification	CPUC Policies and Proceedings
High resolution in-line technologies are incredibly costly. The current process requires that operations be shut down and tubing pulled out to complete the inspection. Gas RD&D seeks to reduce the installation and real-time monitoring costs of continuous monitoring solutions, while ensuring high quality, ongoing data transmission.	• Equity Safety • Reliability • Improved Air Quality • Reduced GHG Emissions	Loss of containment from natural gas infrastructure is listed as one of the top 12 safety risks in PG&E's RAMP Report. Earthquakes and land movements are identified as risks requiring mitigation.	R.13-11-00G General Order No. 167 R.20-01-007 R.24-09-012

Gas System Integrity

Storage Wells

Quantifiable Benefits

Cost Savings: Reduction in maintenance and repair costs due to proactive storage well management.

Improved Reliability: Decrease in number of service interruptions caused by well issues.

Enhanced Safety: Reduction in number of incidents and accidents related to well operations.

Operational Efficiency: Increase in the efficiency of well operations, measured by reduced downtime and improved performance metrics.

Regulatory Compliance: Number of compliance issues resolved and adherence to regulatory standards.

Non-quantifiable Benefits

Improved Customer Satisfaction: Enhanced reliability and safety of storage wells can lead to higher customer satisfaction.

Environmental Benefit: Effective management of storage wells can prevent environmental damage caused by gas leaks and infrastructure failures.

Stakeholder Agreement: Engage with stakeholders, including IOUs, regulatory bodies, and CBOs, to discuss and agree on anticipated benefits.

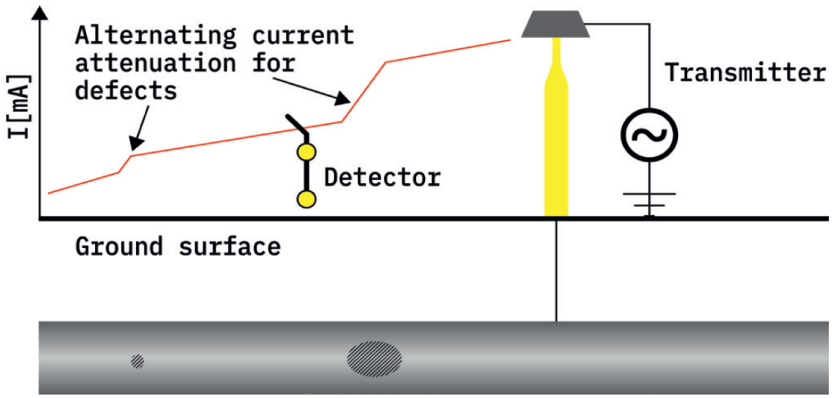
Regulatory Justification: Demonstrate the necessity and benefits of using ratepayer funds for storage well projects by providing detailed cost-benefit analyses and risk assessments.

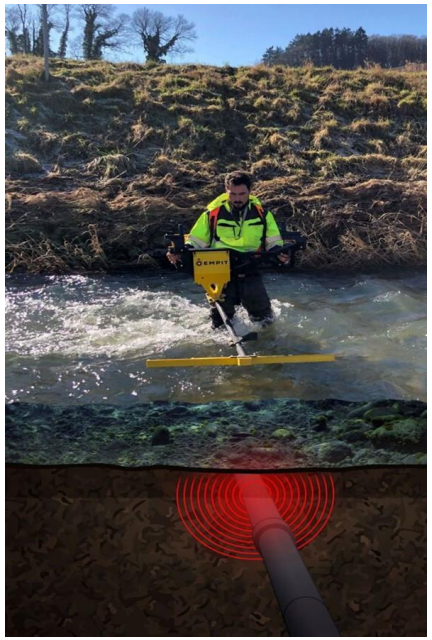
Gas System Integrity

2024 in Review—Case Study

Current Magnetometry Inspection (CMI) Technology for Pipeline 3D Mapping

- Non-intrusive, active CMI technology capable of 3D mapping.
- Localizes and categorizes metal losses based on above-ground measurements of the magnetic field of the buried pipeline and the associated magnetic field changes associated with metal loss.
- Enhances accuracy, efficiency, and reliability of pipeline geolocating under challenging scenarios.
- Complements pipeline corrosion inspection and frequent monitoring at a fraction of the inline inspection cost.
- Ensuring safer operations and minimizes environmental risks at significant O&M cost reduction.

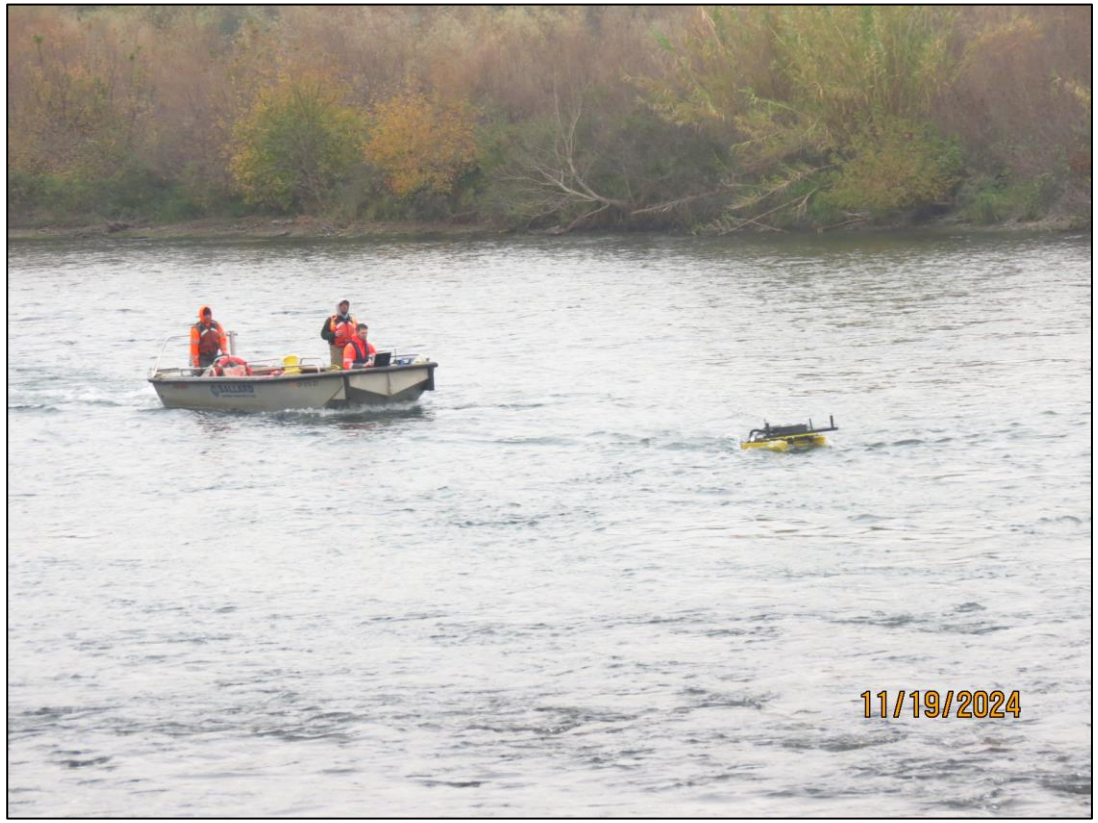




Gas System Integrity

2024 in Review—Case Study

- Field Sites: Sacramento River Crossing (2024-2025); SF Bay Area Onshore (2025)
- Cost saving 10x+ in comparison to NT ILI or the current ECDA practice
- Autonomous boat survey at Sacramento River (2024-2025): the unpiggable pipeline exposed at the river bottom (inquiry from California Land Commissions)
- Hand-carry tool survey in SF Bay Area: 2 pipelines subject to DC Interference by BART
- To lead an evaluation study at PRCI TDC test bed in 2025, funded by 14 operator members globally



Non-intrusive survey of pipeline integrity at a Sacramento River Crossing Site

Gas System Integrity

QUESTIONS


Five-Minute
Break

Gas System Integrity

Revised Emissions Calculation Methodologies

These projects seek to meet regulatory emissions-related goals by collecting necessary data to encourage an adjustment in emissions reporting framework.

Gas System Integrity

Revised Emissions Calculation Methodologies

CHALLENGE

Although PG&E has made great progress in reducing emissions with respect to the Natural Gas Leak Abatement Program, there are still current limitations on reaching both internal and regulatory emission reduction goals.

Figures for Transmission Metering and Regulating station emissions are not based on actual recorded emissions but instead on station level population-based emission factors.

While efficient, this approach doesn't provide accurate emissions estimates and does not allow PG&E to demonstrate emissions reduction efforts.

SOLUTION

- Perform R&D to collect the necessary data needed to adjust the current emissions reporting framework.

Gas System Integrity

Revised Emissions Calculation Methodologies

Affordability	Anticipated Ratepayer Benefit	Ratepayer Fund Justification	CPUC Policies and Proceedings
Projects in this area help PG&E present accurate emissions data, which can build trust and streamline project approvals.	• Equity • Safety • Reliability • Improved Air Quality • Reduced GHG Emissions	Aligns with the Natural Gas Leak Abatement Program and the Best Practices established by the CPUC to reduce methane emissions from natural gas facilities. Using 2015 emissions levels as a baseline value, the data demonstrated that PG&E achieved a 38% emissions reductions by reporting year (RY) 2023.	D.17-06-015. R.24-09-012 R.15-01-008

Gas System Integrity

Revised Emissions Calculation Methodologies

Quantifiable Benefits

Cost Savings: Reduced maintenance costs due to more accurate emission calculations and targeted repairs.

Improved Reliability: Enhanced system reliability through better emission data and planning.

Non-quantifiable Benefits

Improved Customer Satisfaction: Better service reliability and safety can lead to higher customer satisfaction.

Environmental Benefits: Reduced methane emissions contribute to environmental sustainability.

Stakeholder Agreement: Engage relevant stakeholders to ensure high-level agreement on anticipated outcomes and benefits.

Regulatory Justification: Demonstrate that the project provides significant benefits not available through competitive or regulated markets, justifying the use of ratepayer funds.

Gas System Integrity

Efficient Methane Leak Repair

These projects seek to develop novel technologies that minimize repair times, maintain a high-quality seal that can handle pressure at 60 psi and support subsequent parts replacements and repairs.

Gas System Integrity

Efficient Methane Leak Repair

CHALLENGE

The current meter set leak repair process is time-consuming and increases ergonomic exposure for workers completing the repairs.

SOLUTION

- Develop novel technologies that minimize repair times, reduce the need for follow-up service visits, and maintain a high-quality seal that can handle pressure at 60 psi.
- Shorten meter set repair times and ensure a high-quality seal without breaking down the meter set. This could help reduce emissions and ensure worker safety while completing repairs.

Gas System Integrity

Efficient Methane Leak Repair

Affordability	Anticipated Ratepayer Benefit	Ratepayer Fund Justification	CPUC Policies and Proceedings
Projects in this area promote affordability by seeking to develop technologies that can repair meter set leaks without breaking down the meter set	• Equity • Safety • Reliability • Improved Air Quality • Reduced GHG Emissions	Aligns with PG&E's Natural Gas Leak Abatement Program and the Best Practices established by the CPUC to reduce methane emissions from its natural gas pipeline facilities. Using 2015 emissions levels as a baseline value, the data demonstrated that PG&E had achieved more than 38% emissions reductions by reporting year (RY) 2023.	D.17-06-015 R.24-09-012 R.15-01-008 R.13-11-006 General Order 112-F

Gas System Integrity

Efficient Methane Leak Repair

Quantifiable Benefits

Cost Savings: Efficient leak repair results in less lost gas that utilities cannot bill for, directly lowering costs.

Extended infrastructure lifetime and reduced frequency of expensive infrastructure overhauls.

Improved Reliability: Enhanced system reliability through timely leak repair.

Enhanced Safety: Fewer safety incidents related to methane leaks.

Non-quantifiable Benefits

Improved Customer Satisfaction: Better service reliability and safety can lead to higher customer satisfaction.

Environmental Benefits: Reduced methane emissions contribute to environmental sustainability.

Stakeholder Agreement: Engage relevant stakeholders to ensure high-level agreement on anticipated outcomes and benefits.

Regulatory Justification: Demonstrate that the project provides significant benefits not available through competitive or regulated markets, justifying the use of ratepayer funds.

Gas System Integrity

Advanced Methane Leak Detection

These projects investigate new leak detection technologies as they enter the market including mobile leak detection and aerial leak detection such as drone platforms, helicopters, fixed-wing aircrafts, and satellites.

Other technologies include continuous monitoring options for facilities such as underground storage and station assets.

Gas System Integrity

Advanced Methane Leak Detection

CHALLENGE

The industry evolves quickly and there are constantly new technologies on the market that can quicken leak detection and improve efficiency.

That is why it is important to invest in pilot projects of different types of advanced leak detection technologies.

SOLUTION

- Drive down emissions through advanced leak detection.
- Quicken the survey process, assist in localization, and help quantify emissions.
- Maximize emissions reduction efforts by identifying large emitters and prioritizing them for repair.
- Reduce costs and improve affordability for all customers—including those from ESJ communities.

Gas System Integrity

Advanced Methane Leak Detection

Affordability	Anticipated Ratepayer Benefits	Ratepayer Fund Justification	CPUC Policies and Proceedings
Reduces unaccounted-for and lost gas. Lowers maintenance and emergency response costs. Extends infrastructure lifespan. Helps prioritize infrastructure investments.	• Equity • Reliability • Improved Air Quality • Reduced GHG Emissions	Aligns with PG&E's Natural Gas Leak Abatement Program and the Best Practices established by the CPUC to reduce methane emissions from its natural gas pipeline facilities. Using 2015 emissions levels as a baseline value, the data demonstrated that PG&E had achieved more than 38% emissions reductions by reporting year (RY) 2023.	D.17-06-0151 R.24-09-012 R.15-01-008

Gas System Integrity

Advanced Methane Leak Detection

Quantifiable Benefits

Improved Reliability: Enhanced system reliability through timely leak detection and repair.

Enhanced Safety: Decreased safety incidents related to methane leaks.

Reduce Emissions: Identifying larger emitters so they can be prioritized for repair.

Non-quantifiable Benefits

Improved Customer Satisfaction: Better service reliability and safety can lead to higher customer satisfaction.

Environmental Benefits: Reduced methane emissions contribute to environmental sustainability.

Stakeholder Agreement: Engage relevant stakeholders to ensure high-level agreement on anticipated outcomes and benefits.

Regulatory Justification: Demonstrate that the project provides significant benefits not available through competitive or regulated markets, justifying the use of ratepayer funds.

Gas System Integrity

2024 in Review—Case Study

Monitoring Emissions at Transmission M&R Stations Using QLM Gas Sensing LiDAR

In 2024, PG&E completed an internal pilot project in conjunction with QLM Technology Ltd.

- QLM LiDAR-based camera was used to continuously monitor emissions from 10 intermittent-bleed transmission M&R stations for 24-hour periods.
- Continuous monitoring is necessary to accurately estimate emissions since emissions are often intermittent within station assets
- The data from this study can now be used to support a emissions reporting framework adjustment
- If the reporting framework adjustment is accepted, it will help California operators demonstrate abatement efforts through strategies that have been put in place to mitigate emissions

Gas System Integrity

POLL

What types of benefits should we be seeking in the Gas System Integrity projects we support?

Gas System Integrity

QUESTIONS

Investment Theme II: Decarbonization

Presenters

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Decarbonization

Summary & Goals

Projects in this theme focus on transitioning to cleaner energy sources, enhancing energy efficiency, and integrating innovative technologies.

- **Hydrogen Utilization and Clean Fuels Integration:** Study hydrogen utilization to understand impact on gas system, customer end uses, and appliances. Integrate clean fuels (H2, RNG, etc.), ensuring compatibility with existing infrastructure and processes.
- **Affordability and Emissions Reduction:** Repurpose existing gas pipelines to avoid additional electrical infrastructure costs. Reduce GHG emissions, benefit ESJ communities, and offer cost-effective energy options for hard-to-electrify customers.
- **Research, Development, and Training:** Support R&D and pilot projects exploring cost-effective interconnection, energy-saving measures, and geothermal technologies. Provide training and education opportunities in clean energy.

Source: Biogas/RNG - Ohio Lumex

Source: Formerly C-zero, Graphitic Energy | Moving American energy forward

Decarbonization

Budget Breakdown

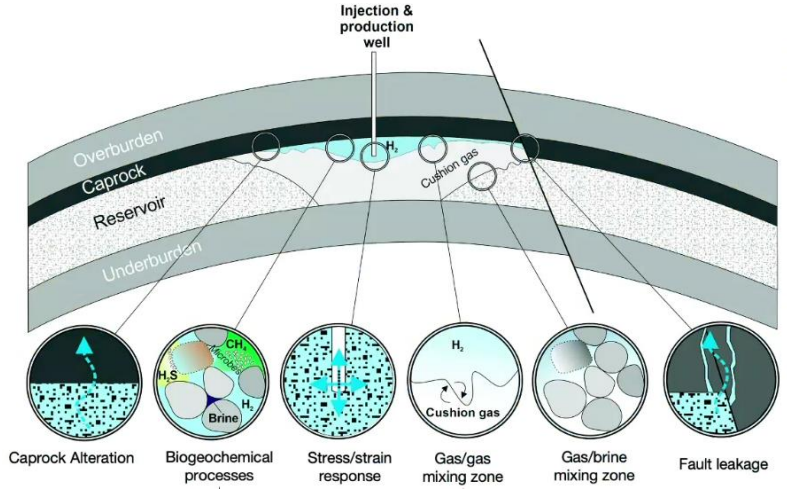
Theme	Initiative	2024 Budget	2025 Budget
Decarbonization	Impact of Hydrogen	$1,662,270	$1,194,633
	Integrating Cleaner Fuels	$529,390	$508,729
	Energy Efficiency	$0	$344,301
	Networked Geothermal	$0	$244,301
	TOTAL	$2,191,660	$2,291,965

Decarbonization

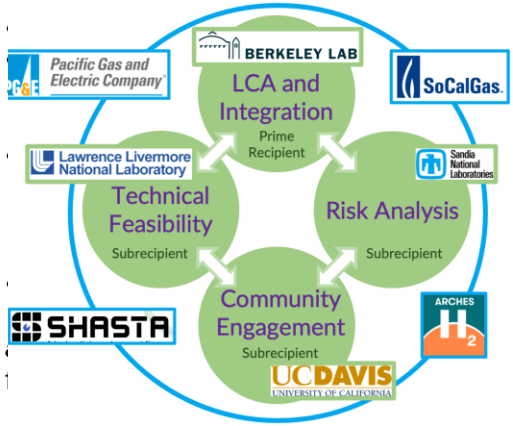
Impact of Hydrogen

The planned projects aim to study hydrogen utilization to understand its impact on the gas system, customer end uses, and appliances, and adapt existing infrastructure accordingly. These efforts support the interaction between traditional energy resources and emerging fuels, achieving affordability by repurposing natural gas pipelines and avoiding additional electrical infrastructure costs.

Additionally, the projects are designed to lower greenhouse gas emissions, which will benefit ESJ communities. They also provide training and educational opportunities in hydrogen blending pipeline operations. Moreover, hard-to-electrify customers will have access to affordable energy solutions, promoting the exploration of hydrogen and renewable energy sources.

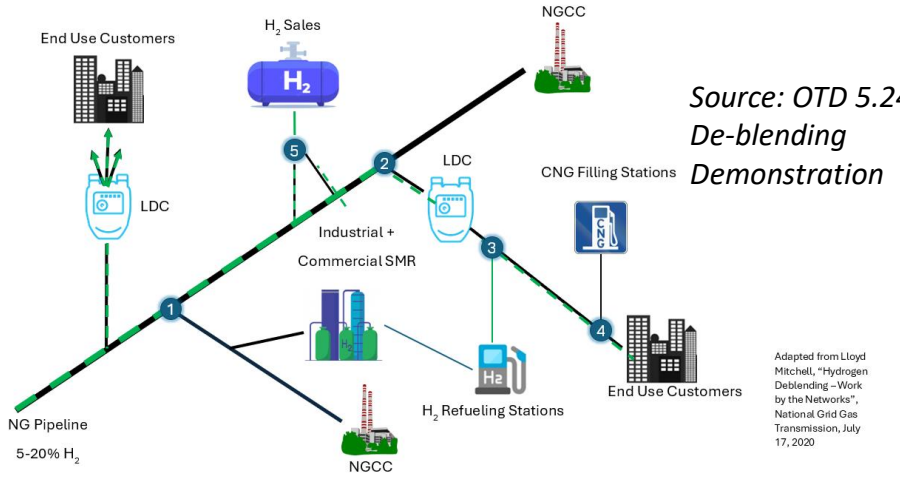


Source: Heinemann et al. (2021)



Source: Potential of Hydrogen Storage in California (PHySiCa). (2024)

Boiler-burner for NG-H2 blending



Source: OTD 5.24.s De-blending Demonstration

Source: UTD 2.24.H Hydrogen-blending at Asphalt Plants – Field Tests

Decarbonization

Impact of Hydrogen

CHALLENGE

Hydrogen has different physical and chemical properties compared to natural gas, which can affect the integrity and safety of the infrastructure

SOLUTION

- Study hydrogen utilization to understand its impact on the gas system, customer end uses, and appliances, and adapt existing infrastructure accordingly.
- Support the interaction between traditional energy resources and emerging fuels.
- Achieve affordability by repurposing natural gas pipelines and avoiding additional electrical infrastructure costs.
- Reduce GHG emissions, benefiting ESJ communities.
- Provide training and education opportunities in hydrogen blending pipeline operations.
- Enable hard-to-electrify customers to access affordable energy solutions, promoting the exploration of hydrogen and renewable energy sources.

Decarbonization

Impact of Hydrogen

Affordability	Anticipated Ratepayer Benefit	Ratepayer Fund Justification	CPUC Policies and Proceedings
Affordability can be achieved by repurposing existing natural gas pipelines and facilities, avoiding the costs of additional electrical infrastructure. Projects can provide hard-to-electrify customers affordable energy solutions, promoting the exploration of hydrogen and renewable energy sources.	• Equity • Safety • Reliability • Improved Air Quality • Reduced GHG Emissions	Aligns with state energy policies by emphasizing public benefits and adopting a strategic approach to securing additional funding and resources. By leveraging cost-sharing opportunities with government and industrial entities, these projects maximize the impact of ratepayer funds.	D.22-12-057 SB 1075

Decarbonization

Impact of Hydrogen

Quantifiable Benefits

Energy Reliability: Frequency and duration of power outages before and after hydrogen integration.

Cost Savings: Reduction in energy costs for ratepayers.

Carbon Emissions Reduction: Decrease in GHG emissions.

Energy Storage Capacity: Amount of energy stored and released from hydrogen storage systems.

Safety and Reliability: Number of safety incidents and system failures.

Non-quantifiable Benefits

Customer Energy Solutions: The promotion of hydrogen and renewable energy exploration for hard-to-electrify customers is more qualitative, focusing on the broader impact and adoption rather than specific metrics.

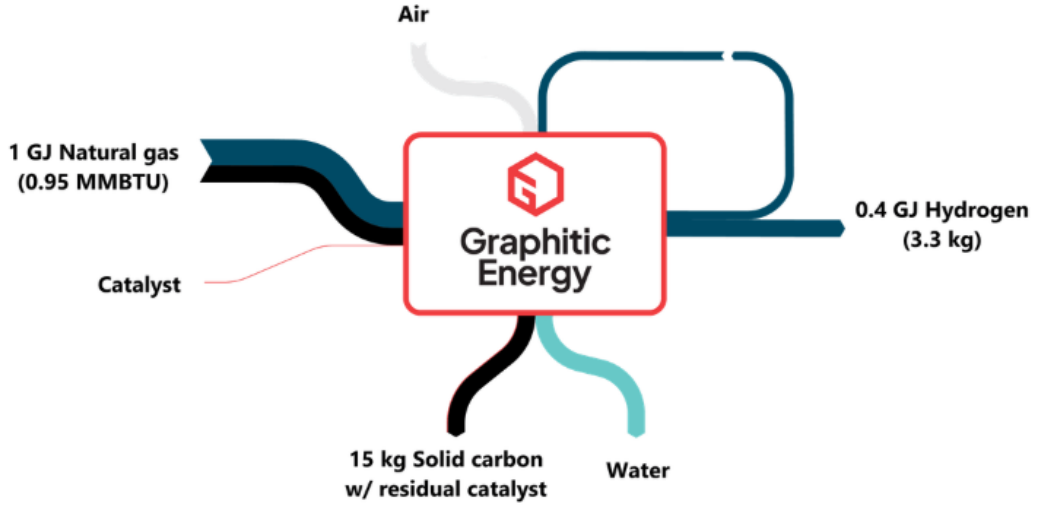
Decarbonization

Integrating Clean Fuels

The planned projects aim to integrate clean fuels such as traditional RNG, non-traditional RNG, renewable hydrogen, and synthetic methane. These efforts support R&D and pilot projects exploring cost-effective interconnection while addressing feedstock limitations.

Additionally, the projects ensure compatibility with existing infrastructure and processes and develop novel fuel production processes. These initiatives are crucial for maintaining and increasing the safety and reliability of the gas system while reducing costs and improving affordability for all customers, including those from ESJ communities. This is particularly important as gas throughput is expected to decline due to the transition toward non-fossil clean energy in the future.

Source: Chomp modular, self-contained anaerobic digester systems



Source: Formerly C-zero, Graphitic Energy | Moving American energy forward

Decarbonization

Integrating Clean Fuels

CHALLENGE

Blending clean fuels with natural gas can affect overall gas quality and require modifications to measurement systems.

SOLUTION

- Integrate clean fuels such as traditional RNG, non-traditional RNG, renewable hydrogen, and synthetic methane.
- Support R&D and pilot projects exploring cost-effective interconnection.
- Address feedstock limitations.
- Ensure compatibility with existing infrastructure and processes.
- Develop novel fuel production processes.

Decarbonization

Integrating Clean Fuels

Affordability	Anticipated Ratepayer Benefit	Ratepayer Fund Justification	CPUC Policies and Proceedings
Gas RD&D seeks to support R&D and pilot projects exploring cost-effective interconnection, feedstock limitations, compatibility with existing infrastructure and processes, and novel fuel production processes.	• Equity • Safety • Reliability • Improved Air Quality • Reduced GHG Emissions	Aligns with state energy policies by emphasizing public benefits and adopting a strategic approach to securing additional funding and resources. By leveraging cost-sharing opportunities with government and industrial entities, these projects maximize the impact of ratepayer funds.	D.22-12-057 D.22-02-025 D.22-12-057

Decarbonization

Integrating Clean Fuels

Quantifiable Benefits

Reduction in GHG Emissions: Amount of CO2e emissions reduced.

Energy Cost Savings: Reduction in energy costs for ratepayers.

Energy Reliability: Frequency and duration of power outages before and after cleaner fuel integration.

Non-quantifiable Benefits

Operational Efficiency: Improvement in operational efficiency metrics such as fuel consumption rates and maintenance costs.

Safety Incidents: Number of safety incidents and system failures.

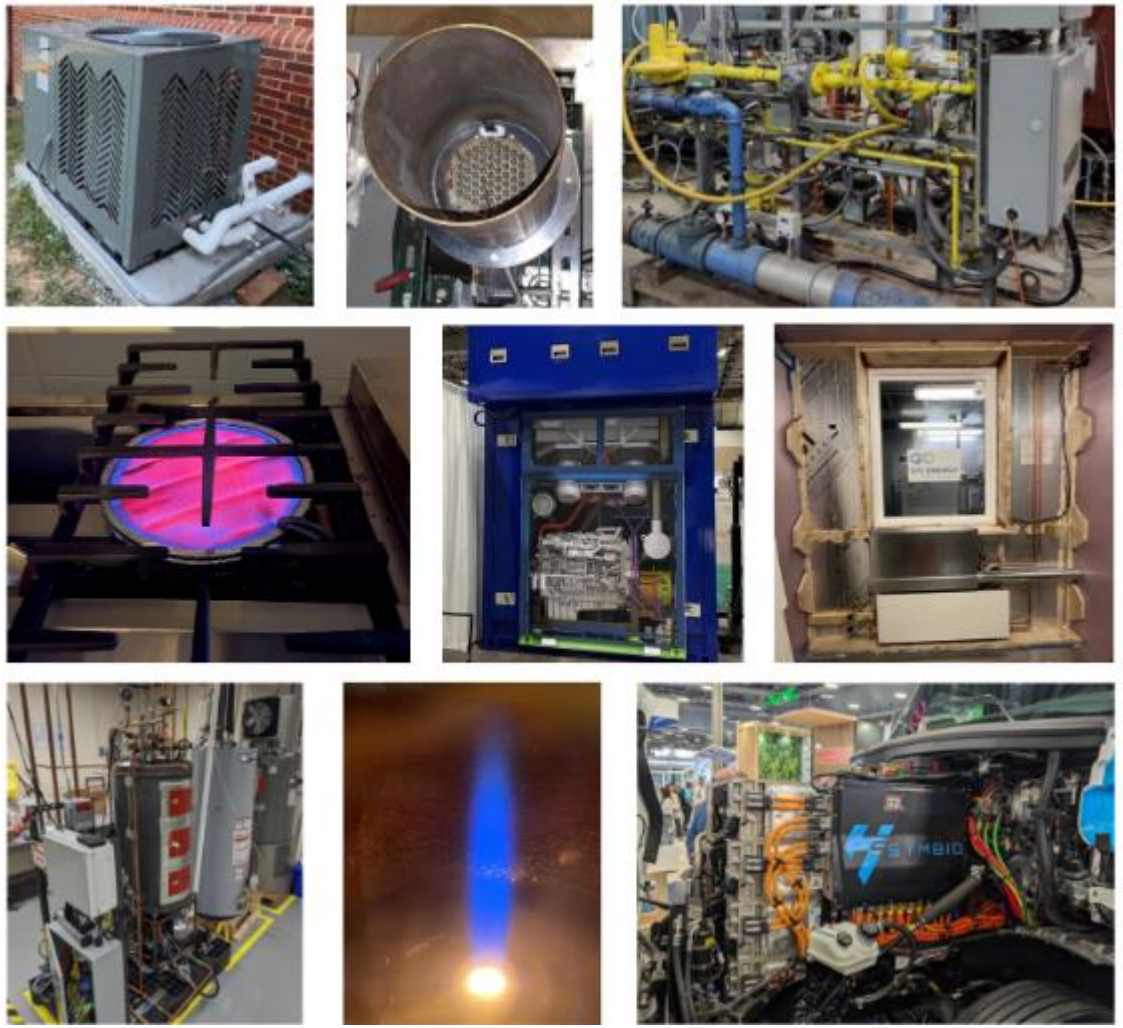
Decarbonization

Energy Efficiency

The planned projects aim to implement energy-efficient technologies and products to reduce energy consumption. These efforts support R&D and pilot projects exploring cost-effective energy-saving measures while addressing limitations in energy efficiency technologies and processes.

Additionally, the projects ensure compatibility of energy-efficient solutions with existing infrastructure and develop innovative processes to enhance energy efficiency. These initiatives are crucial for addressing the needs of hard-to-electrify customers with tailored energy efficiency solutions.

This is particularly important as energy consumption patterns evolve and the demand for sustainable solutions increases.



Source: UTD Research Project Summaries 2023-2024

Decarbonization

Energy Efficiency

CHALLENGE

California faces challenges in energy efficiency due to aging infrastructure, high energy demand, wildfire risks, regulatory hurdles, equity and accessibility issues, and the need for technological integration.

SOLUTION

- Implementing advanced energy systems with smart controls, energy storage, customer engagement, and financial incentives can enhance energy efficiency for hard-to-electrify customers without requiring extensive electrical upgrades.
- Reliable and cost-effective heating with lower electrical demand, ideal for facilities with limited electrical capacity.
- Highly efficient and environmentally friendly, hybrid systems optimize performance by switching between heat pumps and gas furnaces based on weather conditions, ensuring consistent comfort and long-term cost savings.

Decarbonization

Energy Efficiency

Affordability	Anticipated Ratepayer Benefit	Ratepayer Fund Justification	CPUC Policies and Proceedings
Provides essential insights to support integration of energy-saving technologies and practices with traditional and emerging technologies. Affordability can be achieved by implementing energy- efficient technologies and retrofitting existing infrastructure, reducing the need for costly new infrastructure as demand grows.	• Equity • Safety • Reliability • Improved Air Quality • Reduced GHG Emissions • Improved Affordability	Aligns with state energy policies by emphasizing public benefits and adopting a strategic approach to securing additional funding and resources. Focuses on improving safety and reliability, reducing costs, and supporting the transition to cleaner energy sources.	R.13-11-005 D.23-08-005 D.23-06-055

Decarbonization

Energy Efficiency

Quantifiable Benefits

Energy Savings: Reduction in energy consumption.

Cost Savings: reduction in energy costs for ratepayers.

Carbon Emissions Reduction: Decrease in GHG emissions.

Operational Efficiency: Improvement in operational efficiency metrics such as fuel consumption or

User Satisfaction: Ratepayer satisfaction with energy efficiency measures.

Non-quantifiable Benefits

Improved Customer Satisfaction: Better service reliability and safety can lead to higher customer satisfaction.

Stakeholder Agreement: Engage relevant stakeholders to ensure high-level agreement on anticipated outcomes and benefits.

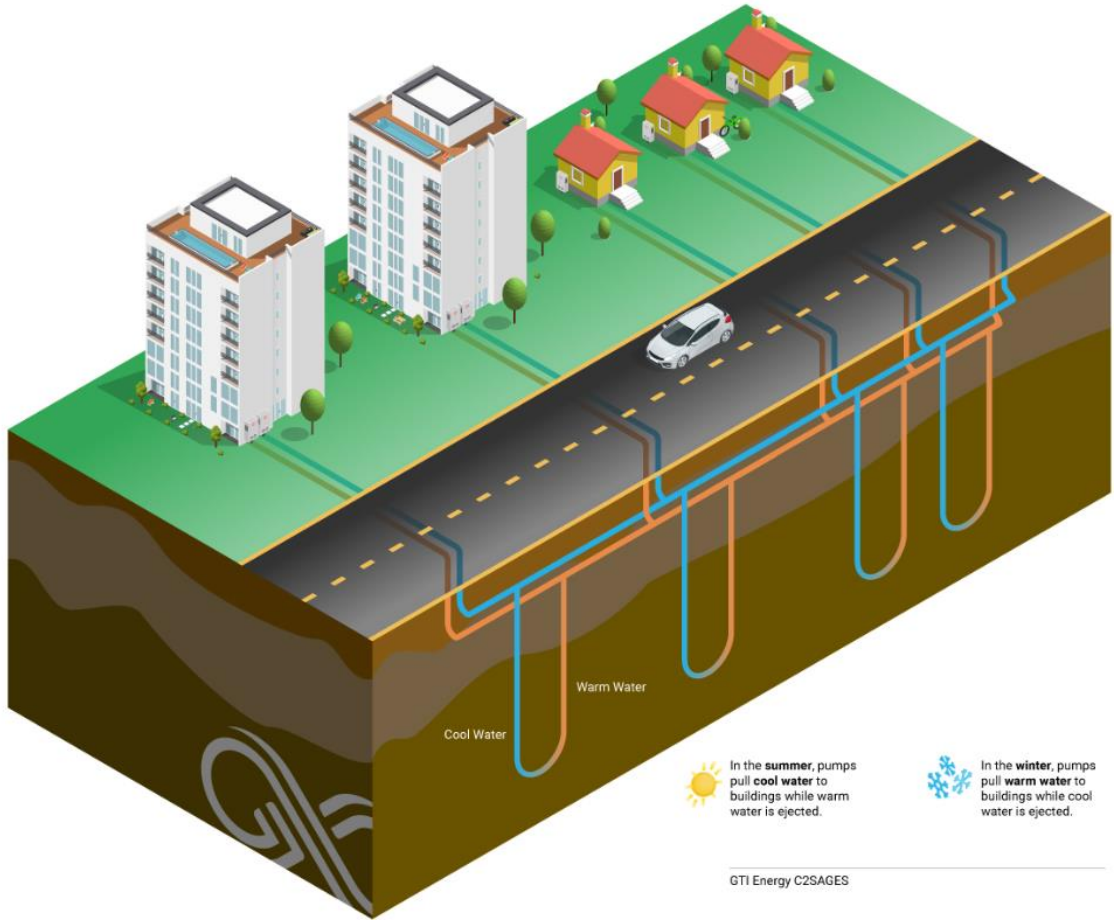
Regulatory Justification: Demonstrate that the project provides significant benefits not available through competitive or regulated markets, justifying the use of ratepayer funds.

Decarbonization

Networked Geothermal

The planned projects aim to implement networked geothermal systems to provide sustainable heating and cooling solutions. These efforts support R&D and pilot projects exploring cost-effective geothermal interconnection and deployment while addressing limitations in geothermal technologies and processes.

Additionally, the projects ensure compatibility of geothermal systems with existing infrastructure and develop innovative processes to enhance geothermal energy efficiency. This is particularly important as the demand for sustainable and efficient energy solutions continues to grow in the transition toward a cleaner energy future.



Source: C2SAGES • GTI Energy

Decarbonization

Networked Geothermal

CHALLENGE

Utilities face increasing pressure to transition to low-carbon solutions in response to building electrification mandates.

As more buildings switch to electric heat pumps, gas utilities risk losing customers and facing stranded assets in gas infrastructure.

SOLUTION

- Leverage stable underground temperatures for heating and cooling through networked geothermal systems.
- Support R&D and pilot projects exploring cost-effective geothermal interconnection and deployment.
- Address limitations in geothermal technologies and processes.
- Ensure compatibility of geothermal systems with existing infrastructure.
- Develop innovative processes to enhance geothermal energy efficiency.
- Address the needs of hard-to-electrify customers with tailored geothermal solutions.

Decarbonization

Networked Geothermal

Affordability	Anticipated Ratepayer Benefit	Ratepayer Fund Justification	CPUC Policies and Proceedings
Networked geothermal supports the integration of geothermal heating and cooling with traditional and emerging energy systems. Affordability is achieved by implementing these systems and retrofitting existing infrastructure, reducing the need for costly new infrastructure.	• Equity • Safety • Reliability • Improved Air Quality • Reduced GHG Emissions • Improved Affordability	Reduces pipeline replacement costs. Stabilizes heating costs by reducing reliance on natural gas. Lower operational costs after installation. Reduces winter peak demand on grid. Prevents customer loss due to electrification.	R.13-02-008 D.22-02-025 D.22-12-057 R.22-12-001/D.22-12-011 R.15-01-008 D.23-08-005

Decarbonization

Networked Geothermal

Quantifiable Benefits

Cost Savings: Reduction in heating and cooling costs for ratepayers.

Carbon Emissions Reduction: Decrease in GHG emissions.

System Reliability: Reduction in frequency and duration of outages or failures.

User Satisfaction: Ratepayer satisfaction with geothermal heating and cooling systems.

Non-quantifiable Benefits

Improved Customer Satisfaction: Better service reliability and safety can lead to higher customer satisfaction.

Stakeholder Agreement: Engage relevant stakeholders to ensure high-level agreement on anticipated outcomes and benefits.

Regulatory Justification: Demonstrate that the project provides significant benefits not available through competitive or regulated markets, justifying the use of ratepayer funds.

Decarbonization

2024 in Review—Case Study

UTD Project 1.22P "Emerging Distributed Methane Pyrolysis Technologies"

This project seeks to classify emerging distributed methane pyrolysis solutions as good, better, or best fit for gas ratepayers and consumers to decarbonize their operations.

By combining application/process modeling with end-user demand modeling and technology assessments, the research team conducted primary research through direct outreach to leading technology developers. They created a landscape survey of distributed methane pyrolysis technologies, including a techno-economic assessment over various applications.

The project includes a thorough modeling assessment, analytical feedback, R&D gap summary, and pre-feasibility analysis for prospective demonstrations.

Source: UTD Research Project Summaries 2023-2024

Decarbonization

What new trends or technologies in decarbonization are you aware of that you would recommend we explore further?

Decarbonization

QUESTIONS

General Questions

General

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

General

QUESTIONS

Presenters

Jeannette Lindemann

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Aaron Rezendez

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Submitting follow-up questions

Please email any additional questions or comments about PG&E's Gas RD&D program by Tuesday, April 29, 2025, to innovation@pge.com.

The workshop recording and other related materials will be posted in the coming weeks at pge.com/innovation.