



California
Energy Commission
Research & Development

Natural Gas Research and Development Program Expansion Overview

Energy Research and Development Division

Arthur Rosenfeld Room
January 25, 2018





Agenda

Time	Topic
1:15 pm	Introduction and Purpose – Laurie ten Hope <ul style="list-style-type: none">• Proposed Natural Gas Research Program Expansion Request• Background and Motivation• Proposed Key Program Features
1:30 pm	Proposed Natural Gas Research Initiatives – Kevin Uy <ul style="list-style-type: none">• Program Impacts• Proposed Key Research Areas• Expanded Program Scope, Timing, and Funding
2:15 pm	Public Comments
3:30 pm	Closing & Next Steps – Laurie ten Hope



Introduction and Purpose

- ▶ Proposed Natural Gas Research Program Expansion Request
- ▶ Background and Motivation
- ▶ Proposed Key Program Features



Proposed Natural Gas Research Program Expansion Request

- ▶ The Energy Commission plans to submit a formal request to the CPUC to expand the Natural Gas Research and Development Program
- ▶ This presentation will brief stakeholders on the planned request, proposed program structure, and proposed key research areas
- ▶ Stakeholder feedback is vital to shaping proposed program structure and research initiatives



Program Background

- ▶ The Natural Gas Research and Development Program is funded by a natural gas ratepayer surcharge authorized by legislation in 2001 and was established by the California Public Utilities Commission in 2004
- ▶ The purpose of the Natural Gas R&D Program is to benefit the ratepayers of natural gas investor-owned utilities*
- ▶ The Natural Gas R&D Program funds clean energy technology projects that promote greater natural gas reliability, lower costs, and increased safety
- ▶ Funded projects must support state energy policy, provide community wide benefits including job creation, improved air quality, and economic stimulation, and are not adequately addressed by competitive or regulated entities.
- ▶ Annual program funds total \$24 million

* Pacific Gas and Electric Co., San Diego Gas and Electric Co., and Southern California Gas Company



Feedback on Program Expansion

- ▶ The potential program expansion was first presented at the FY 2017/2018 Natural Gas Stakeholder workshop
- ▶ Several stakeholders strongly supported expansion of the Natural Gas Research Program, and offered suggestions regarding the funding level and research focus
- ▶ The feedback received was used to inform the proposed research areas and funding levels discussed later in the presentation



Motivation for Increased Funding

- ▶ New research needs have arisen due to legislation and recent events
 - ▶ New mandates and goals to dramatically reduce GHGs, increase energy efficiency, increase renewable generation, and improve freight sustainability
 - ▶ Major natural gas infrastructure failures
 - ▶ Natural events including prolonged drought, extensive tree mortality, record wildfires, and climate change-related subsidence and seawater rise



Motivation for Increased Funding

- ▶ The Energy Commission has shifted funding to new areas to respond to these priority topics
- ▶ However, the current program funding level has become a limitation
- ▶ Despite expanding research needs, program funding has not increased since 2009



Proposed Key Program Features

- ▶ Increased focus on critical research topics – safety, environment, and transportation – and on disadvantaged and low income communities
- ▶ Expansion of program scope to include market facilitation, small grants, and cost-share
- ▶ Change in program timing
- ▶ Greater coordination with IOUs
- ▶ Increased level of funding



Proposed Natural Gas Research Initiatives

- ▶ Program Impacts
- ▶ Proposed Key Research Objectives
- ▶ Proposed Program Timing, IOU Coordination, and Funding

Program Impacts



Energy Efficient Appliances for
Commercial Food Service



Informing Residential
Building Energy Standards

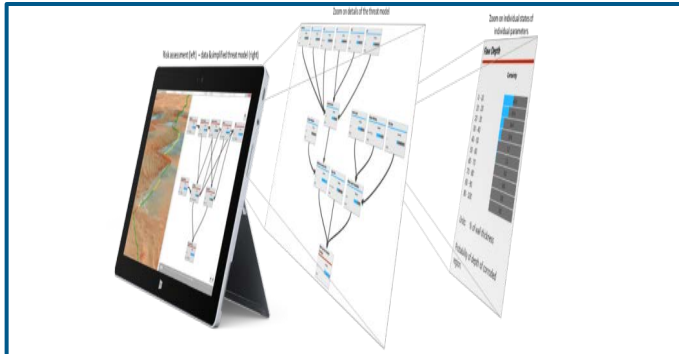


Energy Retrofits for Low
Income Housing

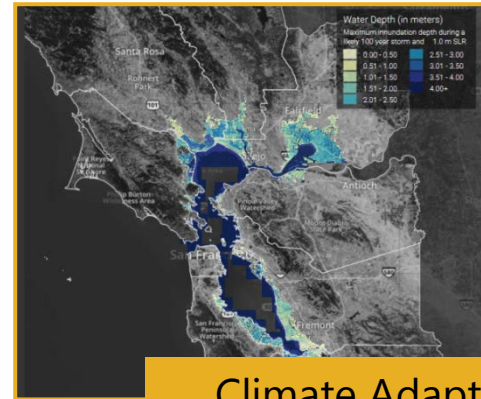


Reducing Natural Gas Use
in Food Processing

Program Impacts



Pipeline Risk Management



Climate Adaptation



Highly Efficient Low Emission Small CHP



Near Zero NOx Engine Development



Proposed Key Program Objectives

- ▶ Expanding the Research Program would enable the Energy Commission to contribute to achieving the following key program objectives:
 - ▶ Alleviating Pressure on the Aliso Canyon Service Area
 - ▶ Benefiting Low Income and Disadvantaged Communities
 - ▶ Mitigating and Adapting to Critical Safety Incidents and Extreme Events
 - ▶ Realizing Landmark Greenhouse Gas and Short Lived Climate Pollutant Reduction Goals
 - ▶ Accelerating Sustainable Freight in California's Transportation Corridors
 - ▶ Expanding the California Energy Ecosystem to the Gas Sector



Alleviating Pressure on the Aliso Canyon Service Area

- ▶ Goal: Significantly reduce natural gas dependence in the Aliso Canyon service area
- ▶ Proposed Research:
 - ▶ **Programmatic** approach that includes: a) applied research to plan and maximize use of **low or no carbon alternatives** to reduce natural gas dependence; b) test advanced technologies; c) demonstrate and deploy the technologies/appliances in the Aliso Canyon affected areas, and d) provide program support such as community technical assistance, deployment and documentation of benefits.
 - ▶ Develop **integrated** community scale, holistic approach that includes demonstration of advanced/ emerging technologies coupled with use of renewable generation and transportation to minimize natural gas use.
 - ▶ Examples include advanced solar thermal, ultra clean and efficient distributed generation (e.g. fuel cell or hybrid generation), and other systems integrated to dramatically reduce natural gas consumption
 - ▶ Applies to residential, commercial, and industrial sectors



Benefiting Low Income and Disadvantaged Communities

- ▶ Goal: Contribute to economic development and air quality improvement in California's low income and disadvantaged communities
- ▶ Proposed Research:
 - ▶ Working with Community Based Organizations, develop a **programmatic** approach that includes: 1) applied research to identify and test advanced technologies aimed at DACs including low or no carbon alternatives to natural gas; 2) demonstrate and deploy the technologies in DACs and/or low income areas; and 3) provide technical support to help DACs identify and implement best low carbon approaches
 - ▶ For example, deep multi-family housing retrofits
 - ▶ Applies to residential, commercial, industrial, and agricultural sectors



Mitigating and Adapting to Critical Safety Incidents and Extreme Events

- ▶ Goal: Build resilience in the natural gas system to extreme events such as wildfire and flooding
- ▶ Proposed Research:
 - ▶ Expand California Expertise by Fostering Natural Gas Safety Research at California State Universities
 - ▶ Develop low-cost technologies for wide deployment to significantly improve infrastructure management and emergency response and improve emissions monitoring
 - ▶ Climate Change-Related Natural Gas System Climate Vulnerability and Adaptation Research



Realizing Landmark GHG and SLCP Reduction Goals

- ▶ Goal: Provide awards of the appropriate size and scope to realize deep GHG emissions reductions
- ▶ Proposed Research:
 - ▶ Deep building retrofits using advanced technologies that will significantly reduce GHG emissions in large commercial buildings, such as prisons, universities and hospitals*
 - ▶ Deep industrial retrofits deploying advanced technologies that will significantly reduce on-site GHG emissions in industrial facilities*
 - ▶ Examples include heat capture and recycling, high efficiency industrial combined heat and power, and other systems to significantly reduce greenhouse gas emissions
 - ▶ Awards proportional to facility size – \$5 to \$10 million
 - ▶ Demonstrate, evaluate, and deploy highly advanced technologies for long-term methane monitoring research (e.g. micro-satellites)

* Focus on Cap and Trade covered entities



Accelerating Sustainable Freight in California's Transportation Corridors

- ▶ Goal: Deploy near-zero NOx engines in long haul and off-road applications while reducing the carbon intensity of the fuel supply
- ▶ Proposed Research:
 - ▶ Off-Road Locomotive and Marine Vessel Technology Demonstration and Deployment
 - ▶ Heavy-Duty Vehicle Pilot Demonstration and Deployment Strategies for Accelerating Adoption
 - ▶ Expanding Low-Carbon RNG Fuel Adoption for Transportation by Optimizing Production, Distribution, and Fueling Locations



Expanding the California Energy Ecosystem to the Gas Sector

- ▶ Goal: Foster Natural Gas-Related Energy Innovations and Bringing Promising Technologies to Market
- ▶ Proposed Research:
 - ▶ Small Grants Program – provide proof-of-concept funding to promising natural gas related technologies
 - ▶ Innovation Clusters – provide key support services to entrepreneurs and start-up companies
 - ▶ BRIDGE – streamlined process to competitively award follow-on funding for previous successful projects
 - ▶ Cost-Share Program – to leverage other funding opportunities such as federal, state, and local government



Proposed Program Timing

- ▶ Change submission of research plans from annual to triennial (from every year to every three years)
- ▶ Several advantages of triennial planning including:
 - ▶ Ability to establish long-term research goals and plan research accordingly
 - ▶ Larger and more impactful funding opportunities
 - ▶ Increased preparation time for researchers prior to funding opportunities



IOU Funding and Coordination

- ▶ Plan would propose a portion (20%) of funding be administered by the Natural Gas IOUs:
 - ▶ Pacific Gas & Electric Company, Southern California Gas Company, and San Diego Gas & Electric
- ▶ The Energy Commission would establish this IOU funding on the condition of increased coordination
- ▶ Coordination would ensure that proposed research is consistent with overall program objectives



Proposed Level of Funding

- ▶ Increase in funding level from \$24 million annually to \$70 million annually
 - ▶ \$56 million administered by the Energy Commission annually
 - ▶ \$14 million administered by the IOUs annually



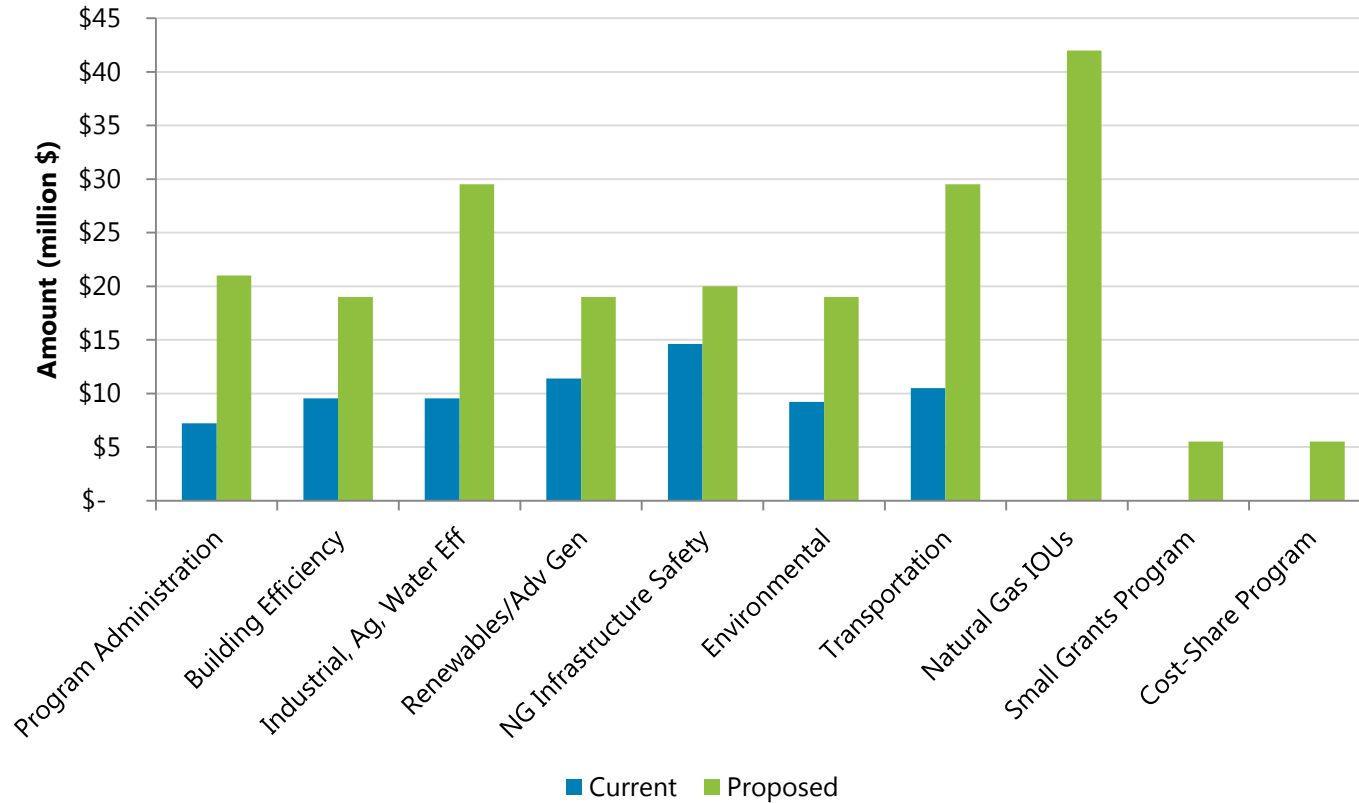
Proposed Level of Funding

Research Area	Amount	% Total
Natural Gas IOUs	\$42,000,000	20%
Building Energy Efficiency	\$19,000,000	9%
Industrial, Ag, Water Efficiency	\$29,500,000	14%
Renewable Energy and Adv Gen	\$19,000,000	9%
Natural Gas Infrastructure Safety	\$20,000,000	9%
Environmental Related Research	\$19,000,000	9%
Transportation Related Research	\$29,500,000	14%
Natural Gas Small Grants	\$5,500,000	3%
Natural Gas Federal Cost-Share	\$5,500,000	3%
Program Administration*	\$21,000,000	10%
Total Program Budget (Triennial)	\$210,000,000	

*Includes IOU and Energy Commission Administration



Proposed Level of Funding





Questions for Stakeholders

- ▶ Will fewer, but larger awards (e.g., \$5 million each) increase program participation and result in significant greenhouse gas and emission reductions?
- ▶ What steps can the Energy Commission take to increase collaboration between targeted sectors and California based researchers and technology developers?
- ▶ What natural gas technologies and strategies will provide the greatest impact and benefit to low income, disadvantaged, and/or agricultural communities?
- ▶ What is needed to get proven clean and efficient technologies widely adopted and thus provide full benefits to ratepayers?
- ▶ What near and mid term research on end-use technologies can best help alleviate natural gas shortages caused by the Aliso Canyon storage facility?
- ▶ How can we leverage technologies from other industries to improve the safety and integrity of the natural gas infrastructure?



Questions for Stakeholders (cont.)

- ▶ How can we increase participation in our programs, especially from large users of natural gas, or the capped facilities on CARB's list?
- ▶ What research would be beneficial to helping industries and large commercial buildings best meet the energy and environmental challenges, especially the greenhouse gas reduction goals of 2030 and 2050?
- ▶ In order to reach the 2030 and 2050 GHG reduction goals, studies suggest electrification of all services will be needed. What R&D is needed to chart a path for hard-to-electrify end uses?
- ▶ Should the Energy Commission investigate other potential pathways for dramatic GHG emissions reduction? For example are hydrogen and synthetic natural gas production technologies and carbon capture and sequestration technologies worth investigating?

Public Questions and Comments



- ▶ Please state your name and affiliation
- ▶ Please limit time to 3 minutes to allow enough time for others



Next Steps

- ▶ Receive stakeholder feedback on proposed key research areas and expanded program scope
- ▶ Host additional workshop(s) to further refine program goals, structure, and research topics
- ▶ Submit formal request to CPUC in Q2 2018



Closing Comments

Please submit additional written comments related to the Natural Gas Research Program Expansion to:

Kevin Uy

Kevin.Uy@energy.ca.gov

Deadline to submit questions:

Friday, February 9, 2018 5:00 PM PDT