**Questions and Answers Document**

# **Disclaimer**

The most up-to-date solicitation documents (including the solicitation manual) are available at the solicitation webpage: <https://www.energy.ca.gov/solicitations/2024-03/gfo-23-502-industrial-carbon-dioxide-utilization-value-added-products?utm_medium=email&utm_source=govdelivery>

On April 16, 2024, the California Energy Commission (CEC) held a Pre-Application Workshop for the Industrial Carbon Dioxide Utilization for Value Added Products Solicitation.

The workshop slides and recording can be found at: <https://www.energy.ca.gov/event/funding-workshop/2024-04/pre-application-workshop-gfo-23-502-industrial-carbon-dioxide>.

The following answers are based on CEC staff’s interpretation of the questions received. It is the Applicant’s responsibility to review the Solicitation Manual and to determine whether their 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 proposal details are known.

Unless indicated otherwise, all section numbers identified are from the solicitation manual (for example, “Section II.B” refers to Section II.B of the Solicitation Manual). The solicitation manual is Attachment 00 found on the webpage linked above.

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# **General/Administrative**

1. I'm interested in submitting an application for the GFO-23-502 grant funding opportunity. In the Application Manual, it mentions, "The questions and answers will also be posted on the Commission's website at: <https://www.energy.ca.gov/funding-opportunities/solicitations>." However, I was unable to find the Q&A post there. Could you assist me in locating it? Another question is that it was mentioned in the Application Manual, “Prospective applicants looking for partnering opportunities for this funding opportunity should register on the California Energy Commission (CEC)’s Empower Innovation website at [www.empowerinnovation.net](http://www.empowerinnovation.net). I have just registered on this webpage but haven't figured out how to use this platform to look for partnering opportunities. Could you provide some guidance?

**CEC Response:** The Pre-Application Workshop Presentation can be found on the CEC’s website at the following link: [GFO-23-502 - Industrial Carbon Dioxide Utilization for Value Added Products](https://www.energy.ca.gov/solicitations/2024-03/gfo-23-502-industrial-carbon-dioxide-utilization-value-added-products?utm_medium=email&utm_source=govdelivery). Under Solicitation Events, click on Pre-Application Workshop, and under Presentations, click on Pre-Application Workshop Presentation. Then open the document and search for the word Empower, which will take you to the appropriate information.

The Pre-Application Workshop Recording is located at the above link. Under Event Recording, click on Pre-Application Workshop. Adam Gottlieb from the CEC gave a presentation on Empower Innovation that starts just under 5 minutes into the recording.

# **Technical**

**General/Eligibility**

1. My team and I were reviewing the Application Manual for GFO-23-502, Industrial Carbon Dioxide Utilization for Value Added Products, and a few concerns popped up that I’d like to flag.

Carbon dioxide (CO2) capture and utilization (CCU) does not necessarily lead to carbon reductions. In fact, CCU has limited potential to reduce net carbon emissions, and most likely increases net CO2 emissions, unless one or both of two criteria are met:

(1) The captured CO2 is from biomass or direct air sources and not fossil-fuel originated flue gas.

(2) The captured and utilized CO2 is ultimately stored for a meaningful period of time.

Oddly, the solicitation makes no mention of biomass or direct air CO2 sources (and actually specifies “technologies and approaches that can convert waste CO2 from industrial flue gas into value-added products”), nor does it provide any requirements for storage of CO2 in end-use products. In fact, several of the value-added products specified in the GFO, such as fuels, chemicals, and food products, would not result in any meaningful carbon reductions, and would most likely result in increased net CO2 emissions unless the CO2 source was biomass or direct air. Carbon capture, use, and storage scenarios can result in some rather complex, counterintuitive, and tricky carbon accounting – but this GFO seems to be lacking certain high-level guidelines and specifications that would even partially ensure net CO2 reduction benefits.

**CEC Response:** The focus of this GFO is following the approved energy efficiency initiative from [Fiscal Year (FY) 21-22 Gas R&D Budget Plan.](https://www.energy.ca.gov/publications/2021/natural-gas-research-and-development-program-proposed-budget-plan-fiscal-year) The initiative was meant to target difficult-to-abate emissions originating from gas combustion via industrial carbon capture and utilization. The final GFO was aligned with the recent developments in federal funding opportunities available for carbon capture, utilization, and storage. Given the many federal funding opportunities targeting point source capture, direct air capture, and support for CO2 transport and storage infrastructure, we chose carbon utilization technology development as a focus for this GFO. The source of CO2 eligible under this solicitation will be captured CO2 from industrial emissions or air. An Addendum for GFO-23-502 has been released to reflect this update; the revised manual can be found here:

<https://www.energy.ca.gov/solicitations/2024-03/gfo-23-502-industrial-carbon-dioxide-utilization-value-added-products?utm_medium=email&utm_source=govdelivery>

Carbon utilization innovations span many industries, including materials, chemicals, plastics, and food. Supporting innovations that can disrupt the business-as-usual supply chains that rely on gas combustion or otherwise high emitting processes, as well as use existing emissions as a feedstock, can serve as an approach to CO2 emissions mitigation. Additionally, growing the market for products generated from CO2 utilization may incentivize point source capture and direct air capture project development.

Finally, all applications for this GFO must demonstrate reduction of GHG emissions through a lifecycle analysis.

1. What is an eligible source of CO2?

**CEC Response:** The solicitation targets funding CO2 utilization research projects that can reduce industrial emissions. The solicitation defines CO2 utilization as the use of captured anthropogenic carbon dioxide as a feedstock for the manufacturing of value-added commodities, such as fuels, chemicals, food, and other materials. Therefore, eligible sources of CO2 must originate from chemical and mechanical processes that capture industrial CO2 emissions, which may come from point source at an industrial facility or direct air capture. An Addendum for GFO-23-502 has been released to reflect this update; the revised manual can be found here:

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The products resulting from CO2 utilization must provide alternative approaches to incumbent industrial products/processes, resulting in reduced gas use, reduced CO2 emissions, and any other justified benefits to gas ratepayers.

1. Can we use any type of feedstock that has any amount of CO2?

**CEC Response:** The feedstock for CO2 utilization technology in this GFO must come from carbon captured from air or industrial processes. An Addendum for GFO-23-502 has been released to reflect this update; the revised manual can be found here: <https://www.energy.ca.gov/solicitations/2024-03/gfo-23-502-industrial-carbon-dioxide-utilization-value-added-products?utm_medium=email&utm_source=govdelivery>

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1. Is it safe to say we can use any type of “emissions” (e.g., from flue gas from some combustion, some type of captured/created biogas, etc.)?

**CEC Response:** Please see the answer to Question 4 above.

1. What if the CO2 is captured from other processes that do not combust hydrocarbon, for example beer brewing?

**CEC Response:** Process emissions from industrial facilities, including food processing plants (such as a brewery), are an eligible source of CO2.

1. Is Direct Air Capture (DAC) covered under this funding opportunity? If DAC is an eligible source of CO2, can revenue generated from carbon credits count as the match funding contribution?

**CEC Response:**  Direct air capture is an eligible source of CO2 for CO2 utilization projects. However, this solicitation will not fund the development of carbon capture technology, including development of direct air capture technology. An Addendum for GFO-23-502 has been released to reflect this update; the revised manual can be found here:

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Match funding must be either cash in hand or in-kind (non-cash) contributions; please see section I.J. of the solicitation manual. However, please note that cash match are funds that are in the recipient's possession or proposed by match partner and clearly identified in a support letter, and are reserved for the proposed project. Consequently, anticipated future revenue will not count as a match contribution.

1. Does decarbonizing wastewater treatment plants and producing a carbon free feedstock that can be repurposed for wastewater treatment process apply?

**CEC Response:** This solicitation targets technologies that convert CO2 from eligible sources into value-added products. Based solely on the information provided in this question, it is unclear for the CEC if such conversion is a part of the project described.

1. Would DOE tested technology apply?

**CEC Response:** DOE tested technologies are eligible for funding under this solicitation as long as all eligibility requirements, including those specified for project type and technology readiness level (TRL), are met.

1. Are there any particular requirements for scale of CO2 utilization other than TRL and the given metrics?

**CEC Response:** There are no particular scale requirements defined in this solicitation. However, for Group 2 demonstration projects (TRL 6-7), production sufficient to enter into the required two purchase agreements at a minimum value of 25% of CEC requested funds each will dictate the scale of the CO2-based products generated by the end of the agreement. An Addendum for GFO-23-502 has been released to reflect this update; the revised manual can be found here:

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Group 1 (TRL 4-5) will focus on technology development and not scaled up production of CO2-based products. Projects that demonstrate conversion at larger scale and/or higher potential for future scaling up may receive higher scores. Please refer to Section IV of the solicitation manual for additional information.

1. Operationally what might this look like from a process or volume perspective? For instance, does the applicant need to demonstrate a certain volume of production during the grant period?

**CEC Response:** For Group 1, the focus will be on technology development (e.g. reducing GHG emissions associated with the target product (relative to an incumbent product) and improving energy efficiency of the technology) and will not have requirements on quantity of production. For Group 2, it is expected that recipients will develop purchase agreements with at least two companies for the offtake of the CO2-based products. At the application stage, the applicant must provide support letters from the potential purchase partners, and over the course of the project must develop the actual purchase agreements. The value of each purchase agreement must equal at least 25% of the CEC funds. An Addendum for GFO-23-502 has been released to reflect this update; the revised manual can be found here:

<https://www.energy.ca.gov/solicitations/2024-03/gfo-23-502-industrial-carbon-dioxide-utilization-value-added-products?utm_medium=email&utm_source=govdelivery>

Projects that demonstrate conversion at larger scale and/or higher potential for future scaling up may receive higher scores. Please refer to Section IV of the solicitation manual for additional information.

1. Is large agriculture considered “industrial sector?”

**CEC Response:** The industrial sector may encompass large agriculture in this solicitation. To establish eligibility of your project, you need to describe and justify how conversion of CO2 into value-added products will help reduce GHG emissions from the industrial sector. For example, if your project involves CO2 utilization to produce food that would otherwise originate from high-GHG emission agricultural practices, it may be eligible under this solicitation.

1. Is there some evaluation of efficiency and/or economic value such that any process would/could be evaluated in that context?

**CEC Response:** Evaluation of a project’s efficiency will be based on the relative efficiency of the proposed CO2 utilization technology at the start of the agreement. Evaluation of the economic value of a proposed product will be relative to a similar incumbent product’s market value. Please refer to Section I.C of the solicitation manual for additional information.

1. Can you clarify the types of match funding that qualify, e.g. internal company people and assets?

**CEC Response:** Match funding must be either cash in hand or in-kind (non-cash) contributions. Section I.J. of the solicitation manual includes the following definitions for match funding categories:

* + “’Cash’ match means funds that are in the recipient’s possession or proposed by match partner and clearly identified in a support letter, 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 match can 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 match will be considered more favorably than in-kind contributions during the scoring phase.
  + “’In-Kind’ match can be in the form of goods or services that are not reimbursed with CEC funds such as labor (if reasonable and justified), donated space, existing equipment, existing supplies, services provided by a third-party or subrecipient, and other expendable property in support of the project. 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. The value of existing equipment must be prorated for its use in the project and depreciated or amortized over the term of the project using generally accepted accounting principles. Labor rates for hours donated by non-employees who are not paid for their time must be consistent with those paid for similar work. Cost allocations must be reasonable and allocable to the proposed project. In-kind match share must be included in the agreement budget. The grant recipient is expected to maintain appropriate documentation to support the fair market value of all in-kind match including match donated by third parties or major subrecipients.”

1. Are the evaluation criteria the same for both groups?

**CEC Response:** The scoring criteria can be found in the solicitation manual Section IV.F. The same scoring criteria will be used for both groups, except where it is indicated that certain items apply to Group 2 only. The Project Narrative (Attachment 2) prompts the applicant to respond to different requirements for each group as laid out in Section I.C., and these responses are also evaluated when scoring applications.

1. Can you submit a project to both groups?

**CEC Response:** Yes, you may submit two separate applications with two distinct projects in separate groups. You may not submit the same application to both groups.

1. If there were two projects that were otherwise scored the same, but one demonstrated more energy or economic benefits, would they get more points?

**CEC Response:** The impacts and benefits to IOU ratepayers scoring criterion is worth 20 points. Energy and economic benefits fall under this scoring criterion and have the potential to earn more points for projects with more energy/economic benefits.

1. We are considering converting CO2 into liquid compounds such as formate, acetic acid, or methanol first through an electrochemical approach, and then using microorganisms to covert such liquid carbon sources into more valuable products as defined by this grant funding opportunity. I am curious if this approach fits within the scope of work, or if the call specifically requires direct use of CO2 as the substrate for fermentation.

**CEC Response:** Yes, this project description falls within the eligible project types, as long as TRL and other requirements described in solicitation manual are met.

## **Group 1:**

1. Can you give more description of the types of Group 1 projects that would be most applicable/rated? I.e., what might they demonstrate/achieve?

**CEC Response**: Please see Section I.C. of the solicitation manual for the full description of Group 1 (Carbon Dioxide Utilization Research and Development) projects.

Group 1 focuses on technologies between TRL 4-5 at the start of the agreement. Project types for Group 1include small-scale pilot tests in a laboratory and are anticipated to progress testing in a relevant operational environment, with the expectation that the technology will progress to the next TRL by the end of the agreement. Group 1 projects must demonstrate 85% GHG emissions reductions of the proposed product relative to its incumbent counterpart using a lifecycle analysis. An estimate of this information must be provided in the Project Narrative. The technology must also demonstrate at least 10% improvement in energy efficiency from its current operation by the end of the agreement. Project types fall under the following as described in section I.C. of the solicitation manual:

* 1. Carbon Dioxide Mineralization for Cement, Concrete, and Materials
  2. Conversion of Carbon Dioxide into Fuels, Chemicals, and Plastics
  3. Conversion of Carbon Dioxide into Food Products and Textiles

1. For Group 1, is the expectation that projects would be demonstrated in the lab or on-site with a host in a relevant operational environment?

**CEC Response:** Because Group 1 has a relatively lower TRL starting point (i.e., TRL 4-5) compared to Group 2 (i.e., TRL 6-7), we assume that at least part of the projects will begin in a laboratory. Because the goal is to move up at least one TRL by the end of the agreement, it is reasonable to assume that by this time prototypes would be developed and have started testing within a relevant operational environment. Please see the DOE definitions/expectations: “Technology Readiness Assessment Guide”. <https://www2.lbl.gov/dir/assets/docs/TRL%20guide.pdf>

## **Group 2:**

1. Are purchase agreements required as part of the application materials? Or are they expected sometime within the project period?

**CEC Response:** At the application stage, at least two letters of support from planned purchase partners (Attachment 09) are required. The actual purchase agreements must be developed over the course of the project period and executed by the end of the agreement.