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GRANT FUNDING OPPORTUNITY

Natural Gas Infrastructure Safety and Integrity

GFO-18-TBD

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

State of California

California Energy Commission

September 2018

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I. Introduction

A. Purpose of Solicitation

The purpose of this solicitation is to fund energy infrastructure research projects that meet the following initiatives:

- Seismic Risk Assessment of Natural Gas Storage and Pipeline Infrastructure
- Enhanced Training and Tools for Conducting Pipeline Inspections

California has 14 underground natural gas storage projects in 12 fields with a capacity of 385.4 billion cubic feet of natural gas.[1] There are about 350 active wells associated with those fields. The natural gas transmission and distribution pipelines total 118,000 miles throughout the state.[2] Since 2001, several accidents involving underground natural gas storage and pipeline infrastructure have occurred, including the San Bruno pipeline explosion and Aliso Canyon natural gas storage leak. These events have highlighted the need to assess and improve natural gas infrastructure safety and integrity. The California Energy Commission (Energy Commission) has identified the research needs on: (1) seismic risk assessment of natural gas infrastructure; and (2) enhanced training and tools for natural gas engineers and inspectors.

In the event of an earthquake in California, the underground natural gas pipeline and storage facilities may experience significant damage, resulting in catastrophic incident and gas supply disruption. While the utilities have approaches to identify seismic risks, there is general agreement that more research is needed to better identify, prioritize, and mitigate these risks. Therefore, new and advanced methods should be developed to assess seismic impacts to these facilities, conduct system vulnerability reviews, and improve the overall safety and integrity of natural gas infrastructure.

Substantial research has been conducted on seismic risks to above-ground built infrastructure in California; however, very little research has been conducted on potential seismic risks to underground natural gas storage and little research covers the threat of certain risks such as landslides to above ground natural gas infrastructure.

In addition, detailed analyses are time comsuming and expensive and cannot be readily conducted on all natural gas infrastructure. An advanced seismic risk analysis methodology is needed to enable more efficient and effective analysis of seismic risks to natural gas infrastructure and to prioritize mitigation activities. These capabilities are needed by the California Department of Conservation, Division of Oil, Gas, and Geothermal Resources (DOGGR), the California Public Utilities Commission (CPUC) and natural gas infrastructure owners and operators.

A finding from the independent review following the San Bruno natural gas explosion was that natural gas infrastructure inspectors of the CPUC could benefit from additional California-specific training beyond that provided through Pipeline and Hazardous Materials Safety Administration (PHMSA) required programs.[3] While these nationally provided programs are well regarded, the CPUC inspectors could benefit from more experiential, virtual, or in-field training activities. The

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[1] Lawrence Berkeley National Laboratory. "Keeping California's natural gas system safe." ScienceDaily. ScienceDaily, 19 June 2017. <www.sciencedaily.com/releases/2017/06/170619132914.htm>.

[2] PHMSA Pipeline Miles and Facilities. https://hip.phmsa.dot.gov/analyticsSOAP/saw.dll?Portalpages.

[3] Crowe Horwath LLP. “Gas Safety and Reliability Branch Management and Operations Review: Report and Recommendations.” 2015.

commercial state of training technology has advanced significantly with new capabilities that include high definition visualization capability, advanced pipeline infrastructure simulation, and tools to integrate existing and new technologies for field use. New approaches could be leveraged to improve the CPUC inspection process, thus improving the safety and integrity of California's natural gas infrastructure.

The Gas Safety and Reliability Branch (GSRB) in the Safety and Enforcement Division of the CPUC performs safety assurance inspections and incident investigations of natural gas operators throughout California. GSRB inspectors would benefit from enhanced in-field inspection and training tools and approaches to investigate, identify and respond to leaks and verify leak repairs. Simulated or actual training scenarios would provide opportunities for inspectors to further hone skills.

Projects must fall within the following project groups:

- **Group 1**: Seismic Risk Assessment of Underground Natural Gas Storage and Pipeline Infrastructure
- **Group 2**: Enhanced Training and Tools for Conducting Pipeline Inspections

See Part II of this solicitation for project eligibility requirements. Applications will be evaluated as follows: Stage One proposal screening and Stage Two proposal scoring. Applicants may submit multiple applications, though each application may address only one of the project groups above. If an applicant submits multiple applications that address the same project group, each application must be for a distinct project (i.e., no overlap with respect to the tasks described in the Scope of Work, Attachment 6).

B. KEY WORDS/TERMS

Word/Term	Definition
Applicant	The respondent to this solicitation
Application	An applicant's formal written response to this solicitation
CAM	*Commission Agreement Manager,* the person designated by the Energy Commission to oversee the performance of an agreement resulting from this solicitation and to serve as the main point of contact for the Recipient
CAO	Commission Agreement Officer
CEQA	California Environmental Quality Act
CPUC	California Public Utilities Commission
Days	Days refers to calendar days
Disadvantaged Community	These are communities defined as areas representing census tracts scoring in the top 25% in *CalEnviroScreen 3.0*. (https://oehha.ca.gov/calenviroscreen/report/calenviroscreen-30)
DOGGR	California Department of Conservation, Division of Oil, Gas, and Geothermal Resources
Energy Commission	California Energy Commission
GSRB	Gas Safety and Reliability Branch
NG IOU	*Natural Gas Investor-owned Utility,* including Pacific Gas & Electric Co., San Diego Gas & Electric Co., and Southern California Gas Co.
NOPA	*Notice of Proposed Award,* a public notice that identifies award recipients
PHMSA	Pipeline and Hazardous Materials Safety Administration
Principal Investigator	The lead scientist or engineer for the applicant's project, who is responsible for overseeing the project; in some instances, the Principal Investigator and Project Manager may be the same person
Project Manager	The person designated by the applicant to oversee the project and to serve as the main point of contact for the Energy Commission

Word/Term	Definition
Project Partner	An entity or individual that contributes financially or otherwise to the project (e.g., match funding, provision of a test site), and does not receive Energy Commission funds
Recipient	The recipient of an award under this solicitation
Solicitation	This entire document, including all attachments and exhibits ("solicitation" may be used interchangeably with "Grant Funding Opportunity")
State	State of California

C. APPLICANTS' ADMONISHMENT

This solicitation contains application requirements and instructions. Applicants are responsible for reading the solicitation **carefully**: asking appropriate questions in a timely manner; ensuring that all solicitation requirements are met; submitting all required responses in a complete manner by the required date and time; and **carefully rereading** the solicitation before submitting an application. In particular, please carefully read the **Screening/Scoring Criteria and Grounds for Rejection** in Part IV, and the terms and conditions at: http://www.energy.ca.gov/research/contractors.html.

Applicants are responsible for the cost of developing applications. This cost cannot be charged to the State. All submitted documents will become public records upon the posting of the Notice of Proposed Award.

D. BACKGROUND

1. Natural Gas R&D Program

This solicitation will award projects under the Natural Gas program, which is funded by a ratepayer surcharge on natural gas consumed by ratepayers of NG IOUs in California (see California Public Utilities Code § 890). The CPUC designated the California Energy Commission as administrator of the program in August 2004.[4] The purpose of the program is to benefit California natural gas ratepayers by funding public interest research and development activities, which the CPUC has defined as "developing science or technology, the benefits of which accrues to California citizens and are not adequately addressed by competitive or regulated entities."[5]

2. Program Areas, Strategic Objectives, and Funding Initiatives

Natural Gas R&D projects must fall within one or more specific focus areas (**"research initiatives"**) identified in the Natural Gas R&D Budget Plan. This solicitation targets the following research initiative(s) from the Natural Gas R&D Budget Plan for Fiscal Year 2016/2017[6] and Fiscal Year 2017/2018[7]:

- **Natural Gas R&D Budget Plan for Fiscal Year 2016/2017 and Fiscal Year 2017/2018 Research Area**: Energy Infrastructure
  - **Research Initiative** Seismic Risk Assessment and Management of Underground Natural Gas Storage Infrastructure
  - **Research Initiative:** Enhanced Methods, Tools, and Assessments for Natural Gas Infrastructure Safety and Integrity Management

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[4] See CPUC Decision 04-08-010, August 19, 2004, http://docs.cpuc.ca.gov/PublishedDocs/WORD_PDF/FINAL_DECISION/39314.PDF.

[5] *Id.* at pp. 25 and 46.

[6] 2016. *The Natural Gas Research Development and Demonstration Program: Proposed Program Plan and Funding Request for Fiscal Year 2016-17*. California Energy Commission. http://www.energy.ca.gov/2016publications/CEC-500-2016-063/CEC-500-2016-063.pdf

[7] 2017. *The Natural Gas Research Development and Demonstration Program: Proposed Program Plan and Funding Request for Fiscal Year 2017-18*. California Energy Commission.

3. Applicable Laws, Policies, and Background Documents

This solicitation addresses the energy goals described in the following laws, policies, and background documents.

Laws/Regulations

- **SB 887 Natural Gas Storage Wells**

  SB 887 requires the operator of a gas storage well, before January 1, 2018, to have commenced a mechanical integrity testing regime specified by the Division of Oil, Gas, and Geothermal Resources in the California's Department of Conservation and would require the division to promulgate regulations that establish standards for all gas storage wells. It also requires the division to determine by regulation what constitutes a reportable leak from a gas storage well and the timeframe for reporting those leaks, as specified. Until the regulations are in effect, this bill would require the operator to notify the division immediately of a leak of any size from a gas storage well.

  Additional information:
  https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201520160SB887

Policies/Plans

- **Executive Order B-30-15**

  Governor Brown's Executive Order B-30-15 established a new interim statewide greenhouse gas emission reduction target to reduce greenhouse gas emissions to 40% below 1990 levels by 2030, to ensure California meets its target of reducing greenhouse gas emissions to 80% below 1990 levels by 2050.

- **Governor Brown Aliso Canyon Gas Leak Proclamation**

  Governor Brown issued a proclamation that declares the Aliso Canyon natural gas leak an emergency. The order also directs further action to protect public health and safety, ensure accountability and strengthen oversight of gas storage facilities.

  Additional Information: https://www.gov.ca.gov/2016/01/06/news19264/

- **CPUC's Natural Gas Safety Action Pan**

  The Natural Gas Safety Action Plan is a high-level, Gas Safety Action Plan to guide and promote the CPUC's shift in culture from the traditional compliance model to a regulatory structure that sets, monitors, and enforces rules for regulated utilities based on risk assessment and risk management. The Gas Safety Action Plan also tracks the CPUC's implementation of improvements responsive to recommendations made by the Independent Review Panel and the National Transportation Safety Board in response to the PG&E San Bruno pipeline explosion that occurred on September 9, 2010. As part of the Plan, the CPUC engaged in an in-depth review of its current practices and procedures to seek areas for improvement in gas pipeline safety.

  Additional information: http://www.cpuc.ca.gov/General.aspx?id=2496

E. FUNDING

1. Amount Available and Minimum/Maximum Funding Amounts

There is **up to $6,700,000** available for grants awarded under this solicitation. The total, minimum, and maximum funding amounts for each project group are listed below.

Project Group	Available funding	Maximum award amount	Minimum match funding (% of Natural Gas Funds Requested)
Group 1: Seismic Risk Assessment and Management of Natural Gas Storage and Pipeline Infrastructure	$5,000,000	$5,000,000	0%
Group 2: Enhanced Training and Tools for CPUC Inspectors	$1,700,000	$1,700,000	0%

2. Match Funding Requirement

Match funding is not required for this solicitation. However, applications that include match funding will receive additional points during the scoring phase.

- **Match funds** include the following if used for project expenses: (1) cash in hand funds; (2) equipment; (3) materials; (4) information technology services; (5) travel; (6) subcontractor costs; (7) contractor/project partner in-kind labor costs; and (8) advanced practice costs. Match funding sources include the prime contractor, subcontractors, and pilot testing/demonstration/deployment sites (e.g., test site staff services).

  Match funds **do not** include: Energy Commission awards, future/contingent awards from other entities (public or private), the cost or value of the project work site, or the cost or value of structures or other improvements affixed to the project work site permanently or for an indefinite period of time.

  Definitions of "match funding" categories are listed below.

  - **Cash in hand Funds** means funds that are in the recipient's possession and are reserved for the proposed project, meaning that they have not been committed for use or pledged as match for any other project. Cash in hand funds include funding awards earned or received from other agencies for the proposed technologies or study (but not for the identical work). Proof that the funds exist as cash is required. Cash in hand funds will be considered more favorably than other types of match funding during the scoring phase.

- **Equipment** means an item with a unit cost of at least $5,000 and a useful life of at least one year. **Purchasing equipment with match funding is encouraged** because there are no disposition requirements at the end of the agreement for such equipment. Typically, grant recipients may continue to use equipment purchased with Energy Commission funds if the use is consistent with the intent of the original agreement.
- **Materials** means tangible project items that cost less than $5,000 and have a useful life of less than one year.
- **Information Technology Services** means the design, development, application, implementation, support, and management of computer-based information systems directly related to the tasks in the Scope of Work. All information technology services in this area must comply with the electronic file format requirements in Subtask 1.1 (Products) of the Scope of Work (Attachment 6).
    - **Travel** means all travel required to complete the tasks identified in the Scope of Work. Travel includes in-state and out-of-state travel, and travel to conferences. Use of match funds for out-of-state travel and travel to conferences is encouraged because the Energy Commission might not approve the use of its funds for such travel. Applicants should be aware of all state and shall adhere to travel restrictions of using state funds to travel to certain other states pursuant to AB 1887 (2016) and codified at California Government Code Section 11139.8. All applicants are encouraged to go to the Attorney General's website https://oag.ca.gov/ab1887 for a current list of states subject to travel restrictions. Grants awarded under this solicitation shall not contain travel paid for with Commission funds (applicants can instead use match funds) to the listed states unless the Commission approves in writing that the trip falls within one of the exceptions under the law.
- **Subcontractor Costs** means all costs incurred by subcontractors for the project, including labor and non-labor costs.
- **Contractor/Project Partner In-Kind Labor Costs** means contractor or project partner labor costs that are not charged to the Energy Commission.
- **Advanced Practice' Costs** means costs not charged to the Energy Commission that represent the incremental cost difference between standard and advanced practices, measures, and products used to implement the proposed project. For example, if the cost of purchasing and/or installing insulation that meets the applicable building energy efficiency standard is $1/square foot and the cost of more advanced, energy efficient insulation is $3/square foot, the Recipient may count up to $2/square foot as match funds.

- Match funds may be spent only during the agreement term, either before or concurrently with natural gas funds. Match funds also must be reported in invoices submitted to the Energy Commission.
- All applicants providing match funds must submit commitment letters that: (1) identify the source(s) of the funds; (2) justify the dollar value claimed; (3) provide an unqualified (i.e., without reservation or limitation) commitment that guarantees the availability of the funds for the project; and (4) provide a strategy for replacing the funds if they are significantly reduced or lost. Please see Attachment 11, Commitment and Support Letter Form. Commitment and support letters must be submitted with the application to be considered.

3. Change in Funding Amount

Along with any other rights and remedies available to it, the Energy Commission reserves the right to:

- Increase or decrease the available funding and the group minimum/maximum award amounts described in this section.
- Allocate any additional or unawarded funds to passing applications, in rank order.
- Reduce funding to an amount deemed appropriate if the budgeted funds do not provide full funding for agreements. In this event, the Recipient and Commission Agreement Manager will reach agreement on a reduced Scope of Work commensurate with available funding.

F. KEY ACTIVITIES SCHEDULE

Key activities, dates, and times for this solicitation and for agreements resulting from this solicitation are presented below. An addendum will be released if the dates change for activities that appear in **bold.**

ACTIVITY	DATE	TIME[8]
Solicitation Release	October 2018	
Pre-Application Workshop	**October 2018**	**TBD**
Deadline for Written Questions[9]	**TBD**	**5:00 p.m.**
Anticipated Distribution of Questions and Answers	TBD	
Deadline to Submit Applications	**November 2018**	**3:00 p.m.**
Anticipated Notice of Proposed Award Posting Date	December 2018	
Anticipated Energy Commission Business Meeting Date	TBD	
Anticipated Agreement Start Date	TBD	
Anticipated Agreement End Date	TBD	

G. NOTICE OF PRE-APPLICATION WORKSHOP

Energy Commission staff will hold one pre-application workshop to discuss the solicitation with potential applicants. Participation is optional but encouraged. Applicants may attend the workshop in-person, via the internet (WebEx, see instructions below), or via conference call on the date and at the time and location listed below. Please call (916) 654-4381 or refer to the Energy Commission's website at www.energy.ca.gov/contracts/index.html to confirm the date and time.

Date and time: TBD
Location: California Energy Commission
1516 9th Street
Sacramento, CA 95814

[8] Pacific Standard Time or Pacific Daylight Time, whichever is being observed.

[9] This deadline does not apply to non-technical questions (e.g., questions concerning application format requirements or attachment instructions) or to questions that address an ambiguity, conflict, discrepancy, omission, or other error in the solicitation. Such questions may be submitted to the Commission Agreement Officer listed in Section H at any time prior to the application deadline. Please see Section H for additional information.

H. QUESTIONS

During the solicitation process, direct questions to the Commission Agreement Officer listed below:

TBD, Commission Agreement Officer
California Energy Commission
1516 Ninth Street, MS-18
Sacramento, California 95814
Telephone: (916)
FAX: (916) 654-4423
E-mail: TBD

Applicants may ask questions at the pre-application workshop, and may submit written questions via mail, electronic mail, and by FAX. However, all **technical** questions must be received by the deadline listed in the "Key Activities Schedule" above. Questions received after the deadline may be answered at the Energy Commission's discretion. **Non-technical** questions (e.g., questions concerning application format requirements or attachment instructions) may be submitted to the Commission Agreement Officer (CAO) at any time prior the application deadline.

A question and answer document will be e-mailed to all parties who attended the pre-application Workshop and provided their contact information on the sign-in sheet. The questions and answers will also be posted on the Commission's website: http://www.energy.ca.gov/ contracts/index.html.

If an applicant discovers a **conflict, discrepancy, omission, or other error** in the solicitation at any time prior to the application deadline, the applicant may notify the Energy Commission in writing and request modification or clarification of the solicitation. The Energy Commission, at its discretion will provide modifications or clarifications by either an addendum to the solicitation or by written notice to all parties who requested the solicitation. At its discretion, the Energy Commission may re-open the question/answer period to provide all applicants the opportunity to seek any further clarification required.

Any verbal communication with a Commission employee concerning this solicitation is not binding on the State and will in no way alter a specification, term, or condition of the solicitation. Therefore, all communication should be directed in writing to the assigned CAO.

II. Eligibility Requirements

A. Applicant Requirements

1. Eligibility

This solicitation is open to all public and private entities and individuals. Demonstration proposals in this solicitation must be located in the service territory of a California natural gas Investor Owned Utility (NG IOU), which includes Pacific Gas & Electric Company, San Diego Gas & Electric Company, and Southern California Gas Company. All projects in this solicitation must benefit natural gas IOU ratepayers.

2. Terms and Conditions

Each grant agreement resulting from this solicitation will include terms and conditions that set forth the recipient's rights and responsibilities. By signing the Application Form (Attachment 1), each applicant agrees to enter into an agreement with the Energy Commission to conduct the proposed project according to the terms and conditions that correspond to its organization, without negotiation: (1) University of California and California State University terms and conditions; (2) U.S. Department of Energy terms and conditions; or (3) standard terms and conditions. All terms and conditions are located at http://www.energy.ca.gov/research/contractors.html.

Failure to agree to the terms and conditions by taking actions such as failing to sign the Application Form or indicating that acceptance is based on modification of the terms will result in **rejection** of the application. Applicants **must read** the terms and conditions carefully. The Energy Commission reserves the right to modify the terms and conditions prior to executing grant agreements.

3. California Secretary of State Registration

All corporations, limited liability companies (LLCs), limited partnerships (LPs) and limited liability partnerships (LLPs) are required to be registered and in good standing with the California Secretary of State prior to its project being recommended for approval at an Energy Commission business meeting. If not currently registered with the California Secretary of State, applicants are encouraged to contact the Secretary of State's Office as soon as possible to avoid potential delays in beginning the proposed project(s) should the application be successful. For more information, contact the Secretary of State's Office at http://www.sos.ca.gov/. Sole proprietors using a fictitious business name must be registered with the appropriate county and provide evidence of registration to the Energy Commission prior to their project being recommended for approval at an Energy Commission business meeting.

4. California-Based Entities

Pursuant to California Public Resources Code § 25620.5(h), the California Energy Commission's Natural Gas Program must give priority to "California-Based Entities" (CBE) when making awards. California Public Resources Code § 25620.5(i) defines "CBE" as a corporation or other business entity organized for the transaction of business that either:

- Has its headquarters in California **and** manufactures in California the product that is the subject of the award; **or**
- Has an office for the transaction of business in California and substantially manufactures the product or substantially performs the research within California that is the subject of the award.

Proposals must meet the following requirements to receive CBE preference points:

- The proposal must include a CBE as either the recipient or a subcontractor.
- The budget must show that the CBE(s) will receive more than 60.00% of the funds awarded.

5. Disadvantaged Communities

In 2012, the Legislature passed Senate Bill 535 (de León) directing that, in addition to reducing greenhouse gas emissions, a quarter of the proceeds from the Greenhouse Gas Reduction Fund must also go to projects that provide a benefit to disadvantaged communities. The legislation gives the California Environmental Protection Agency responsibility for identifying those communities.

For more information on disadvantaged communities and to determine if your project is in a disadvantaged community, use the California Communities Environmental Health Screening tool (CalEnviroScreen 3.0) at: https://oehha.ca.gov/calenviroscreen/report/calenviroscreen-30

While it is not required to complete the project within a disadvantaged community, demonstrations in disadvantaged communities are encouraged and will be considered under the scoring criteria for this GFO.

B. PROJECT REQUIREMENTS

1. Project Focus

a. Seismic Risk Assessment and Management of Underground Natural Gas Storage and Pipeline Infrastructure

Projects should focus on developing a risk assessment approach taking into account the nature and origin of earthquakes, seismic ground motion, fault rupture and displacement, site specific soil-structure interactions, current seismic risk, existing approaches to seismic risk vulnerabilities, regulatory requirements, and seismic hazard and risk guidelines in relation to various natural gas storage and pipeline facilities in California. The research includes identification and assessment of seismic hazards, development of seismic design models for pipeline and storage facilities, and derivation of mitigative or preventive measures for current or future natural gas facilities with associated costs. The research should also include an evaluation of existing models and development and validation of more advanced deterministic or probabilistic seismic risk assessment methods and models. Current and future seismic datasets should be integrated into the model. The methods and models should be validated on one or more specific pipeline(s) and/one or more storage facilities in California via site demonstration.

The research should result in a packaged, open-source application product that can be used as a tool for seismic risk assessment and operated from a desktop computer. The immediate users of the tool would be CPUC, DOGGR, and Investor Owned Utilities (IOUs) in California, and the application should be released for their use by addressing their specific needs. In particular, the application tool should be tailored to different levels of analysis, complexity and functionality, so that it can accommodate customized requirements by these user groups.

b. Develop Enhanced Training and Tools for Engineers and Inspectors Responsible for Conducting Pipeline Inspections and Utility Operations Audit

Projects should focus on the development of enhanced training and tools that integrate technologies to improve inspection capabilities beyond those provided by PHMSA training and are tailored to California system operation. The training and tools can include integration of existing proven technologies or development and demonstration of new approaches or technologies. The tools should help CPUC engineers efficiently trace the features and specifications of natural gas facilities, make important decisions in real time, and enhance the capacity and productivity of facility inspection.

The tools should be an open-source application product that can be used on a desktop computer or tablet. In addition, the tools should combine data from past and current inspections, incident investigations, pipeline attributes, and leak data to target inspections to areas of greatest risks. Inputs from remote sensing technologies, such as natural gas sensors and aerial drones, should be integrated into the tools to enhance their analytical ability. The tools should also be able to perform field verification of recently repaired leaks to ensure operator compliance. In addition, the tools can enable in-field inspectors to make important decisions based on data gathered remotely through aerial observation, infrared thermal imaging and/or pipe wall internal stress monitoring within a damaged area, and analyze at-risk areas before failures occur.