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Gas R&D Program FY 2023-2024 Budget Plan

January 24, 2023

Agenda

- Welcome and Overview
- Staff Presentations and Clarifying Questions
  - Hydrogen Infrastructure Safety
  - Building Decarbonization
  - Entrepreneur Development
  - Leveraging Federal Opportunities
- General Questions and Public Comment
- Adjourn

Announcements

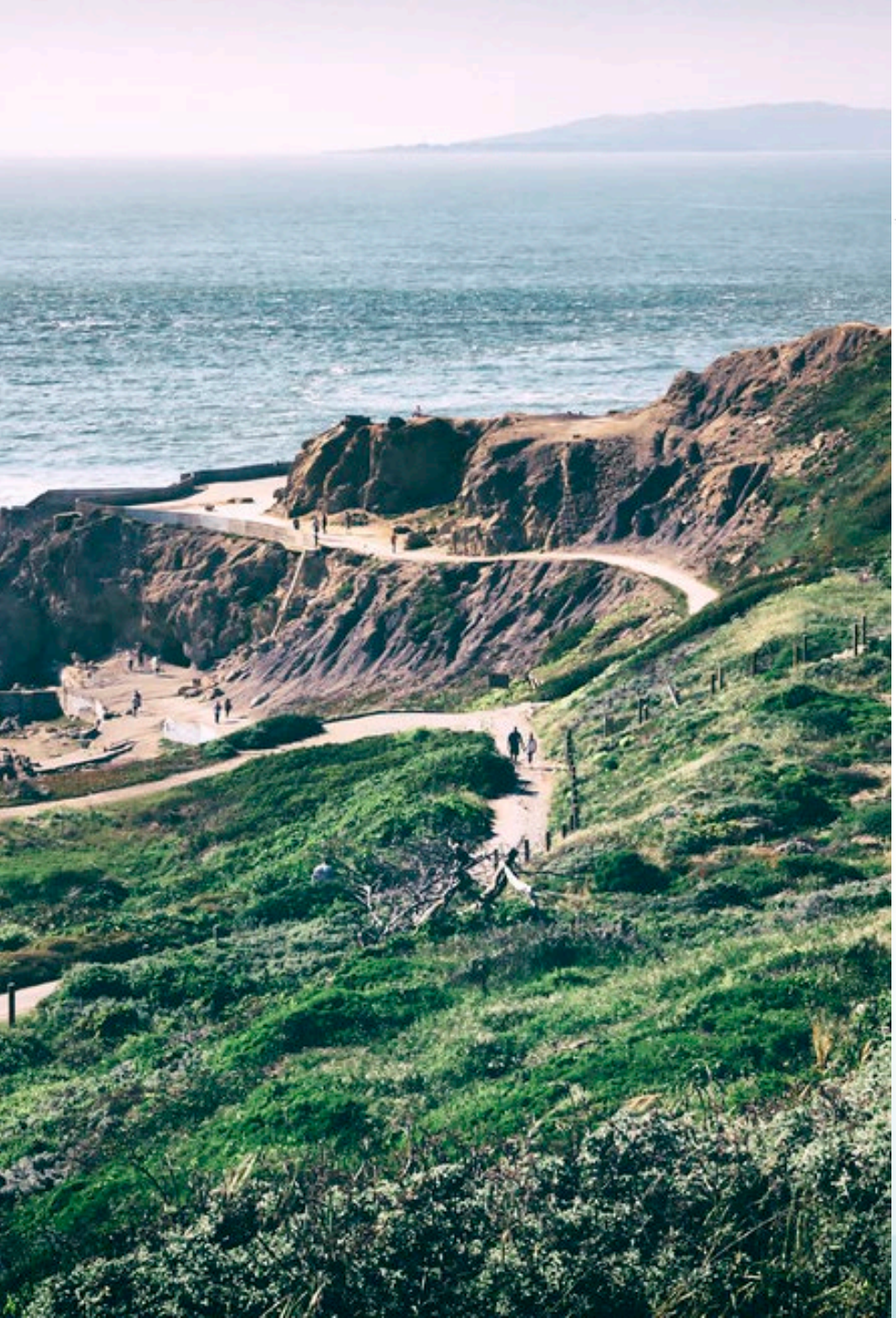
- This workshop is being recorded and will be posted at:
  https://www.energy.ca.gov/events
- Gas R&D Budget Plan documents and workshop materials, including this presentation, will be posted at:
  https://efiling.energy.ca.gov/Lists/DocketLog.aspx?docketnumber=16-PIER-01
- Please type your comments and questions in the Q&A window.
- Participants will be muted during the presentation.
- Sign up for updates on "Energy Research and Development":
  https://public.govdelivery.com/accounts/CNRA/signup/31719

Introduction

- Research and development to support the transition to clean energy, greater reliability, lower costs, and increased safety for Californians.
  - Benefits California citizens.
  - Not adequately addressed by competitive or regulated entities.
- $24 million annual budget, funded by a surcharge on gas consumption in California.
  - Energy efficiency, renewable technologies, conservation, environmental issues, and transportation.
  - Supports state energy policy.

State Energy Policy Drivers

- **SB 32 (2016)**
  - Aims to reduce GHG emissions to 40% below 1990 levels by 2030.
- **EO B-55-18 and AB 1279 (2022)**
  - Establishes statewide goal to achieve carbon neutrality as soon as possible and no later than 2045.
- **Integrated Energy Policy Report**
  - Policy recommendations that conserve resources, protect the environment, ensure energy reliability, enhance the state's economy, and protect public health and safety.



Developing Initiatives

Informed by:

- Gas R&D objectives
- CPUC resolutions
- Equity considerations
- Discussion with stakeholders
  - Docket: https://efiling.energy.ca.gov/Lists/DocketLog.aspx?docketnumber=16-PIER-01

Developing Initiatives

CPUC Resolution G-3584

For FY 2022-2023 and subsequent plans, CEC should:

- Consider the findings from the Assembly Bill 3232 (Friedman, 2018) report.
- Consider the findings from the 2019-2020 initiative: *Long-Term Technological Development Strategy to Meet Aggressive Statewide Decarbonization Goals*.

Developing Initiatives

Diversity & Equity Commitment

To meet CECs commitment to diversity and equity, Energy Commission staff:

- Engage with disadvantaged and underrepresented groups throughout the state.
- Improve CEC's application and grant management process to relieve administrative burdens.
- Continue to encourage participation at community meetings.

Developing Initiatives

Stakeholder Feedback

- The California Energy Commission would like to hear your thoughts on the proposed initiatives.
- Comments can be provided to the PIER Gas Docket until **January 31, 2023:** https://efiling.energy.ca.gov/Ecomment/Ecomment.aspx?docketnumber=16-PIER-01

Initiative Themes

FY 2023-24 proposed research initiatives are framed around ***decarbonization***.

Initiative Themes:

- Hydrogen Leakage Mitigation
- Building Decarbonization
- Entrepreneur Development
- Leveraging Cost Share Opportunities

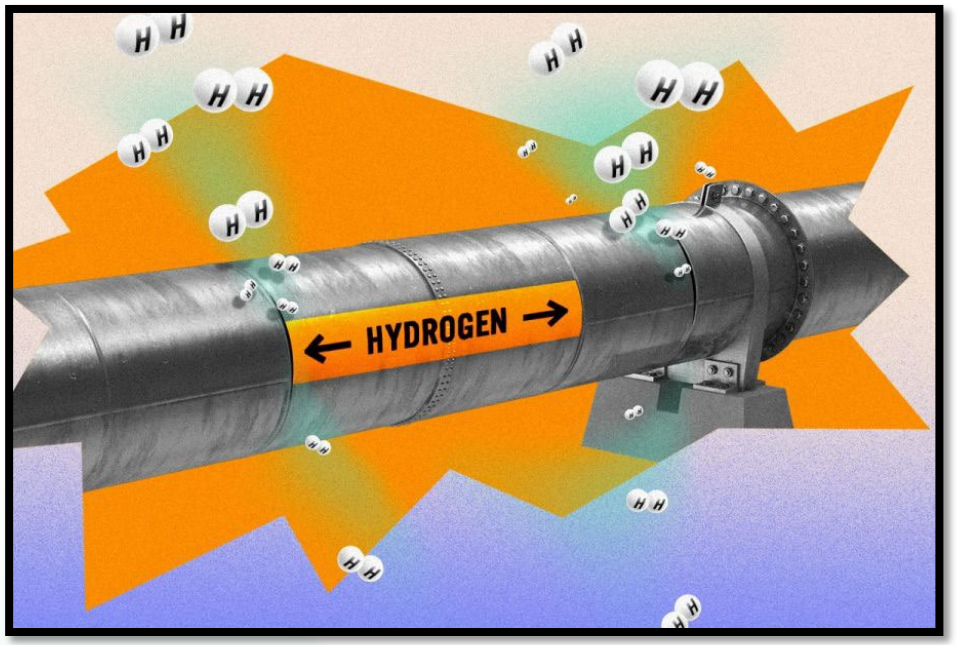
Hydrogen Leakage Detection, Monitoring, and Prevention

Topic Area: Hydrogen Leakage Mitigation

Presenters: Sean Anayah, Peter Chen, and Qing Tian

Background

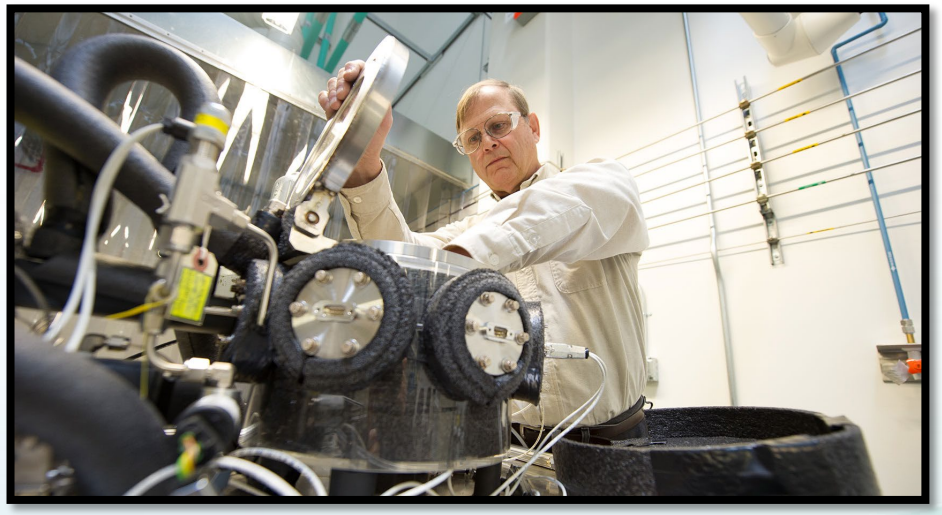
- New investments underway to scale-up clean hydrogen for difficult-to-decarbonize sectors.
- Hydrogen leakage can lead to safety risks, economic loss, and indirect global warming impacts.
- Limited data on hydrogen leakage rates.
- Gaps exist in technologies and methods for detection at sub-ppm levels, quantification, monitoring, and mitigation.



Source: Emerging Tech Brew

Innovations

1. Conduct R&D to improve the sensitivity, accuracy, durability, scalability, and cost of hydrogen detection and quantification technologies.
2. Gather data to improve understanding of hydrogen leakage rates along the supply chain (e.g., production, delivery, storage, end-uses).
3. Develop hydrogen leakage prevention solutions for key points in the supply chain where leaks may be concentrated.



Source: NREL

Source: Columbia University

Benefits

- Advance hydrogen leakage detection, quantification, and prevention products to support emerging hydrogen supply chains.
- Obtain data to inform and implement mitigation and prevention strategies.
- Minimize safety, economic, and indirect global warming impacts of leakage as hydrogen scales up as a decarbonization pathway.

Air Pollutant Exposure Assessment in California Residences

Topic Area: Building Decarbonization

Presenters: Maninder Thind & Susan Wilhelm

Background

- Exposure data is extremely limited.
- Difficult to characterize due to complexity of problem.

- Support building decarbonization, maximization of health benefits.

- Exposure assessment framework will advance accounting for benefits.

Innovations

1. Rigorous basis for quantitative exposure assessment: laboratory *and* field measurements.
2. Laboratory work will link cooking patterns to concentrations of health-damaging pollutants (e.g., $PM_{2.5}$, NO_2) in controlled settings.
3. Fieldwork needed to characterize factors that are strong determinants of exposures (e.g., appliance use patterns, ventilation).
4. Exposure framework will enable quantification of health benefits across diverse households.

Source: NREL

Source: PSE Healthy Energy

Benefits

- Support building decarbonization policy that maximizes health and equity benefits.
- Support future efforts to monetize health impacts of electrification (possible leverage point for funding).
- Inform evaluation of impacts of building electrification programs.

California Sustainable Energy Entrepreneur Development (CalSEED) – Low Carbon Gas

Entrepreneur Development

Presenter: Michael Ferreira

Background

- Modeled after EPIC-funded CalSEED:
  - Supported over 90 startups; over $190M of follow-on funding.
- Provide starting capital to develop proofs-of-concept into prototypes.
- Focus on Technology Readiness Levels 2-4.
- Initiated 2021 – Program begins 2023, 1st Solicitation release 2024.

CalSEED

Innovations

- Pathway for intellectual property to go from lab to commercial venture.
- Possible technology areas :
  - Industrial processes
  - Carbon capture
  - Medium- and heavy-duty transportation using hydrogen
  - Hydrogen production and infrastructure

Source: Hydrogen-Central

Source: Climeworks

Benefits

- Advancing/supporting robust cleantech ecosystem in California.
- Increased safety from technologies that can predict, detect, and repair gas infrastructure threats.
- Cost effective solutions to decarbonize hard-to-electrify existing uses of fossil gas.
- Improved air quality through development of fossil gas alternatives.

Federal and Private Cost Share

Topic Area: Cross Cutting

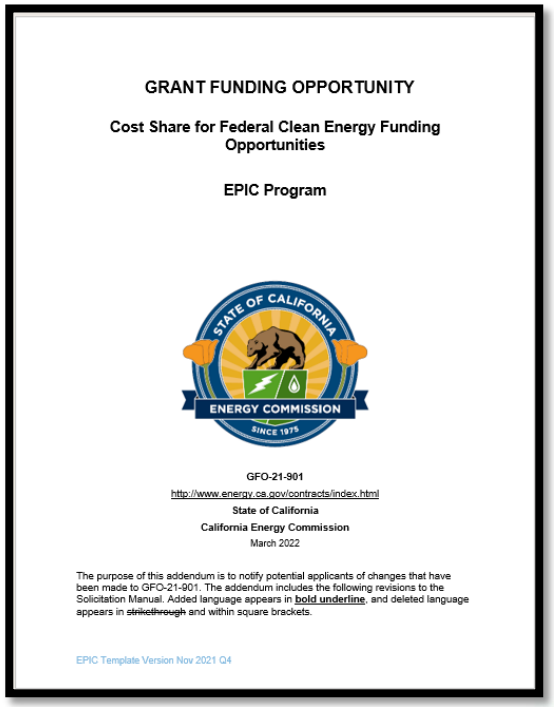
Presenter: Claire Sweeney

Background

- Modeled after EPIC-funded federal cost share solicitation:
  - Successful in leveraging > $100M in DOE funds.
- Federal solicitations require 20% to 50% cost share.
- Private funding sources will also be allowed:
  - Examples: Breakthrough Energy Ventures, ClimateWorks Foundation.
- Providing cost share opportunities attracts funding and projects to California.

Innovations

- Opportunity to fund innovations in industrial decarbonization, transportation, other areas aligned with the Gas R&D program.
- Federal Infrastructure Investment and Jobs Act (IIJA) and the Inflation Reduction Act (IRA) have potential funding:
  - Regional Clean Hydrogen Hub - ARCH$_2$ ES (estimated $1B/award)[1]
  - Regional Direct Air Capture Hub (estimated $3M to $500M/award)[2]
  - Industrial Decarbonization and Environmental Reduction Demonstration to Deployment (estimated $35M-$500M/award)[3]



GRANT FUNDING OPPORTUNITY

Cost Share for Federal Clean Energy Funding Opportunities

EPIC Program

GFO-21-901

http://www.energy.ca.gov/contracts/index.html

State of California

California Energy Commission

March 2022

The purpose of this addendum is to notify potential applicants of changes that have been made to GFO-21-901. The addendum includes the following revisions to the Solicitation Manual. Added language appears in **bold underline**, and deleted language appears in ~~strikethrough~~ and within square brackets.

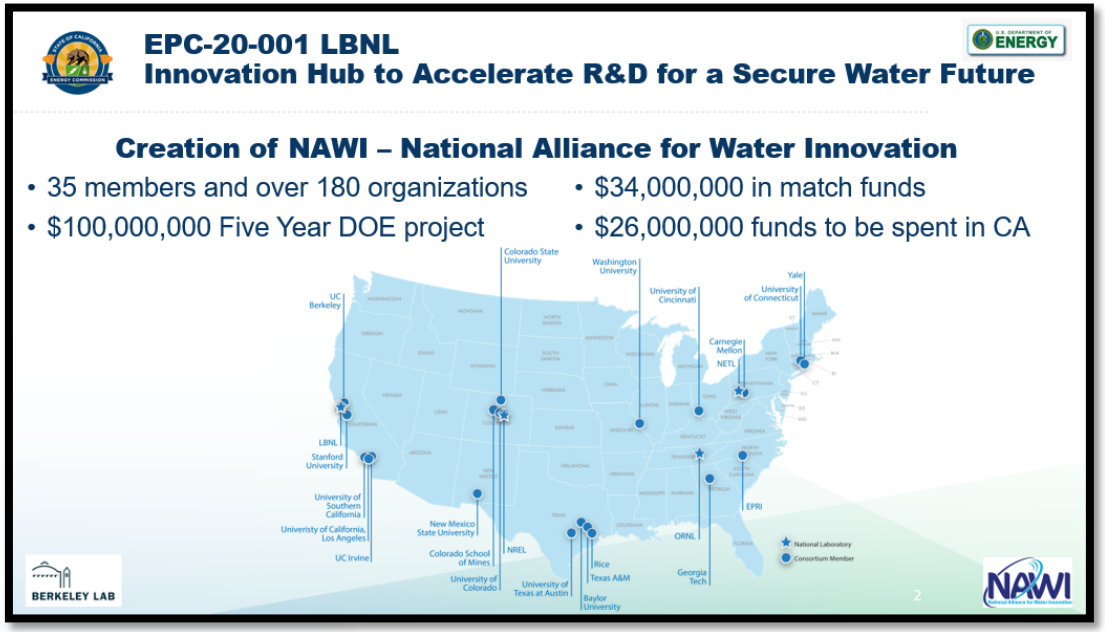
EPIC Template Version Nov 2021 Q4

Source: CEC Website (Example of EPIC Cost Share GFO)

[1] Clean H2 Hub FOA: 0002779
[2] Regional Direct Air Capture Hub FOA: DE-FOA-0002735
[3] Notice of Intent: DE-FOA-0002935

Benefits

- Increase impact of state funding.
- Attract funding and projects to California, resulting in market growth and jobs.
- Potential to provide localized benefits, such as air quality improvement.
- Support companies/entrepreneurs/researchers developing clean energy technologies.
- Coordinate/collaborate with federal agencies on mutually beneficial projects.
- Increase competitiveness of California-based organizations.



Source: National Alliance for Water Innovation (Example of EPIC Cost Share)

Possible Research Initiative Topics:

FY 2024-2025

- Gas Decommissioning: Supporting equitable, safe, and cost-effective decarbonization of California's gas system.
- Gas System Safety: Deploying innovations to detect and reduce fugitive emissions.
- Transportation: Advancing innovative onboard hydrogen storage and fuel system solutions.
- Renewable Generation: Enhancing fuel-flexible power generation.
- Entrepreneur Development: Continuing investments in CalSEED – Low Carbon Gas.

Questions for Stakeholders

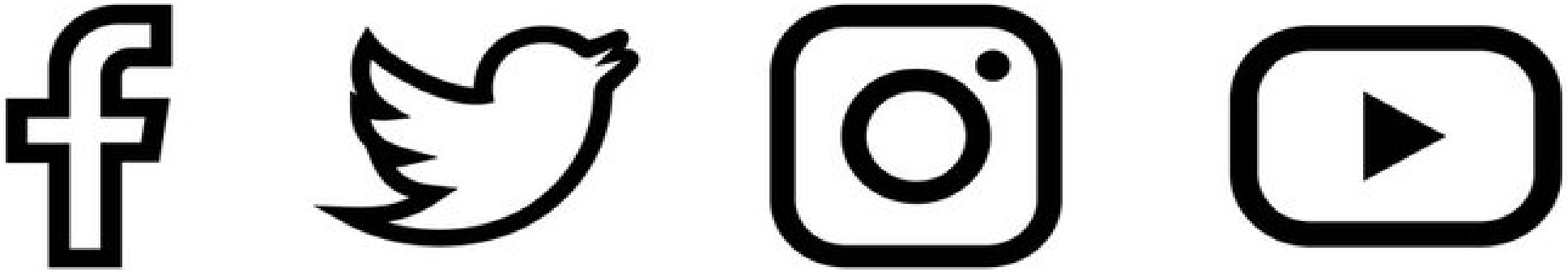
1. What are some resources that can help inform the research initiatives?
2. Please provide a summary of use cases or opportunities that would benefit from these proposed initiatives.
3. Are there any recommended research approaches that could strengthen any of the initiatives?
4. What are example performance metrics or targets that could be used to determine project success?
5. Are there other priority areas that the Gas R&D Program should consider? If so, please provide the proposed scope and a justification, including the urgency for the topic.

Public Comments

- Please submit your question or comment in the **Question and Answers** window.
  - Facilitator will read questions and Team Leads will provide responses.

Next Steps

- Comments can be provided to the PIER Gas Docket until ***January 31, 2023:*** https://efiling.energy.ca.gov/Ecomment/Ecomment.aspx?docketnumber=16-PIER-01
  - Energy Commission staff will consider these comments while developing the *FY 2023-24 Gas R&D Proposed Budget Plan.*
- Proposed Budget Plan will be submitted to California Public Utilities Commission for consideration by April 1, 2023.
- Solicitations derived from this Budget Plan may be released shortly thereafter, contingent on California Public Utilities Commission approval.



Connect with Us

- The Energy Commission can be found on most social media platforms: Facebook, YouTube, Twitter, and LinkedIn.
- Energize Innovation provides access to the CEC R&D project resource libraries, tools, and databases.

www.energizeinnovation.fund/

Thank You!