

Pre-Application Workshop Questions and Answers

GFO-23-503 - Feasibility of Underground Hydrogen Storage in California

Disclaimer

The following answers are based on California Energy Commission (CEC) staff's interpretation of the questions received. The applicant is responsible for reviewing the Application Manual and determining whether its proposed project is eligible for funding by reviewing the Eligibility Requirements within the solicitation. The CEC cannot give definitive advice as to whether a particular project is eligible for funding, because not all application details are known.

General/Administrative Questions

Q.1. Can one testing/demonstration site provide site commitment letters for multiple grant applications?

Yes, a testing/demonstration site host may provide site commitment letters for multiple grant applications.

Q.2. Can you explain the difference between cash match vs in-kind match?

“Cash” match means the funds that are in the recipient’s possession or proposed by a match partner are clearly identified in a commitment letter and are reserved for the proposed project. “In-Kind” match can be in the form of goods or services that are not reimbursed with CEC funds, such as labor, donated space, existing equipment, and existing supplies. The value of in-kind match is based on the fair market value of the goods and services provided at the time it is claimed as match.

See Section I. J. in the Solicitation Manual for more information.

Q.3. Is a Canadian entity eligible for participation at least as a subrecipient?

Entities outside the United States may participate by providing match funds. However, CEC funds must not be spent outside of the United States. Refer to Section III. C. in the Solicitation Manual:

The budget must NOT identify that CEC funds will be spent outside of the United States or for out-of-country travel. However, match funds may cover these costs if there are no legal restrictions.

Q.4. Our startup is registered in Texas, one of the co-founders and some of our partners are in California. Does it matter who is the Prime in the application?

Entities that are out-of-state but within the United States are eligible to apply as prime applicant but must meet the Applicant Eligibility Requirements. See Section II in the Solicitation Manual for more information.

While there is no preference for in-state versus out-of-state prime applicants, projects that maximize the spending of CEC funds in California will receive points under scoring criterion 6, and projects that maximize the spending of CEC funds on California Based Entities will receive preference points under scoring criterion 8. Applicants are encouraged to review the scoring criteria in Section IV. F. in the Solicitation Manual for more information.

Q.5. I see that CEC Funds Spent in California is worth 5 points (criterion 6). Does that mean 60% spent in California is encouraged but not mandated?

While CEC funds are not required to be spent in California, points are awarded preferentially, depending on the percentage. Those spending at least 60% of CEC funds in California receive preference points, up to the maximum possible points awarded for greater than 98%.

Applicants are encouraged to review the scoring criteria in Section IV. F. to see how funds spent in California affects application scoring.

Q.6. If the proposal includes a pilot study, does the pilot study need to be in California?

Yes, pilot studies must be located in California and within the service territory of an investor owned utility. Refer to Section II. A. in the Solicitation Manual:

Demonstration projects in this solicitation must be located in the service territory of a California gas Investor Owned Utility (Gas IOU), which includes Pacific Gas and Electric Company, San Diego Gas & Electric Company, and Southern California Gas Company.

Q.7. What is CEC's near-term vision beyond this grant funding opportunity? Do you expect this to lead into a field scale pilot hydrogen storage test? Further, do you anticipate additional work surrounding hydrogen storage studies funded by CEC to happen in parallel?

This grant funding opportunity and the resulting project may inform parallel and future research and demonstration projects funded by the CEC.

Q.8. There will likely be contributions of confidential information (i.e. financial) from partners in the performance studies if awarded. Can you please verify there will be a mechanism to protect this information?

Applicants must not include confidential information in the proposal. See Section IV. C. in the Solicitation Manual for more information.

For work products, the Commission Agreement Manager may require the recipient to submit non-confidential versions to the CEC. In the case that confidential information may be required in agreement deliverables or work products, the recipient should follow the procedures outlined in the PIER

Terms and Conditions, located on the CEC's [Funding Resources](https://www.energy.ca.gov/funding-opportunities/funding-resources) page, at <https://www.energy.ca.gov/funding-opportunities/funding-resources> for more information.

Technical Questions

Q.1. Are proposals limited to storage owned by the IOUs or can they involve California's independent gas storage providers?

The storage facilities proposed are not required to be owned by an IOU; however, they must be located in an IOU service territory. Refer to Section II. A. in the Solicitation Manual:

Demonstration projects in this solicitation must be located in the service territory of a California gas Investor Owned Utility (Gas IOU), which includes Pacific Gas and Electric Company, San Diego Gas & Electric Company, and Southern California Gas Company.

Q.2. Would you consider fields with historic gas storage as one of the two considered fields or must they be current active underground gas storage sites in California?

Yes, gas fields with historic gas storage use can be eligible sites if they also meet other site requirements outlined in Section III. C. of the Solicitation Manual.

Q.3. Is the CEC open to active or depleted oil and gas fields as a potential third field for analysis?

Yes, existing gas fields would be eligible if they had previously been used for underground gas storage and meet other site requirements identified in Section III. C. of the Solicitation Manual.

Q.4. Are gas fields owned by IOUs eligible for the GFO?

Yes, gas fields owned by IOUs would be eligible if: 1) they had previously been used for underground gas storage, 2) the IOUs have provided the required site commitment letters, and 3) other site requirements identified in Section III. C. of the Solicitation Manual are met.

Q.5. Can you please detail the expectations for a "robust risk mitigation strategy" for pilot testing and field experiments? Is the description of an applicant's approach to risk mitigation, with a commitment to complete a full risk mitigation plan prior to executing the experiment, responsive to the grant's Project Focus? California regulations define underground gas storage projects specifically for the storage of natural gas, and project operators must submit rigorous and project-specific Risk Management Plans to CalGEM and abide by them. Depending on the nature of the proposed pilot testing and field experiments, it is likely impractical to complete a

full risk analysis in consultation with multiple regulatory agencies before the deadline for the grant application.

Applicants are not expected to have a completed risk mitigation strategy at the time of proposal. A detailed description of the applicant's approach to risk mitigation, with a commitment to complete a full risk mitigation plan prior to executing the experiment, is responsive to the requirement pertaining to field experiments and pilot studies described in Section I. C. in the Solicitation Manual. The applicant's approach to risk mitigation will be evaluated based on the scoring criteria described in Section IV. F. of the Solicitation Manual.

Q.6. How will CEC evaluate a project with a pilot field study vs a project without a pilot study that otherwise address all proposal requirements? Is a pilot study strongly preferred?

Experiments, whether conducted in a lab or the field, and pilot studies will have equal standing. The solicitation allows different project approaches. All proposals will be evaluated based on the scoring criteria found in Section IV. F. of the Solicitation Manual.

Q.7. Could you define the volume of small-scale testing? Injection and production volumes?

Pilot testing is not a requirement and is presented as one potential project approach. If pilot testing is to be conducted, the applicant should identify which volumes of hydrogen are to be used and why they are appropriate.

Q.8. How to define an experiment? Is it lab experiment such as core analyses on cap rock and reservoir rock? Does Reservoir simulations count?

Experiments must include laboratory or field testing. Models and simulations alone would not constitute an experiment. Analysis of cap rock and reservoir rock in controlled environments would be classified as a laboratory experiment while reservoirs simulations alone would not.

Q.9. Green hydrogen must be produced on the storage site? And is the withdrawn gas to be distributed to a specific commercial entity or restored on site?

There are no specific requirements regarding the source of hydrogen to be used in the project's experiments or small-scale pilot studies. However, the solicitation would require that the study be limited to clean renewable hydrogen, which for the purposes of this solicitation is defined as "hydrogen which is produced through a process that results in a lifecycle (i.e. well-to-gas) GHG emissions rate of not greater than 4 kilograms of CO₂e per kilogram of hydrogen produced and does not use fossil fuel as either a feedstock or production energy source," consistent with the CPUC's interim definition adopted in the [Decision Directing Biomethane Reporting and Directing Pilot Projects to Further Evaluate and Establish Pipeline Injection](#)

[Standards for Clean Renewable Hydrogen](https://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M500/K055/500055657.PDF) which can be found at <https://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M500/K055/500055657.PDF>.

The solicitation does not specify whether withdrawn gas should be distributed to a specific commercial entity or restored onsite. However, the research should be inclusive, exploring use cases for various end-use needs.

Q.10. Will the CEC assist in permitting the underground storage test, reservoir storage and wells?

The CEC does not assist with permitting. Permitting costs may be accounted for in match share. Permitting costs and the expenses associated with obtaining permits are not reimbursable with CEC funds with the exception of costs incurred by University of California grant recipients. See Section III. C. in the Solicitation Manual for more information.

Q.11. Can CEC provide guidance on the assumptions to be made on the demand estimates MMT per annum of hydrogen from hard to decarbonize sectors? Given the seasonality of storage, the cycling turns assumptions will dictate the levelized cost of storage.

The CEC's 2023 Integrated Energy Policy Report (IEPR) includes modeling results of the potential growth for hydrogen and its role in decarbonizing the electricity and transportation sectors of the economy required by SB 1075. Additional information can be found in the [Hydrogen Analysis for Electricity Generation in the 2023 IEPR](#) which can be found at: <https://efiling.energy.ca.gov/GetDocument.aspx?tn=252210&DocumentContentId=87216>

The California Air Resources Board's 2022 Scoping Plan provides targets for scaling up renewable hydrogen to achieve the state's goal of carbon neutrality by 2045. The [2022 Scoping Plan](#) and additional information can be found at: <https://ww2.arb.ca.gov/resources/documents/2022-scoping-plan-documents>.

The sources provided in this response are not exhaustive, and the use of up-to-date information from multiple sources is encouraged.

Q.12. Can you provide more details on this: "Experiments should be inclusive of use cases involving storage as well as retrieval of hydrogen blends and sufficiently pure hydrogen for separation and end-use needs"?

Experiments to assess potential impacts of introducing hydrogen to, and retrieving hydrogen from, the selected sites should study both hydrogen blended with gas as well as pure hydrogen. A [Hydrogen Blending Impacts Study](#) prepared by UC Riverside for the CPUC determined that literature gaps exist in the area of hydrogen impacts on underground gas storage beyond 2% blends. The study can be found at:

<https://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M493/K760/493760600.PDF>

Q.13. When do you foresee the project to be underway after the CEC awarded the project?

Staff anticipate taking proposed projects to a CEC Business Meeting for approval in October 2024 with agreements starting in November 2024.

Q.14. Does CEC have a definition of green hydrogen required for this test?

For the purposes of this solicitation, clean renewable hydrogen is defined as “hydrogen which is produced through a process that results in a lifecycle (i.e. well-to-gas) GHG emissions rate of not greater than 4 kilograms of CO₂e per kilogram of hydrogen produced and does not use fossil fuel as either a feedstock or production energy source,” consistent with the CPUC’s interim definition adopted in the [Decision Directing Biomethane Reporting and Directing Pilot Projects to Further Evaluate and Establish Pipeline Injection Standards for Clean Renewable Hydrogen](https://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M500/K055/500055657.PDF) which can be found at <https://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M500/K055/500055657.PDF>

Q.15. The GFO requests that the scope of work cover the following: Necessary mitigation measures (e.g., material selection, inspection tools, operational changes) to ensure safety and reliability. Is this a requirement for reporting of learnings or is this a request to create a measuring/monitoring/verification plan? Could you please elaborate a bit on expectations for this element of the proposal.

This is a requirement for reported learnings. Work products related to this requirement may include descriptions of experiments or studies, information about samples and data sources, key results, and conclusions. The conclusions may suggest that certain mitigation measures are necessary to ensure safety and reliability of the facility while storing hydrogen.

Q.16. How do inspection tools and operational changes fit in laboratory experiments? Could you perhaps provide some examples on that?

Laboratory experiments to study the impacts of introducing hydrogen to underground gas storage facilities may help inform recommendations for inspection tools and/or operational changes to ensure safety and reliability of the facility.

Q.17. Can you please add a bit more clarity to what you mean by “geographically diverse”? You give “north and south” as an example, but does this mean one from Sacramento Basin and one from LA/Ventura Basin? Would one field from LA basin and one from Ventura suffice? How about two fields from Sac Basin, but one from the far north, and one from the southern end? Is Gill Ranch considered north or south? Are you interested in geographically

diverse (to compare community impacts) or geologically diverse, or both?

Examples of geographic diversity may include, but are not limited to: location, community impacts, jurisdictions, utility service territory, available infrastructure, and geology. Distance alone does not constitute geographical diversity. The applicant should describe the relevance of the geographical diversity of their chosen sites to their study.