PUBLIC UTILITIES COMMISSION OF THE STATE OF CALIFORNIA

ENERGY DIVISION **RESOLUTION G-3555**
August 1, 2019

R E S O L U T I O N

Resolution G-3555. The California Energy Commission requests approval of its Fiscal Year 2019-2020 natural gas research budget.

PROPOSED OUTCOME:

- Approves the California Energy Commission's (CEC's) *Natural Gas Research and Development Program, Proposed Program Plan and Funding Request for Fiscal Year 2019-2020* with a budget of $24 million, pursuant to California Public Utilities Commission Decision (D.) 04-08-010, and approves the use of an additional $8.1 million in unspent encumbered funds.

SAFETY CONSIDERATIONS:

- This Resolution approves and prioritizes $4 million to advance natural gas infrastructure safety and integrity projects. Successful research in this area will support safe infrastructure operation.

ESTIMATED COST:

- Approves $24 million for Fiscal Year 2019-2020, as previously authorized by D.04-08-010.

SUMMARY

This Resolution approves the California Energy Commission's (CEC's) *Natural Gas Research and Development Program Proposed Program Plan and Funding Request for Fiscal Year 2019-2020* (FY 2019-2020 Plan). The Natural Gas Research and Development Program (Gas R&D Program) was established pursuant to Decision (D.) 04-08-010. The California Public Utilities Commission (CPUC or Commission) approves CEC's proposed $32.1 million budget and provides additional implementation guidance.

BACKGROUND

Procedural History

In 2002, the Commission instituted Rulemaking (R.) 02-10-001 to implement Assembly Bill 1002 (Wright, 2000).[1] In that proceeding, the Commission addressed various issues related to the design and implementation of a surcharge to fund gas public purpose programs, resulting in D.04-08-010.

D.04-08-010 establishes certain criteria for gas research and development (Gas R&D) projects to be approved under this program, namely that the projects:

1) Focus on energy efficiency, renewable technologies, conservation and environmental issues,
2) Support State energy policy,
3) Offer a reasonable probability of providing benefits to the general public, and
4) Consider opportunities for collaboration and co-funding opportunities with other entities.

Additionally, the Decision defines public interest Gas R&D activities as those which "are directed towards developing science or technology, 1) the benefits of which accrue to California citizens and 2) are not adequately addressed by competitive or regulated entities."[2]

D.04-08-010 also designates CEC as administrator of the Gas R&D Program. CEC administers various public interest research programs and is publicly accountable, being subject to the Bagley-Keene Open Meeting Act and the Public Records Act.[3] CEC selects funding areas, which the Commission then reviews and approves.

---

[1] Available at https://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill_id=199920000AB1002.

[2] D.04-08-010 at 25.

[3] D.04-08-010 at 31.

D.04-08-010 reserves ultimate oversight for the Commission. The Commission is responsible for adopting the Gas R&D Program, and for setting the surcharge to fund it. The Decision clarifies that the Commission has final responsibility to "approve and resolve administration, funding, project approval, or other matters, and make a final decision."[4] The Decision further designates the Commission's Energy Division to serve as this Commission's advisor.

Starting with the FY 2014-2015 Gas R&D Plan, Resolution G-3484 (2013) requires CEC to provide an accounting, by research area, of then-current unspent funds in the Gas R&D Program, including encumbrances and expiration dates. This requirement shall remain in place for each fiscal year's proposed budget, until otherwise directed by the CPUC.

Budget

D.04-08-010 establishes a zero-based budget for the Gas R&D Program. Historically, each year CEC has requested, and the Commission has approved, the maximum budget increase over the previous year. Starting at $12 million for 2005, the Gas R&D Program budget increased by the maximum annual amount allowed of $3 million each year until 2009. In 2009, the budget reached the maximum amount allowed of $24 million per year and has remained at this level to the present.[5]

In the FY 2019-2020 Plan, CEC continues to request the maximum $24 million. In addition, CEC requests to use $8.1 million of encumbered but unspent funds that the Commission previously approved for prior years' R&D plans. These funds have already been collected from ratepayers and do not constitute an increased cost to ratepayers. CEC's total budget for 2019-2020 is $32.1 million ($24 million in annual funds and a one-time supplement of $8.1 million in unspent funds). CEC has historically been granted the use of 10 percent of Gas R&D funds for program administration. Ten percent ($2.4 million) of the $24 million maximum

[4] D.04-08-010 at 32.

[5] D.04-08-010 at 38.

annual budget was approved for program administration for the years that contributed to the accumulation of the $8.1 million in unspent funds.

Request for Fiscal Year 2019-2020

On March 29, 2019, CEC submitted its request to Energy Division for Fiscal Year 2019-2020. In addition to providing its FY 2019-2020 Plan, CEC also provided information on prior program activities and expenditures.

DISCUSSION

The Commission has reviewed and evaluated CEC's *Natural Gas Research and Development Program: Proposed Program Plan and Funding Request for Fiscal Year 2019-20* based on the following:

- Consistency with D.04-08-010
- Consistency with Resolution G-3546
- Consistency with Resolution G-3484
- Reasonableness of budget request

Consistency with D.04-08-010

D.04-08-010 requires CEC to provide an annual plan to Energy Division outlining its proposed projects. In accordance with the Decision, CEC provided the annual proposed Gas R&D Program FY 2019-2020 Plan to the Commission's Energy Division on March 29, 2019. CEC presented the FY 2019-2020 Plan in a public workshop held on January 24, 2019 and received feedback from stakeholders. Energy Division reviewed CEC's report and found it to be submitted properly in compliance with the Decision.

D.04-08-010 also requires that Gas R&D projects: 1) Focus on energy efficiency, renewable technologies, conservation and environmental issues, 2) Support State energy policy, 3) Offer a reasonable probability of providing benefits to the general public , and 4) Consider opportunities for collaboration and co-funding opportunities with other entities. Consistent with criteria 1 – 3, CEC's proposed budget for the FY 2019-2020 Plan allocates the $32.1 million budget to the following program areas:

- Energy Efficiency ($10.0 million)
- Renewable Energy and Advanced Generation ($3.0 million)
- Energy Infrastructure ($4.0 million)
- Energy-Related Environmental Research ($2.0 million)
- Natural Gas Transportation ($6.6 million)

Additionally, CEC proposes two cross-cutting program areas for FY 2019-2020:

- Natural Gas Strategic Planning Research ($1.0 million)
- Natural Gas Small Grants Program ($2.29 million)

Following guidance from the Decision, CEC allocates 10 percent of the maximum annual plan budget ($2.4 million) to program administration. Appendix A of this Resolution delineates CEC's proposed budget allocations and Appendix B provides a table of projects for FY 2019-2020.

The basic program areas meet the criteria for public interest Gas R&D projects identified in the Decision. CEC reasonably selected Gas R&D program areas, allocated the program's budget to the different program areas, and provided a detailed accounting of stakeholder input on the proposed plan.

Consistency with Resolution G-3546 (2019)

In Resolution G-3546, the Commission directed CEC, in its FY 2019-2020 Plan, to:

- Incorporate an explicit long-term strategy for the role of the Gas R&D Program in the more aggressive statewide decarbonization goals set by Senate Bill 100 (De León, 2018) and Executive Order B-55-18
- Examine the use of the Gas R&D Program to ease the transition from natural gas to less carbon intensive sources
- Enhance its engagement with disadvantaged communities

CEC has adequately addressed both the need for an explicit long-term strategy for the role of Gas R&D Program in meeting statewide decarbonization goals and the use of the Gas R&D Program to ease the transition to less carbon intensive

sources in the natural gas system through the two strategic planning research initiatives proposed in the FY 2019-2020 Plan.

The FY 2019-2020 Plan at page 3-4 describes how planned initiatives will benefit disadvantaged communities. While CEC informed the Disadvantaged Communities Advisory Group and a list of contacts at community-based organizations of their Natural Gas Stakeholder Workshop, CEC did not receive any direct feedback or participation from members or representatives of disadvantaged communities. Given the timing of resolution G-3546, which the Commission approved on January 31, 2019, and CEC's submission of its FY 2019-2020 Plan fewer than two months later on March 29, 2019, we acknowledge that CEC may not have had sufficient time to increase its engagement with disadvantaged community stakeholders in response to Resolution G-3546. However, we reaffirm our commitment to Disadvantaged Communities in future CEC Plans and encourage CEC to consult with the Disadvantaged Communities Advisory Group on outreach and stakeholder engagement.

We additionally note that only two stakeholders provided comment to CEC's Proposed Natural Gas Research Initiatives workshop, held January 24, 2019. In future Gas R&D plans, the Commission requests that CEC enhance its general outreach and engagement at earlier stages of development to ensure substantive and timely feedback from stakeholders, which could include campuses of the University of California or California State University systems, or community colleges. CEC's next Gas R&D Plan should document its outreach activities.

Consistency with Resolution G-3484 (2013)

Resolution G-3484 directs the CEC to include in their proposed budget an account, by research area, of then-current unspent funds in the program, including encumbrances and expiration dates. Guided by D.04-08-010, the research areas have historically included some variant of:

- Energy Efficiency
- Renewable Energy and Advanced Generation
- Energy Infrastructure
- Energy-Related Environmental Research

- Natural Gas Transportation

However, other research areas are sometimes included in Gas R&D plans, such as the Natural Gas Small Grants research area from the FY 2019-2020 Plan.

The CEC has two years to encumber[6] Gas R&D Program funds with projects, and an additional four years before such funds expire. After those six years, remaining funds must be approved for re-investment by the Commission. Beginning with the FY 2014-2015 proposed budget, the CEC has been required to include in its proposed budget an account of then-current, unspent funds in the Gas R&D Program, including encumbrances and expiration dates. The intent of this requirement is to show that the CEC has spent its cumulative authorized budgets in the areas in which the money was authorized and to provide an accounting of the status of cumulative unspent funds. This requirement shall remain in place for each fiscal year's proposed budget, until otherwise directed by the Commission.

In its FY 2019-2020 Plan, CEC identifies $8.1 million in unspent funds that it wishes to apply to the current budget cycle. As these funds have been encumbered but unspent, their use does not constitute an increased cost to ratepayers. The Commission finds the use of these funds appropriate considering the aggressive decarbonization goals set by Senate Bill 100 (De León, 2018) and Executive Order B-55-18 and the importance of innovation in California's natural gas system to meet these goals.

However, a review of Gas R&D Plans from FY 2014-2015 to FY 2019-2020 shows that a full accounting of then-current unspent funds has never been given. That is, CEC has not provided the Commission with the expiration date, encumbrances, or respective research area of unspent funds for any year in which this requirement has been in force. Instead, CEC has provided only the total amount of then-current unspent funds for each fiscal year's plan.

[6] Encumbered funds are funds committed to projects but which have not yet been spent (see www.ebudget.ca.gov/reference/GlossaryOfTerms.pdf).

Within 120 days of the effective date of this Resolution, CEC shall provide to Energy Division a report that, for the period FY 2014-2015 to FY 2018-2019:

a) Provides expenditures, by program area, for the Gas R&D Program.
b) Provides a full accounting of unspent funds, by program area, including encumbrances and expiration dates.
c) Summarizes accomplishments of the Gas R&D Program, including a count of patents, copyrights, publications, and citations; an accounting of leveraged public and private funds; the successful commercialization of Gas R&D-funded projects; the development of any codes, standards, or protocols based on project results; and any other metrics of success CEC uses in tracking project and program accomplishments. This is meant to provide a high-level overview of Program results to supplement the Program's annual reports.

If CEC requests to use encumbered but unspent funds for new projects in the future, the request should identify the respective research areas the Commission originally authorized the funding for, as well as encumbrances and expiration dates for these funds, consistent with the direction in G-3484. It is important for the Commission to have information on which research areas received funds that went unspent in order to recognize any trends and better optimize the Gas R&D budget allocation across research areas.

Reasonableness of Budget Request

D.04-08-010 provides for Commission review of the "reasonableness of the funding level, and the overall R&D program" after four years, i.e., sometime after FY 2009-2010. The Commission is in the process of developing a timeline for such a review and is gathering information for this purpose.

In the interim, we elect to maintain CEC as the administrator and maximum funding level at $24 million per year. We approve the CEC's proposed budget of $24 million for FY 2019-2020 and the one-time use of $8.1 million in unspent funds. This funding level has no precedential value regarding the overall program review or funding levels beyond FY 2019-2020, as the CEC must propose a zero-based budget for each fiscal year. Pending an assessment of the

reasonableness of the overall R&D program, the maximum limit for program funding at $24 million is reasonable.

CEC's request for administrative expenses ($3.21 million, or 10 percent of the total proposed budget) is an appropriate use of ratepayer funds. The Commission approves the use of $3.21 million, or 10 percent of the total funding amount of $32.1 million, for program administration. We adopt this limit and require the CEC to adhere to it and encourage the CEC to continue to keep such expenses at 10 percent or less of the *maximum annual budget* of $24 million for future budget proposals.

Summary of Assessment of FY 2019-2020 Plan

The Commission approves CEC's proposed $32.1 million budget as described in its *Natural Gas Research and Development Program: Proposed Program Plan and Funding Request for Fiscal Year 2019-2020*.

Additional Guidance for FY 2019-2020 Plan

In response to Assembly Bill 617 (Garcia, 2017), the California Air Resources Board (CARB) created the Community Air Protection Program (CAPP).[7] CAPP focuses on reducing exposure to air pollution in those communities most impacted by it. CARB has selected 10 CAPP communities throughout California in the initial round of CAPP. The Commission requests that CEC consider linkages with CAPP communities in its administration of the Gas R&D Program. Two research areas that have potential overlap with the goals of CAPP are the Natural Gas Small Grants Research Program and Energy-Related Environmental Research, though there may be others as Gas R&D projects develop.

Guidance for Fiscal Year 2020-2021 Plan

In developing its Fiscal Year 2020-2021 Plan, the CEC shall do the following:

[7] For more information on CAPP, please visit https://ww2.arb.ca.gov/index.php/our-work/programs/community-air-protection-program/about

- Enhance outreach and engagement with representatives and members of disadvantaged communities. Within the FY 2020-2021 Gas R&D Plan, CEC must provide documentation showing which disadvantaged community stakeholders were engaged, how CEC engaged them, what feedback they provided, and how CEC incorporated it. This requirement shall remain in effect for each fiscal year's proposed budget.
- Enhance outreach and engagement with all stakeholders and document outreach within the plan.
- Continue examining the role of natural gas in our state's transition to a low carbon economy. This could include examining opportunities to use natural gas infrastructure to support hydrogen that will be generated and/or used in way that reduces system GHG emissions.
- Ensure coordination and consistency with goals of the Air Resources Board's 2017 Climate Change Scoping Plan Update by 1) Ensuring safety of the natural gas system; 2) Decreasing fugitive methane emissions; and 3) Reducing dependence on fossil fuel natural gas.
- Continue targeting of Emissions-Intensive and Trade-Exposed Facilities consistent with state goals under Assembly Bill 32.
- Consider the health impacts associated with natural gas usage inside homes.
- Ensure coordination with the Commission's Methane Leak Proceeding (R.15-01-008) for any leakage-related Gas R&D work, especially energy-related environmental research.
- Ensure that for any use of encumbered and unspent funds the CEC requests for new projects, CEC's request identifies the respective research areas for which the Commission originally authorized the funding.

Additionally, the Commission has identified the following topic areas as needed to inform our proceedings and policies. In developing their FY 2020-2021 Gas R&D Plan, CEC must consider research to do the following:

- Examine the causation, diagnostics, and mitigation of microbiologically influenced corrosion of pipelines and storage facilities in the California natural gas industry, especially as this relates to safety.
- Assess the effects of delivering hydrogen through the existing natural gas pipeline network, including the impact on pipeline facilities, natural gas generators, and end-use appliances.

- Research the operational, health, and safety consequences of various concentrations of siloxane in biomethane supplies.
- Perform research to establish a standard test method approved by the National Environmental Laboratory Accreditation Program (NELAP) and Department of Defense Environmental Laboratory Accreditation Program (DoD ELAP) for detecting siloxane in biomethane.

If CEC does not include any of the four topic areas listed above in their FY 2020-2021 Gas R&D Plan, CEC must provide their rationale within the Plan.

COMMENTS

Public Utilities Code section 311(g)(1) provides that this resolution must be served on all parties and subject to at least 30 days public review. Section 311(g)(2) provides that this 30-day review period and 20-day comment period may be reduced or waived upon the stipulation of all parties in the proceeding.

All parties in the proceeding have stipulated to reduce the 30-day review period required by PU Code section 311(g)(1) to 20 days. Accordingly, this matter will be placed on the first Commission's agenda 20 days following the mailing of this draft resolution. By stipulation of all parties, the comment period was also reduced. Comments were due 10 days following the mailing of this draft resolution. California Energy Commission (CEC) and Pacific Gas and Electric Company (PG&E) filed comments on the draft resolution on July 1, 2019.

In their comments, CEC claims that Commission staff were erroneous in stating that the use of $810,000 of unspent funds for program administration would account for a double counting of program funds. Additionally, CEC states that, if the use of these funds for program administration were denied, they would rescind their request for the approval of the use of $8.1 million in unspent funds due to an inability to pay for the administration of projects resulting from these funds. CEC also requests that the requirement to file with the Commission a plan on how the $810,000 will be reallocated be removed and that these funds instead be reinstated for program administration. Given the Commission’s desire to see CEC follow through on all the projects proposed in their FY 2019-2020 Gas R&D Plan, the resolution was modified to allow the use of $810,000 for program administration.

Regarding Commission guidance on CEC FY 2020-2021 plan, CEC in their comments request that Commission guidance for specific research areas be suggestive as opposed to prescriptive. While still highlighting Commission priorities, the Commission recognizes the need for some flexibility in CEC's Gas R&D planning to ensure the program is maximizing ratepayer benefits. For example, while the Commission may need research results to inform a proceeding, if the CEC finds in its planning process that another entity is conducting this research, we would not want them to use ratepayer funds on duplicative research efforts. We updated language in the "Guidance for Fiscal Year 2020-2021" section to clearly identify Commission research needs, while allowing for this flexibility.

CEC claims that the record should be corrected regarding stakeholder engagement throughout the development of the FY 2019-2020 Gas R&D Plan due to a mischaracterization of the efforts by Commission staff. Relatedly, CEC states that they place a high value on stakeholder outreach and implements an accessible public process that provides multiple opportunities for stakeholder input. The Commission has not suggested otherwise but has instead highlighted the need for *increased* engagement with disadvantaged communities.

Regarding the Commission's request for CEC to consider potential overlap in the goals of the CARB CAPP and CEC's Natural Gas Small Grants Program and Energy-related Environmental Research, CEC states that CARB and CEC staff meet regularly to coordinate research activities, identify opportunities to leverage funds, and avoid duplication. Additionally, CEC states that they will further discuss CAPP with CARB to identify potential synergies or overlap between the programs, but that there does not appear to be any overlap on initial analysis. The Commission appreciates CEC's input on this issue and no changes to the resolution are needed.

In their comments, PG&E offers support for the need of CEC to improve communication with stakeholders and states their own commitment to supporting CEC in this regard. Additionally, PG&E notes that some of their recommendations have been included in the 2019-2020 Gas R&D Plan.

Regarding the budget allocation for the FY 2019-2020 Gas R&D Plan, PG&E proposes that the Renewable Energy and Advanced Generation program area be increased from $3.0 million to $7.8 million. This increase would be funded through decreases in the Natural Gas Transportation and Energy Efficiency

program areas of $2 million each and the reallocation of $810,000 in proposed program administration funds. PG&E does not provide enough rationale to substantiate the proposed changes. We decline to change the budget allocation at this time as CEC's proposed allocation is appropriate and adequately informed by the stated policy drivers. However, the Commission encourages CEC to continue evaluating the appropriate budget allocation among program areas based on evolving industry trends, technology needs, and policy drivers.

Finally, PG&E encourages CEC to collaborate with organizations in the United States and abroad that coordinate project funding and management, noting that CEC workshops in July 2015 and July 2017 were good starts for this collaboration.

FINDINGS

1. The California Energy Commission (CEC) filed its Fiscal Year 2019-2020 Natural Gas Research and Development Program budget and program plan, per Decision (D.) 04-08-010.
2. CEC's proposed R&D project areas meet the criteria set forth in D.04-08-010.
3. CEC reasonably selected Gas R&D project areas, and reasonably allocated the Fiscal Year 2019-2020 R&D budget to the different project areas.
4. CEC adequately incorporates guidance from G-3546 in its FY 2019-2020 Gas R&D plan regarding the need for an explicit long-term strategy for the role of Gas R&D in meeting statewide decarbonization goals and the use of Gas R&D to ease the transition to less carbon intensive sources in the natural gas system.
5. Given the timing of the Commission's prior Resolution G-3546 and the submission of CEC's current plan fewer than two months later, CEC may not have had sufficient time to increase its engagement with disadvantaged communities in response to the resolution.
6. Only two stakeholders provided comment to CEC's Proposed Natural Gas Research Initiatives workshop.

7. CEC has not provided the Commission with the expiration date, encumbrances, or respective research area of unspent funds for any year in which this requirement has been in force.
8. The Commission has not yet determined the reasonableness of the overall Gas R&D Program or of the funding level beyond FY 2019-2020.
9. CEC's request for administrative expenses is appropriate.
10. CEC's proposed R&D plan and budget in its *Natural Gas Research, Development, and Demonstration Program, Proposed Program Plan and Funding Request for Fiscal Year 2019-2020* should be adopted for a maximum budget of $24 million plus the one-time use of $8.1 million in unspent funds.

THEREFORE IT IS ORDERED THAT:

1. CEC remains the program administrator for the Natural Gas R&D program for FY 2019-2020.
2. The Gas R&D program funding level for FY 2019-2020 is $24 million. There is a one-time supplement of $8.1 million in unspent funds, with 10 percent of this allowed for program administration.
3. CEC's administrative budget is 10 percent of the maximum annual budget of $24 million, or $2.4 million.
4. Within 120 days of the effective date of this Resolution, CEC shall provide to Energy Division a report that, for the period FY 2014-2015 to FY 2018-2019:
    a. Provides expenditures, by program area, for the Gas R&D Program.
    b. Provides a full accounting of unspent funds, by program area, including encumbrances and expiration dates.
    c. Summarizes accomplishments of the Gas R&D Program, including a count of patents, copyrights, publications, and citations; an accounting of leveraged public and private funds; the successful commercialization of Gas R&D-funded projects; the development of any codes, standards, or protocols based on project results; and any

other metrics of success CEC uses in tracking project and program accomplishments. This is meant to provide a high-level overview of Program results to supplement the Program's annual reports.

5. In administering the Fiscal Year 2019-2020 Gas R&D Program, CEC should consider linkages with communities the California Air Resources Board designated as Community Air Protection Communities.
6. In the Fiscal Year 2020-2021 Gas R&D Plan, CEC shall:
    a. Enhance outreach and engagement with representatives and members of disadvantaged communities. Within the FY 2020-2021 Gas R&D Plan, CEC must provide documentation showing which disadvantaged community stakeholders were engaged, how CEC engaged them, what feedback they provided, and how CEC incorporated this feedback. This requirement shall remain in effect for each fiscal year's proposed budget, until otherwise directed by the Commission.
    b. Enhance outreach and engagement with all stakeholders and document outreach within the Gas R&D Plan.
    c. Continue examining the role of natural gas in our state's transition to a low carbon economy. This could include examining opportunities to use natural gas infrastructure to support hydrogen that will be generated and/or used in a way that reduces system GHG emissions.
    d. Ensure coordination and consistency with goals of the Air Resources Board's 2017 Climate Change Scoping Plan Update by 1) Ensuring safety of the natural gas system; 2) Decreasing fugitive methane emissions; and 3) Reducing dependence on fossil fuel natural gas.
    e. Continue targeting of Emissions-Intensive and Trade-Exposed Facilities consistent with state goals under Assembly Bill 32.
    f. Consider the health impacts associated with natural gas usage inside homes.
    g. Ensure coordination with the Commission's Methane Leak Proceeding (R.15-01-008) for any leakage-related Gas R&D work, especially energy-related environmental research.
7. In developing their FY 2020-2021 Gas R&D Plan, CEC must consider research to do the following. If CEC does not include any of the four topic

areas listed below in their FY 2020-2021 Gas R&D Plan, CEC must provide their rationale within the Plan.

a. Examine the causation, diagnostics, and mitigation of microbiologically influenced corrosion of pipelines and storage facilities in the California natural gas industry, especially as this relates to safety.
b. Assess the effects of delivering hydrogen through the existing natural gas pipeline network, including the impact on pipeline facilities, natural gas generators, and end-use appliances.
c. Research the operational, health, and safety consequences of various concentrations of siloxane in biomethane supplies.
d. Perform research to establish a standard test method approved by the National Environmental Laboratory Accreditation Program (NELAP) and Department of Defense Environmental Laboratory Accreditation Program (DoD ELAP) for detecting siloxane in biomethane.

8. In the Fiscal Year 2020-2021 Gas R&D Plan, CEC shall ensure that, for any use of encumbered and unspent funds the CEC requests for new projects, CEC's request identifies the respective research areas for which the Commission originally authorized the funding.
9. CEC's *Natural Gas Research and Development Program: Proposed Program Plan and Funding Request for Fiscal Year 2019-2020* is approved for a total budget of $32.1 million.

This Resolution is effective today.

I certify that the foregoing resolution was duly introduced, passed and adopted at a conference of the Public Utilities Commission of the State of California held on August 1, 2019; the following Commissioners voting favorably thereon:

/s/Alice Stebbins
ALICE STEBBINS
Executive Director

MICHAEL PICKER
President
LIANE M. RANDOLPH
MARTHA GUZMAN ACEVES
CLIFFORD RECHTSCHAFFEN
GENEVIEVE SHIROMA
Commissioners

Appendix A

Table 1: Natural Gas R&D Budget Plan Summary FY 2019-2020

PROGRAM AREA	PROPOSED BASELINE BUDGET	PROPOSED SUPPLEMENTAL BUDGET
Energy Efficiency	$9,000,000	$1,000,000
Renewable Energy and Advanced Generation	$3,000,000	$0
Natural Gas Infrastructure Safety and Integrity	$2,000,000	$2,000,000
Natural Gas-Related Transportation	$6,600,000	$0
Energy-Related Environmental Research	$0	$2,000,000
Natural Gas Strategic Planning	$1,000,000	$0
Natural Gas Small Grants Program	$0	$2,290,000
Program Administration	$2,400,000	$810,000
TOTAL	**$24,000,000**	**$8,100,000**
GRAND TOTAL	**$32,100,000**	

Source: California Energy Commission *Proposed Program Plan and Funding Request for Fiscal Year 2019-2020*.

Appendix B

Table 2: Natural Gas R&D Proposed Projects FY 2019-2020

PROGRAM AREA	PROJECT	DESCRIPTION
Natural Gas Strategic Planning (Cross-cutting)	Establishing a Long-Term Technological Development Strategy to Meet Aggressive Statewide Decarbonization Goals	This research initiative aims to answer one key question: What technologies need to be prioritized and developed to transition the state towards a carbon neutral energy system? To answer this question an explicit, long-term strategic plan for natural gas technology research will be conducted. First, this strategy will examine each sector and determine how decarbonization could be achieved in the near term (within 5 years), mid-term (5-10 years) or long-term (greater than 10 years). Second, the study should identify, by sector, technologies with the potential to significantly reduce or eliminate GHG emissions. These technologies may be at any point in the energy pathway, from energy source (for example, anaerobic digesters that produce biogas) to end use (such as boilers). Each technology will be characterized in terms of maturity (that is, technology readiness level), scalability, and carbon intensity. The result will be an explicit strategic plan for energy technology research in order to meet state carbon neutrality goals that provides priorities for electrification, renewables, and deep carbon reductions for remaining natural gas.

Natural Gas Strategic Planning (Cross-cutting)	Natural Gas Infrastructure Analysis and Strategic Pathway to a Low-Carbon Energy Future	This research initiative will explore a strategic approach to natural gas pipeline decommissioning. A multi-disciplinary approach is required to tackle such an interconnected topic: technical requirements and limitations of decommissioning, economic analysis of cost burdens, and customer acceptance issues must all be addressed holistically. To this end, the funded entity is expected to: • Develop criteria (such as system age, use patterns, and effect on infrastructure safety and reliability) to determine best geographical candidates for a pilot project. • Perform GHG reduction analysis and cost-benefit analysis comparing gas and electric to electric-only service, including costs over time. • Assess customers most likely to be interested in such a pilot and identify what may persuade customers to relinquish gas service (for example, alternative rate structures, and rebates for electric appliances). • Collaborate with gas utilities to engage customers and execute the project. • Prioritize safety and benefits to ratepayers. • Using the criteria and assessments described above, identify the candidates for a pilot project and explain what that pilot project would entail. The results of this study would be a method for decision makers to determine where natural gas infrastructure retreat is plausible, economically viable, and ratepayer-supported, and would identify a pilot project where this method could be implemented.
Natural Gas Small Gants Program (Cross-cutting)	Establish a Natural Gas Small Grants Program for Energy Entrepreneurs	The Energy Commission will establish a small grants program for natural gas research modeled after the successful CalSEED Initiative, which is funded under EPIC. The Natural Gas Small Grants Program will provide a recurring opportunity for entrepreneurs to apply for up to

		$150,000 in funding to test the feasibility of their energy concept. In addition to the $150,000 in funding, applicants selected through the Natural Gas Small Grants Program will receive technical consulting and are eligible to compete in a future business plan competition for an additional $450,000 to move from concept testing to prototype development. The Natural Gas Program will be administrated by a third party selected through a competitive RFP process. In doing so, a third-party contractor team can bring already established resources and expertise to the table to evaluate technology, support innovative concepts, provide business expertise, and more quickly to start the Natural Gas Small Grants Program. Modelling the Natural Gas Small Grants Program after EPIC's CalSEED Initiative will help ensure the success of the program while lowering the administrative costs associated with starting a new research initiative.
Energy Efficiency	Developing and Demonstrating Advanced Combustion Systems	Researchers would develop and demonstrate economically viable advanced combustion systems that can enhance the efficiency of existing boilers or furnaces for industrial plants, such as: • Chemical looping combustion: Technologies that generate oxygen for combustion in situ and eliminate the need for conventional oxygen production. • Oxy-fuel combustion: Combustion processes that use pure oxygen instead of air will improve energy efficiency, reduce NOx, and enable CO2 capture. Higher oxygen concentration allows use of low-calorific fuels, such as biofuels. However, oxygen separation is expensive. High-purity oxygen is required to eliminate NOx, but even moderate levels of oxygen enrichment provide efficiency improvements. Membranes and other absorption techniques for cheaper oxygen production are under development, but there is space for improvement. Available

		cryogenic technology may also be viable for larger facilities, but thorough analysis, use of by-products, and system-level integration are required to make it cost-effective. Use of by-product inert nitrogen (extracted at temperatures below -300ºF) for food conservation, refrigeration, separation of gases and liquids, and reuse of heat extracted from air during cryogenic separation provides additional benefits. • Use of waste energy sources (including absorption chillers, thermoelectric elements, and so forth) and by-products (such as the use of cryogenically extracted nitrogen for food conservation, refrigeration, separation of gases and liquids). • Direct (retrofitted or new equipment) or indirect heating (including infrared heating). • Technologies will focus on improving efficiency, reducing costs, and reducing environmental impact compared to conventional combustion systems.
Energy Efficiency	Innovative Solutions for Facades and Envelopes	Develop and demonstrate cost-effective integrated, manufactured façade solutions, such as: • Creating packages of integrated envelope solutions that include innovative technologies such as triple pane windows, advanced insulation, sealants, cool paint, and fire resistance • Develop materials that will improve the energy efficiency of existing single-pane windows in commercial and residential buildings while minimizing installation and materials cost. • Develop an approach for manufacturing aesthetically pleasing custom façade and cladding retrofits that can be pre-assembled offsite and installed quickly at the building location.

		• Develop and test insulating 3D printed facades for new commercial buildings. Phase 1 would include a contest for manufacturers for façade development and Phase 2 would include the full build out of façade solutions for new commercial buildings. • Test and demonstrate new building envelope materials, including windows, insulation, window coverings, sealants and other measures.
Renewable Energy and Advanced Generation	Solar Heating, Cooling, and Power for Industrial Applications	This initiative proposes that RD&D support technological advances to support the adoption of solar heating, cooling, and power for industrial applications. Projects will advance the state of the art that will lead to cost-effective deployment of solar thermal systems, which could be a combination of solar thermal heating, heat-driven cooling technologies, heat-to-power technologies, or hybrid systems, for industrial applications. Projects are expected to leverage advancement in medium- to medium-high-temperature (for example, 125°C to 400°C) solar thermal collection systems, typically based on solar concentrating systems and evacuated tubes, and develop integration approaches that lower the system cost and expand application in the industry. Applications anticipated for this initiative would include heating processes, integration with cooling systems, and distributed generation anchored on a solar thermal system. Specific projects will focus on: • Improving thermal medium and heat exchange approaches to achieve high process temperature and increase system efficiency. • Developing and demonstrating an integrated industrial solar thermal-driven cooling or refrigeration system. • Developing and demonstrating an industrial solar thermal system that provides thermal energy for heating

		processes or provides subsequent cooling application and distributed power generation. Systems providing solar heat and power could take advantage of various technologies like organic Rankine cycle, thermoelectric, or integration of PV while maintaining or improving performance over comparable standalone thermal collectors. • Demonstrating integration and installation approaches that lowers the overall system cost over traditional linear concentrator on a per-kW basis.
Natural Gas Infrastructure Safety and Integrity	Advancing Technologies to Better Locate Depth of Subsurface Natural Gas Pipelines	This initiative proposes RD&D of the latest advanced technologies to identify the depth of subsurface natural gas pipelines in California with better accuracy, reliability, and confidence. Possible projects include, but are not limited to: • Demonstrating technologies that are able to measure the depth of subsurface pipelines from the ground and validating the technologies in real-world situations. • Applying the same or different technologies to depth identification of plastic and metallic pipelines subject to various covering materials. • Integrating pipeline depth information to horizontal location data, and developing an interface to enter, process, and visualize complete geographic information system (GIS) data on handheld devices, such as a tablet. • Improving the accuracy and reliability of pipeline depth identification cost-effectively. • Addressing the affecting factors in a real-world situation, including cover depth, types of cover material, existence of other assets in the vicinity, and so forth., and quantifying the performance and limitations of specific technologies.

Energy-Related Environmental Research	Further Characterizing Methane Emissions Development of Residential Sector Mitigation Methods for Methane Leakage	This research will fund studies to conduct field measurement of methane emissions from a large sample of California homes. The sample size must be sufficiently large to represent all building types in California. The additional measurements will include multifamily units, which are often in disadvantaged communities. Due to the different building characteristics, a new measurement method may be developed to measure emissions from other building types, particularly multifamily units. This research includes developing methods that can cost-effectively identify and stop leaks in California homes. The methods developed must be able to quantify the total methane emissions from a home. The study will then develop a mitigation strategy (or strategies) that could include sealing leaks in pipes, updating or replacing old combustion appliances, and other strategies. For this phase of the research, the research team will first test the method in the laboratory under conditions of known methane leakage rates to check the effectiveness of the quantification and mitigation methods. Once laboratory testing validates the approach, the research team should identify several homes with substantial emissions and apply the mitigation measures. The amount of methane emissions will be measured before and after the mitigation measures are applied. The emission reductions must be verified and the research team must demonstrate that consequent low emission rates can be maintained for a long duration.
Natural Gas-Related Transportation	Demonstrate Advanced Zero-Emission Fuel Cell Technologies in Rail and Marine Applications at California Ports	This initiative proposes research, development, and demonstration that expands the utilization of zero-emission fuel cell technologies in mobile applications that are difficult to decarbonize using battery-electric alternatives. Projects should be located at highly impacted areas such as California ports to maximize environmental and public health benefits to disadvantaged communities. Possible projects include, but are

		not limited to: • Conversion of an existing diesel switcher or intrastate locomotive operating at a California port to zero-emission using fuel cell technology. • Development of a zero-emission fuel cell harbor craft such a tugboat or ferry with sufficient torque, speed, and operating range to support the specific duty cycle. Projects should focus on addressing vehicle integration and design challenges related to electrifying locomotives and marine vessels using fuel cells. Proposed technologies and architectures must demonstrate the ability to meet performance demands, vehicle design constraints, durability expectations, interoperability, maintainability, and safety requirements of the application. Projects must plan for fueling infrastructure access to support typical operations with considerations to procure renewable fuels. Fuel cell and battery systems should be sized to provide the necessary power and range needed for the designated locomotive or harbor craft's typical duty cycle. Fuel cell and battery chemistries should also match the operational needs of the application. Proton exchange membrane fuel cells that use hydrogen as fuel have seen commercial deployment in light-duty vehicles and limited demonstration in locomotive and maritime applications. Advanced fuel cell chemistries such as solid oxide fuel cells can internally process hydrocarbon fuels such as natural gas, which may be more attractive due to its higher energy density and infrastructure availability; however, these fuel cell technologies require early level research before they can be demonstrated in mobile applications.

Source: California Energy Commission *Proposed Program Plan and Funding Request for Fiscal Year 2019-2020*.