

DOCKETED

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Gas R&D Program FY 2025-26 Budget Plan

February 7, 2025



FY 2025-26 Gas R&D Plan

- Energy Commission R&D Program staff are holding this workshop seeking public input on proposed gas research initiatives for the FY 2025-26 Gas R&D Budget plan
- Questions and feedback will be elicited during the workshop





Agenda

- Overview of Gas R&D Program
- Staff Presentations on Proposed Initiatives Under the Themes:
 - Gas Decommissioning (2)
 - Building Decarbonization
 - Entrepreneurial Ecosystem
- General Questions and Public Comment
- Adjourn



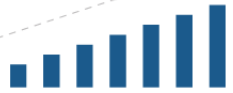
Announcements

- This workshop is being recorded and will be posted at:
<https://www.energy.ca.gov/events>
- Please type your comments and questions in the Q&A window
- Participants will be muted during the presentation
- Workshop materials, including this presentation, will be posted at:
<https://efiling.energy.ca.gov/Lists/DocketLog.aspx?docketnumber=23-ERDD-02>
- Sign up for updates on “Energy Research and Development”: <https://public.govdelivery.com/accounts/CNRA/signup/31719>



PRIMARY FUNCTIONS OF THE

CALIFORNIA ENERGY COMMISSION



**Advancing State
Energy Policy**



**Investing in
Energy Innovation**



**Developing
Renewable Energy**



**Preparing for
Energy Emergencies**



**Achieving
Energy Efficiency**



**Transforming
Transportation**



**Overseeing
Energy Infrastructure**



**Intergovernmental
Collaboration**



Gas R&D Program Background

\$24 million annual budget, public-interest research funded by a gas surcharge



Focus on energy efficiency, renewable technologies, conservation, and environmental issues



Support state energy policy



Offer a reasonable probability of providing benefits to ratepayers



Consider opportunities for collaboration and co-funding opportunities with other entities



Gas R&D Program Focus Areas



Building Decarbonization

Improving building decarbonization technologies, energy efficiency, affordability, health and comfort of homes and businesses.



Gas System Decarbonization

Studying fugitive methane emissions, gas infrastructure decommissioning, renewable hydrogen, and biomethane.



Industrial and Agricultural Innovation

Developing and scaling technology solutions that reduce fossil gas use, cut carbon emissions, and lower waste.



Transportation

Increasing the efficiency and clean operations of medium- and heavy-duty and off-road vehicles.



Resilience, Health, and Safety

Researching pipeline safety, gas storage, climate risk, indoor air quality and health, and forest biomass usage.



Entrepreneurial Ecosystem

Supporting start-ups for early-stage research, prototype development, and commercialization of technologies.



Benefits to Californians

Ratepayer Benefits:

- Affordability
- Safety & Reliability
- Adaptation
- Environmental Sustainability
- Equity

By the Numbers:

\$341M+

GAS R&D FUNDS INVESTED

311

PROJECTS

\$6.3B

FOLLOW-ON FUNDING AFTER
RECEIVING GAS R&D SUPPORT

48%+

OF FUNDING IN UNDER-RESOURCED
COMMUNITIES SINCE FY 2016-17



Developing Initiatives

Informed by:

- State policy drivers, including:
 - Gas R&D authority
 - CPUC Resolutions
- Emerging research trends and gaps
 - Roadmaps and strategies
 - Research at DOE, universities, etc.
 - CPUC and CEC proceedings
- Discussions with technical experts, EJ representatives, members of the public
- Equity considerations



State policy drivers

Decarbonization

- SB 32 (2016): aims to reduce GHG emissions to 40% below 1990 levels by 2030
- AB 1279 (2022): establishes statewide goal to achieve carbon neutrality
- SB 1221 (2024): establishes neighborhood decarbonization zones
- AB 3232 (2018): assess potential to reduce GHG emissions from California's building stock

Equity & Affordability

- CPUC affordability proceeding
- CEC JAEDI Action Plan, DACAG Equity Framework

Public Health & Building Energy Performance

- California Building Energy Code, California Building Energy Action Plan

Reliability & Safety

- CPUC Long term gas-planning rulemaking, Resolution G-3571



Embedding Equity

- Engage with Disadvantaged Communities Advisory Group and EJ representatives in initiative development
- Improve CEC's application and grant management process to relieve administrative burdens
- Provide preference points to grant applications that support benefits to disadvantaged and low-income communities



Research Initiative Feedback

- The California Energy Commission would like to hear your thoughts on the proposed research initiatives
- Written comments can be provided to the Docket until February 21, 2025: <https://efiling.energy.ca.gov/Ecomment/Ecomment.aspx?docketnumber=23-ERDD-02>
- Verbal and written comments will be considered while developing the FY 2025-26 Gas R&D Proposed Budget Plan



Research Initiatives

Initiative Theme	Initiative Title
Gas System Decommissioning	Social Science Research for Gas Decommissioning in the Mid- and Long Term
	Pilot Projects to Advance Gas Decommissioning
Building Decarbonization	Networked Geothermal Heat Pumps
<i>Entrepreneurial Ecosystem</i>	<i>Scaling Technology to Decarbonize California's Gas Sector*</i>

*developing for future budget plan

Social Science Research for Gas Decommissioning in the Mid and Long Term

Theme: Gas Decommissioning

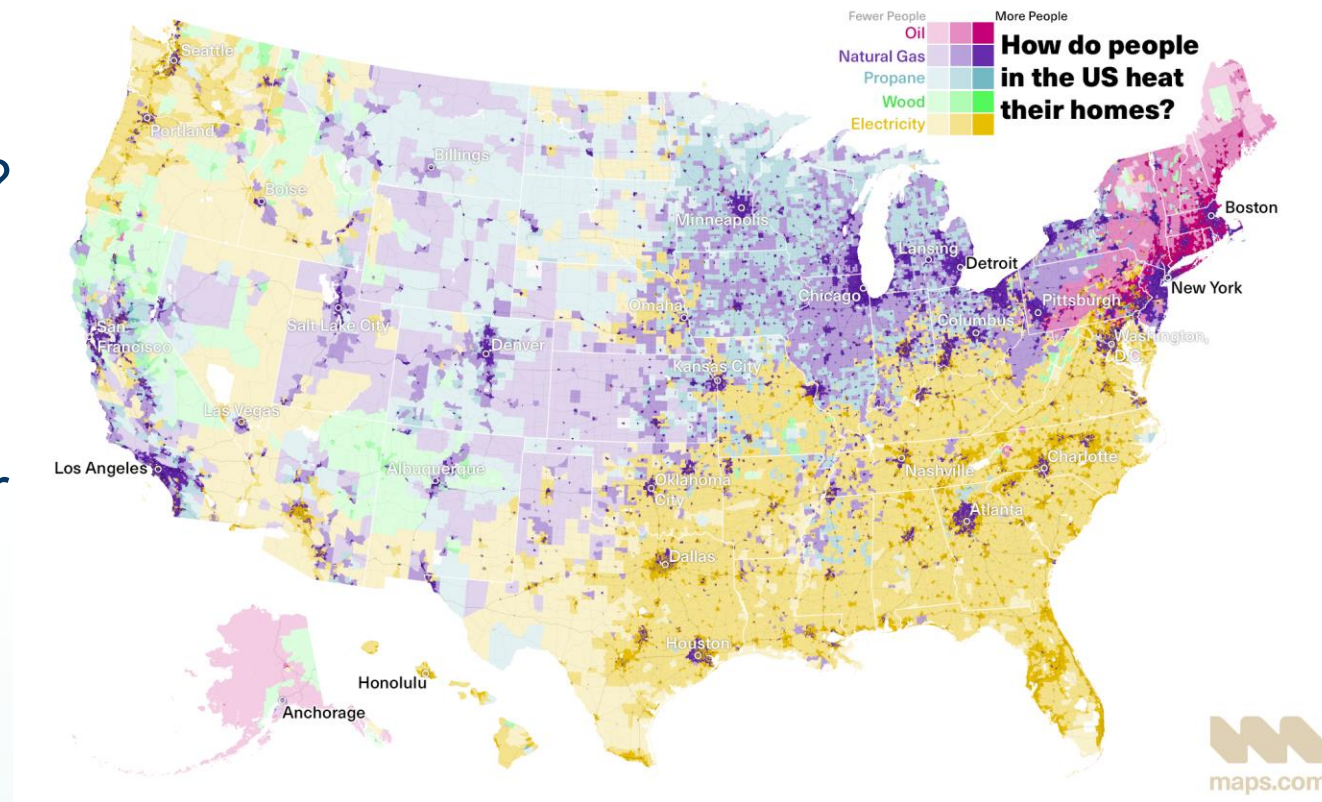


Presenter: Mithra Moezzi



Background

- Planned transition from gas involves millions of technological and societal changes: how to make converting the natural and good choice? How to promote user and ratepayer benefits and control costs?
- Joint Agency Staff White Paper* calls for social scientific research to support sociotechnical transition
- Little systematic social sciences research or integration into policy



The Geography of Heating U.S. Homes

Source: Joshua Stevens, <https://www.maps.com/home-heating-fuels/>; data from American Community Survey 2021

* *2024 Joint Agency Staff Paper: Progress Towards a Gas Transition. A White Paper Supporting the CPUC's Long-Term Gas Planning Rulemaking R.20-01-007.*



Innovations

Vision

- Produce findings, insights, and resources that reveal important patterns for gas end uses to *better achieve positive transition outcomes locally & overall*
- Take opportunity to *learn from experience and apply new & existing data*
- Inspire systematic *experience-based discussions and actions*

Examples of Potential Projects

- ***Advanced geographic analysis:*** Provide location-specific sociocultural, demographic, energy use, and tech data to illustrate context and consequences
- ***Electrification experience:*** Identify strategies to overcome frictions to electrification (including workforce); evaluate impacts
- ***Affordability tools:*** Estimate changes in gas and electricity costs for individuals and groups, drawing from empirical data



Benefits

- **Affordability:** Provides info to planners and ratepayers on costs and risks of various transition pathways, including impacts across ratepayer groups
- **Safety and Reliability:** Affords higher precision in managing energy reliability and safety while transitioning away from gas
- **Adaptation:** Improves society's ability to adapt to a decarbonized energy system under climate change
- **Environmental Sustainability:** Supports cleaner air by reducing gas combustion indoors and at power plants
- **Equity:** Promotes engagement with Environmental and Social Justice* and other communities on energy system transitions; develops resources to improve outcomes for those facing underinvestment or adverse outcomes; may promote high-road career paths

*See CPUC document: [*Environmental & Social Justice Action Plan, Version 2.0 \(April 2022\)*](#)



Questions and Feedback

- What are your latest insights on what impedes or encourages voluntary conversion from gas in residences?
- What are the biggest barriers to deciding to convert from gas in commercial buildings?
- What are the most promising technological directions to facilitate affordable conversion from gas?
- Can you recommend contacts who could speak to the observed impacts of electrifying gas end uses, e.g., end user satisfaction?
- Can you recommend contacts who could speak to workforce development and reskilling needs for converting away from gas end uses?

Pilot Projects to Advance Gas Decommissioning

Theme: Gas Decommissioning



Presenter: Van Do

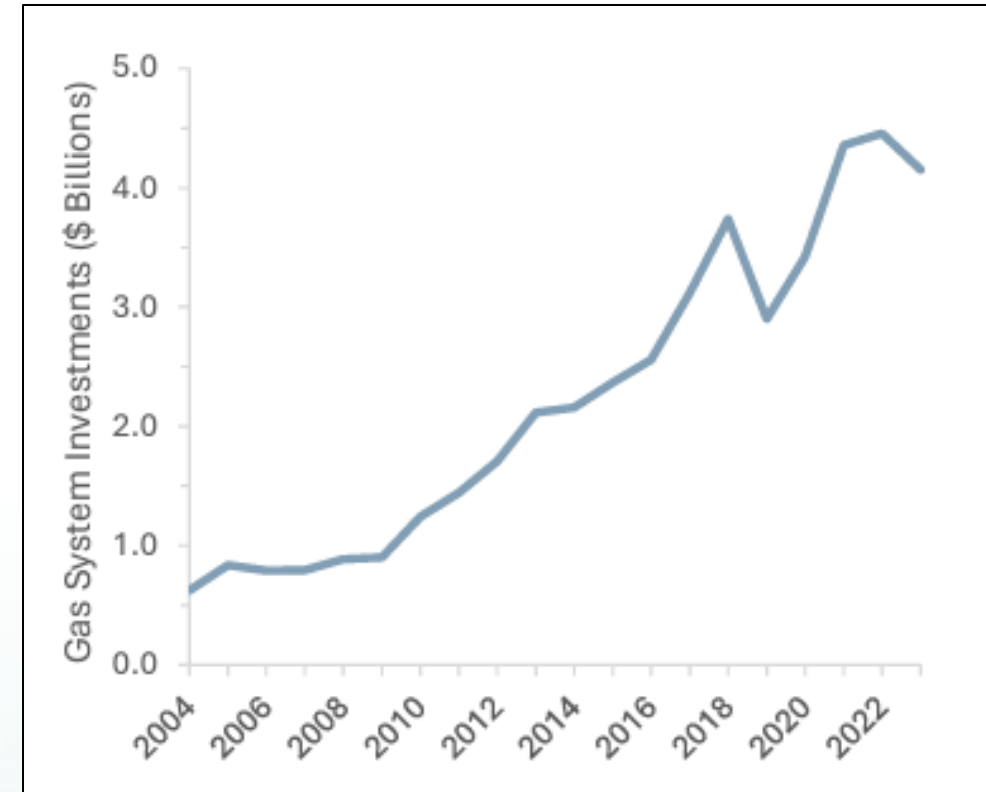


Background

- California's aging gas network will incur \$43 billion in maintenance costs by 2045*
- Annual declines in gas demand could result in rate increases**
- Recent study shows decommissioning paired with targeted electrification can provide net benefits to gas and electric ratepayers
- Pilot demonstrations are needed to assess technical, social, and economic feasibility

* E3, [Avoiding Gas Distribution Pipeline Replacement Through Targeted Electrification in California, 2024](#)

** SoCalGas, [2024 California Gas Report](#), 2024

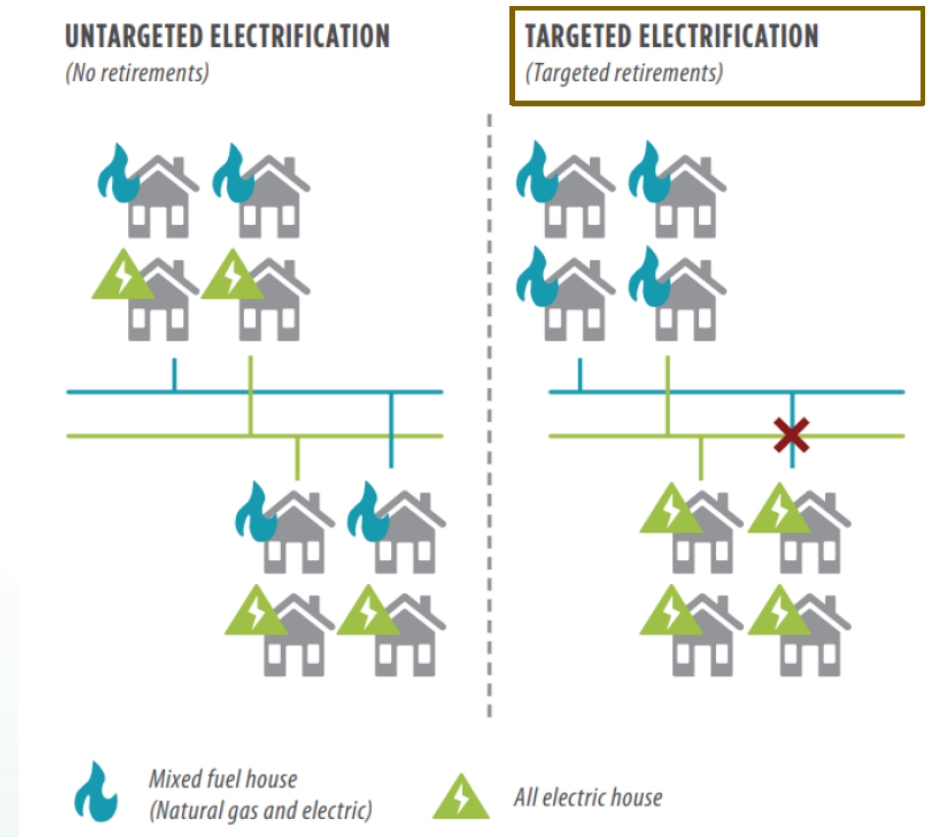


Historical annual capital investment in the PG&E, SCG, and SDG&E gas systems (nominal \$). Over the 10 years from 2014-2023, investments totaled \$33 billion. Source: Utility Form 2: "Gas Plant In-Service – Additions"



Innovations

- Demonstrate zonal decommissioning of buildings, households, and businesses within the same distribution pipeline network
- Replace fossil gas with electricity, thermal energy, or zero-emission alternatives
- Assess real-world technical feasibility, cost evaluation, supply chain dynamics, ratepayer implications, public acceptance
- Inform gas decommissioning policy and program development



Source: Energy+Environmental Economics (E3)



Benefits

- **Affordability:** Provides transparent cost analysis to customers, businesses, policymakers
- **Safety and Reliability:** Reduces reliability concerns by decommissioning aging, potentially hazardous gas infrastructure
- **Adaptation:** Improves reliability and resilience through shifting resources from maintaining aging fossil gas infrastructure to electrification, zero-emission alternatives
- **Environmental Sustainability:** Improves environmental health, reduces local air quality impacts, avoids incidental GHG leakage, supports renewable energy alternatives
- **Equity:** Enhances inclusion and accessibility to low-cost electrification for justice communities and California Native American tribes



Questions and Feedback

- What are the primary technical challenges or concerns for residents, renters, and businesses in the transition from fossil gas to other alternatives?
- What type of financial, technical, or educational resources would support homeowners in transitioning away from fossil gas?
- Besides electricity, what other clean energy sources should we consider as safe and effective fossil gas alternatives?
- What are the top criteria to consider in gas decommissioning pilot site selection?

Networked Geothermal Heat Pumps

Theme: Building Decarbonization

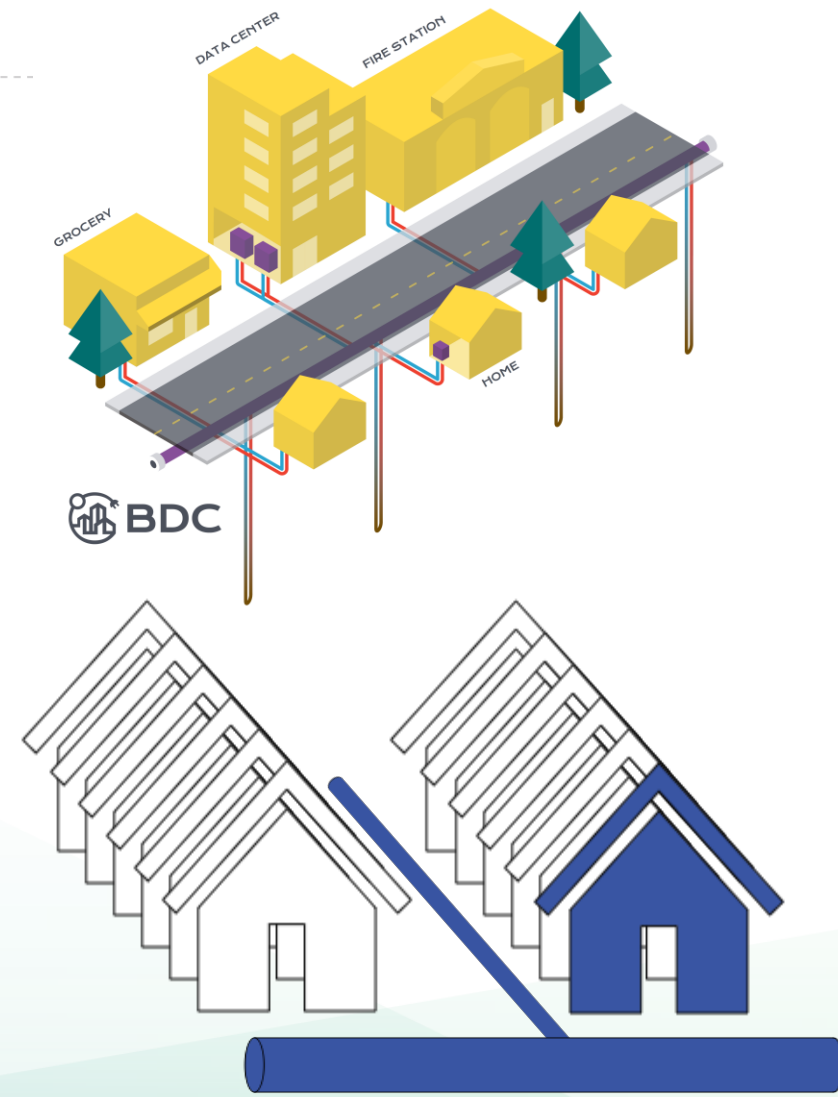


Presenter: Pooya Khodaparast



Background

- Decarbonizing buildings will be important to achieve the state's GHG goals
- Community-scale gas decommissioning and decarbonization can be challenging
- Networked geothermal technologies can offer higher efficiency than competing technologies
- California-specific research is needed to assess and demonstrate the potential of thermal energy networks

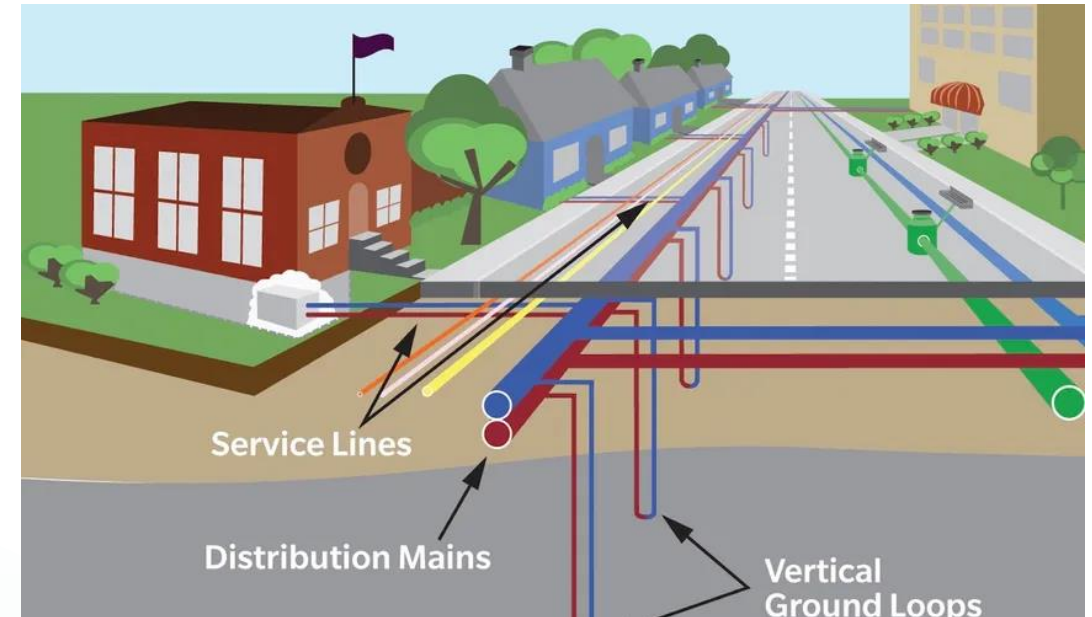


Source: CEC



Innovations

- Assess potential of geo-networks in context of California's climate & geology
- Identify optimal methods, technologies, locations, and sites for deployment
- Analyze, compare applicable business models for different circumstances (e.g., population density, ownership rights)
- Evaluate CA's policy and regulatory landscape pertinent to geo-networks
- Explore geo-networks' potential in large-scale decarbonization via demonstrations



Credit: [Eversource](#)



Benefits

- **Affordability:** Deliver cost savings by improving efficiency, lowering energy use, and reducing dependence on volatile gas pricing
- **Safety and Reliability:** Avoid combustion risks of small and large scales throughout the fossil gas system
- **Adaptation:** Reduce fossil gas demand in cold season and electricity demand in hot season due to high efficiency
- **Environmental Sustainability:** Reduce fossil gas consumption and GHG emissions, improve air quality
- **Equity:** Explore pilot potential and benefit impacts in justice and tribal communities, increase utility investment in decommissioning and decarbonization, explore business models that socialize costs, and help transition fossil economy workforce



Questions and Feedback

- Is there public awareness and knowledge around installing and commissioning networked GHPs? Are there questions or concerns?
- What metrics are suitable in evaluating and comparing existing technologies and networked GHPs?
- What considerations of social and community significance should be made in ensuring that the business models will benefit end users?
- What key community criteria should be considered when evaluating, planning, and implementing networked geothermal systems?
- What outcomes of a successful networked GHP demonstration might encourage community support for gas decommissioning?

Scaling Technology to Decarbonize California's Gas Sector

Theme: Entrepreneurial Ecosystem

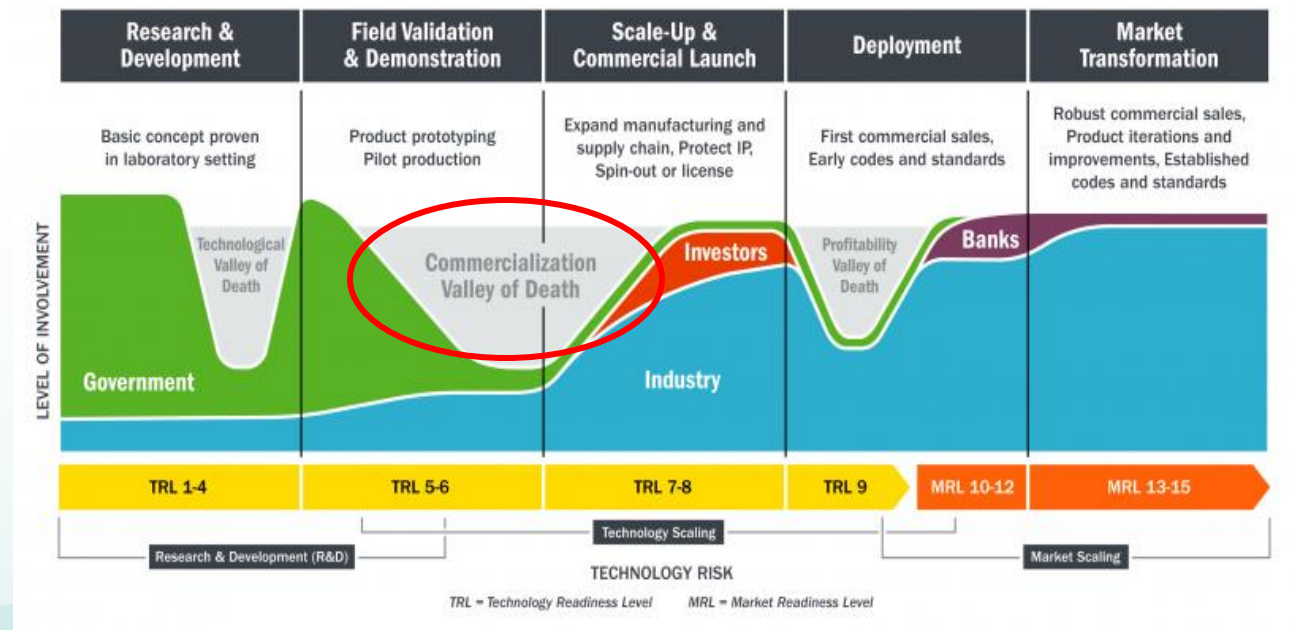


Presenter: Lindsey Fransen



Background

- Some sectors of the economy may not be electrified in the near- to medium-term with existing technology.
- Innovative technologies that reduce GHG emissions in these sectors are in various stages of development in California.
- Innovators struggle to bridge the "valley of death" between prototype and full-scale manufacturing.
- Public funding can accelerate technology scale-up for greater decarbonization.





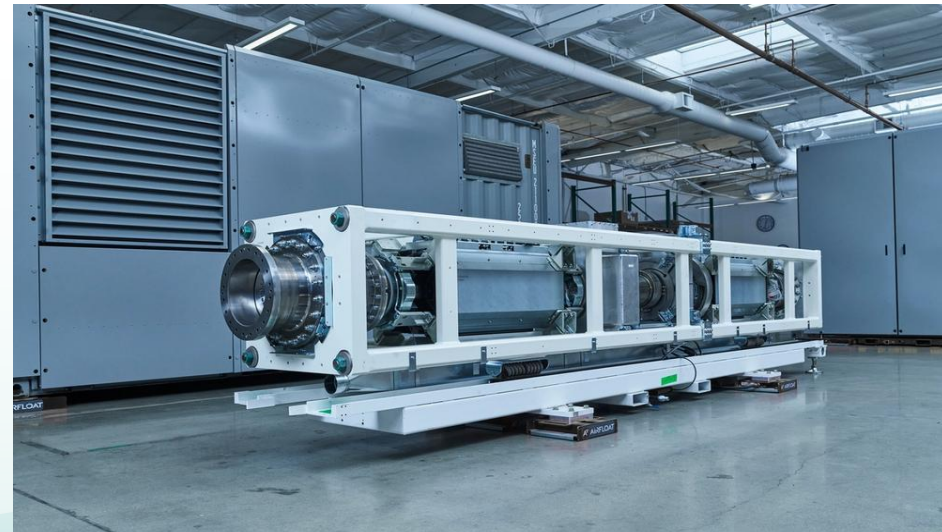
Innovations

Fund manufacturing of innovative technologies to support decarbonization of gas-dependent sectors:

- Industrial manufacturing – e.g., heat capture, storage, and exchange
- Low-carbon fuels – e.g., renewable gas from waste biomass
- Fuel-flexible generation – e.g., linear generators



Wall-mounted plastic heat exchanger. Source: Trevi, Inc.



Linear generator. Source: Mainspring Energy.



Benefits

- **Affordability:** More efficient fuel use reduces utility bills; manufacturing at scale brings down the price of new technologies
- **Reliability:** Enables industries to stay in CA while pursuing decarbonization goals; focus on drop-in technologies to minimize retrofits where possible
- **Environmental Sustainability:** More efficient use of fuel reduces GHG and criteria air pollutant emissions; compatibility with renewable fuels supports GHG emission reductions
- **Equity:** Job creation and transition for gas workforce; reduction in criteria air pollutants, which disproportionately affect justice communities and California Native American tribes



Questions and Feedback

- Do attendees see value in funding a manufacturing initiative in the gas R&D investment plan? Are there any unintended consequences of manufacturing scale-up that we should be considering?
- Which sectors, technologies, or applications currently using fossil gas are most pressing or promising for manufacturing scale-up?
- What results should project(s) funded under this initiative achieve, and what metrics should we use to gauge success?
- How can this initiative best support workers, particularly the existing gas workforce?
- Are there any key contributors on this topic we should be talking to who are not in this workshop?



Public Comment



Public Comments

- Please submit your question or comment in the **Question and Answers** window or raise your hand, and you will be called on to unmute yourself. (*Feature found under the Participants panel*)
 - First, we will call on participants with raised hands for verbal comments/questions.
 - Next, we will turn to the Q&A window for typed comments/questions.





General questions

1. How can equity considerations be centered in these initiatives?
2. Do you have recommended research approaches or resources for any of these initiatives?
3. Which use cases or opportunities would benefit from these initiatives?
4. What are example performance metrics or targets for project success?
5. Are there other priority areas that the Gas R&D Program should consider in future budget plans? If so, please explain.

Social Science Research for Gas Decommissioning in the Mid- and Long Term

Pilot Projects to Advance Gas Decommissioning

Networked Geothermal Heat Pumps

Scaling Technology to Decarbonize California's Gas Sector*



Next steps

- The California Energy Commission would like to hear your thoughts on the proposed research initiatives. Written comments can be provided to the Docket until **February 21, 2025**:
<https://efiling.energy.ca.gov/Ecomment/Ecomment.aspx?docketnumber=23-ERDD-02>
- The proposed Budget Plan will be submitted to the California Public Utilities Commission for consideration by April 1, 2025
- Solicitations derived from this Budget Plan may be released following California Public Utilities Commission approval



Thank you!