



STATE OF CALIFORNIA

GRANT REQUEST FORM (GRF)

CEC-270 (Revised 12/2019)

CALIFORNIA ENERGY COMMISSION

A) New Agreement # PIR-21-003 (to be completed by CGL office)

B) Division	Agreement Manager:	MS-	Phone
ERDD	Nadia Richards		916-897-3804

C) Recipient's Legal Name	Federal ID Number
Southern California Gas Company	95-1240705

D) Title of Project
CNTP Biogas to Low-Carbon H2 Conversion Project

E) Term and Amount

Start Date	End Date	Amount
6/30/2022	3/31/2026	\$ 750,000

F) Business Meeting Information

☐ ARFVTP agreements \$75K and under delegated to Executive Director

Proposed Business Meeting Date 6/8/2022 ☐ Consent ☒ Discussion

Business Meeting Presenter Baldomero Lasam Time Needed: 5 minutes

Please select one list serve. Research (Energy RDD / PIER program)

Agenda Item Subject and Description:

SOUTHERN CALIFORNIA GAS COMPANY. Proposed resolution approving Agreement PIR-21-003 with Southern California Gas Company for a \$750,000 grant to address key challenges associated with developing a low carbon hydrogen production system that is also cost-effective and scalable, and adopting staff's determination that this project is exempt from CEQA. (Gas R&D Program Funding) Contact: Baldomero Lasam. Staff presentation: 5 minutes.

G) California Environmental Quality Act (CEQA) Compliance

1. Is Agreement considered a "Project" under CEQA?

☒ Yes (skip to question 2)

☐ No (complete the following (PRC 21065 and 14 CCR 15378)):

Explain why Agreement is not considered a "Project":

2. If Agreement is considered a "Project" under CEQA:

a) ☒ Agreement **IS** exempt.

☐ Statutory Exemption. List PRC and/or CCR section number:

☒ Categorical Exemption. List CCR section number: Cal. Code Regs., tit. 14, § 15301 ; Cal. Code Regs., tit. 14, § 15306

☐ Common Sense Exemption. 14 CCR 15061 (b) (3)

Explain reason why Agreement is exempt under the above section:



The California Environmental Quality Act (CEQA) (Public Resources Code section 21000 et seq.) requires public agencies to consider the potential impacts to the environment that may arise from the approval of “projects.” The project here includes demonstration of a bench-scale non-thermal plasma reactor powered by renewable electricity at an existing facility in Southern California Gas Company—a natural gas investor-owned utility—service territory. On August 8, 2019, this facility received a Notice of Exemption (2019088026) from the Department of Toxic Substances Control. The permit allows the continued operations for a 10-year term with no expansion of use or physical alteration.

CEQA exempts certain projects from its provisions. One such exemption is found at California Code of Regulations, title 14, section 15301 and provides that projects which consist of the operation, repair, maintenance, permitting, leasing, licensing, or minor alteration of existing public or private structures, facilities, mechanical equipment, or topographical features, and which involve negligible or no expansion of use are exempt. The proposed project will be located entirely within a facility that already exists and that have the ability to operate through 2029. The proposed project will not expand the use of the facility because the project activities to design, fabricate, commission, and test the bench-scale system are in line with normal activities at the existing facility. Therefore, the project falls within section 15301 and will not have a significant effect on the environment.

CEQA also exempts projects that consist of basic data collection, research, experimental management, and resource evaluation activities which do not result in a serious or major disturbance to an environmental resource. (Cal. Code Regs., tit. 14, § 15306). The proposed project will involve research to scale up an early-stage, lab-scale, catalytic non-thermal plasma reactor to a modular, bench-scale system that can cost-effectively convert biogas into low-carbon hydrogen and virtually eliminate the negative environmental impacts associated with Steam Methane Reforming to fabricate and produce hydrogen. This work will not result in a serious or major disturbance to an environmental resource because the system is expected to perform for at least 300 hours and produce up to 5 kilograms of hydrogen per day by project conclusion, which is small in comparison to the overall facility footprint. Additionally, the system will achieve a purity of 99.99 percent so there is no possibility of harmful emissions. For these reasons, the proposed project will have no significant effect on the environment and is categorically exempt under section 15306. CEQA’s exemptions are not absolute. Once a public agency, like the CEC, believes that a project may be exempt from environmental review, it must consider whether there are any exceptions that may preclude use of the exemption. The circumstances giving rise to an exception are listed in California Code of Regulations, title 14, section 15300.2. The proposed project does not involve any cumulative impacts of successive projects of the same type in the same place that might be considered significant; does not involve unusual circumstances that might have a significant effect on the environment; will not result in damage to scenic resources within a highway officially designated as a state scenic highway; the project site is not included on any list compiled pursuant to Government Code section 65962.5; and the project



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will not cause a substantial adverse change in the significance of a historical resource. Therefore, none of the exceptions to categorical exemptions listed in CEQA Guidelines section 15300.2 apply to this project. Therefore, for the reasons stated above, this project is exemption from environmental review under CEQA.

- b) Agreement **IS NOT** exempt. (consult with the legal office to determine next steps)

Check all that apply

- ☐ Initial Study
☐ Negative Declaration
☐ Mitigated Negative Declaration
☐ Environmental Impact Report
☐ Statement of Overriding Considerations

H) List all subcontractors (major and minor) and equipment vendors: (attach additional sheets as necessary)

Legal Company Name:	Budget
Build Momentum (d.b.a. Momentum)	\$ 99,000 (match \$31,000)
DNV GL USA, Inc.	\$ 50,000
Susteon Inc.	\$ 31,000 (match \$319,000)
TBD- Procurement and Fabrication	\$ 95,000
TBD- Commissioning and Testing	\$ 345,000

I) List all key partners: (attach additional sheets as necessary)

Legal Company Name:

J) Budget Information

Funding Source	Funding Year of Appropriation	Budget List Number	Amount
NG Subaccount, PIERDD	20-21	501.001O	\$750,000

R&D Program Area: EGRO: Renewables

TOTAL: \$ 750,000

Explanation for "Other" selection

Reimbursement Contract #: Federal Agreement #:



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K) Recipient's Contact Information

1. Recipient's Administrator/Officer

Name: Kula Addy

Address: 801 K Street, Suite 2800

City, State, Zip: Sacramento, CA
95814

Phone: 650-434-2634

E-Mail: kula@buildmomentum.io

2. Recipient's Project Manager

Name: Flavio da Cruz

Address: 555 W 5Th St # Gt15a4

City, State, Zip: Los Angeles, CA
90013-1010

Phone: 323-447-3420

E-Mail: fdacruz@socalgas.com

L) Selection Process Used

- ☒ Competitive Solicitation Solicitation #: GFO-21-502
☐ First Come First Served Solicitation - Solicitation #:
☐ Non-Competitive Bid Follow-on Funding (SB 115)

M) The following items should be attached to this GRF:

- | | |
|---|--|
| 1. Exhibit A, Scope of Work | ☒ Attached |
| 2. Exhibit B, Budget Detail | ☒ Attached |
| 3. CEC 105, Questionnaire for Identifying Conflicts | ☒ Attached |
| 4. Recipient Resolution ☒ N/A | ☐ Attached |
| 5. CEQA Documentation ☒ N/A | ☐ Attached |

Agreement Manager

Date

Office Manager

Date

Deputy Director

Date

Exhibit A
Scope of Work
Southern California Gas Company (SoCalGas)

I. TASK ACRONYM/TERM LISTS

A. Task List

Task #	CPR ¹	Task Name
1		General Project Tasks
2		Hydrogen Production System Design
3	X	Procurement and Fabrication
4		Commissioning and Safety Review
5	X	Hydrogen Production System Testing
6		Measurement and Verification
7		Technoeconomic Analysis and Lifecycle Analysis
8		Evaluation of Project Benefits
9		Technology/Knowledge Transfer Activities

B. Acronym/Term List

Acronym/Term	Meaning
CAM	Commission Agreement Manager
CAO	Commission Agreement Officer
CEC	California Energy Commission
CO ₂	Carbon Dioxide
CNTP	Catalytic Non-Thermal Plasma Reactor
CPR	Critical Project Review
DBD	Dielectric Barrier Discharge
GHG	Greenhouse Gas
H ₂	Hydrogen
HAZOP	Hazard and Operability
M&V	Measurement and Verification
SMR	Steam Methane Reforming
TAC	Technical Advisory Committee
TRL	Technology Readiness Level

II. PURPOSE OF AGREEMENT, PROBLEM/SOLUTION STATEMENT, AND GOALS AND OBJECTIVES

A. Purpose of Agreement

The purpose of this Agreement is to fund the scale-up of an early-stage, lab-scale catalytic non-thermal plasma reactor to a bench-scale system that can be powered by renewable electricity, from sources such as wind, solar, and hydropower, and can cost-effectively convert biogas into low-carbon hydrogen.

¹ Please see subtask 1.3 in Part III of the Scope of Work (General Project Tasks) for a description of Critical Project Review (CPR) Meetings.

Exhibit A

Scope of Work

Southern California Gas Company (SoCalGas)

B. Problem/ Solution Statement

Problem

Traditional methods of producing hydrogen—such as Steam Methane Reforming (SMR)—are energy-intensive and produce significant greenhouse gas (GHG) emissions. Typically, hydrogen is produced at large-scale in industrial SMRs at 250,000 normal cubic meter per hour (~540 metric tons per day) using methane as feedstock as well as a fuel. Currently, the cost of producing hydrogen (H₂) at such large, centralized facilities is about \$1.25 per kilogram (assuming \$3 per MMBtu of methane). However, for each kilogram of hydrogen produced by industrial SMR, about 10 kilograms of carbon dioxide (CO₂) are emitted. Alternative methods such as electrolysis exist but are costly and therefore have not been widely adopted by industry. Currently available commercial electrolysis processes operate at an electricity consumption rate of 55-65 kilowatt-hour per kilogram-H₂, i.e., a 40-65% efficiency at a cost of \$5 to \$14/kilogram-H₂ depending on plant capacity. Thus, the hydrogen produced is not cost-competitive due to high capital expenses, complex balance of plant, and high cooling requirements.

Therefore, there is an acute need to develop new technologies that can cost-effectively produce clean, low-carbon hydrogen. Such technologies should also include high thermal efficiency for biogas to hydrogen (~75 percent), short start up time (minutes vs. several hours for SMR), wide operating range, smaller overall footprint, lower temperature operation, multiple stop/start capability, on-demand operation, modularity, safety, and robustness. To date, this challenge has not been adequately addressed because the vast majority of hydrogen (96%) is generated from fossil fuels, particularly from SMR of natural gas under high temperature and pressure conditions. It is essential to address this challenge now to stave off the worst impacts of climate change through development of low-carbon fuels and decarbonization of the energy and transportation sectors.

Solution

The proposed solution will address the challenges above by scaling up an early-stage, lab-scale, catalytic non-thermal plasma (CNTP) reactor to a modular, bench-scale system that can cost-effectively convert biogas into low-carbon hydrogen and virtually eliminate the negative environmental impacts associated with traditional SMR. Powered by renewable electricity, this approach dramatically reduces the energy needed to produce syngas from biogas and to convert the syngas to pure hydrogen. This technological breakthrough will overcome one of the primary barriers to producing low-carbon hydrogen: cost. If successful, this project will demonstrate the viability and cost-competitiveness of low-carbon hydrogen production systems and generate data needed to support upscaling and commercialization, while identifying areas for further technology improvement. Additionally, if fully commercialized, it could provide low-carbon energy and an alternative to fossil-based natural gas, helping meet California's GHG reduction goals of 40 percent below 1990 levels by 2030 and carbon neutrality by 2045.

C. Goals and Objectives of the Agreement

Agreement Goals

The goals of this Agreement are to:

- Expand the range of feedstocks and associated production pathways for low-carbon hydrogen.
- Reduce energy consumption associated with low-carbon hydrogen production.

Exhibit A Scope of Work Southern California Gas Company (SoCalGas)

- Reduce the cost of low-carbon hydrogen production to levels that are cost-competitive with conventional hydrogen production methods.
- Generate data needed to support upscaling and commercialization of low-carbon hydrogen production technologies.

Ratepayer Benefits: This Agreement will result in the ratepayer benefits of lower costs, increased safety, and greater reliability. As mentioned above, SMR can produce hydrogen at a cost of approximately \$1.25 per kilogram. Yet, this low price does not reflect the significant additional societal costs associated with SMR's high carbon emissions. According to the Environmental Defense Fund, the current most robust and credible estimate of the social cost of carbon is more than \$50 per ton.² Further this figure does not consider all the widely recognized and accepted scientific and economic impacts of climate change. Thus, the actual cost of carbon pollution is likely far higher. At \$5 to \$14/kilogram-H₂, electrolysis, although cleaner, is generally cost-prohibitive. Using the National Renewable Energy Laboratory's H2A model, the project team has demonstrated a realistic path to a near-term cost of \$2.44/kilogram-H₂, with a pathway to achieving \$1/ kilogram-H₂ once the technology is fully commercialized and scaled to producing approximately 500 kilogram-H₂ per day. The proposed system will have significantly reduced capital costs in comparison with SMR and electrolysis. Operational costs are also projected to be lower, with the system consuming 74 percent less electricity than electrolysis systems and 50 percent less biogas than SMR. Because of the distributed nature of the technology, it can be installed where the biogas is produced and/or where the hydrogen is consumed, thereby eliminating the need for transporting the feedstock, the hydrogen fuel, or both.

The proposed technology will increase safety in several ways. In comparison to SMR, the most common method of hydrogen production, CNTP technology operates at a much lower temperature—as low as 400°C instead of 900°C—and pressure, and can be turned on or off in seconds, with no large thermal mass requiring dissipation. The distributed nature of this technology means that hydrogen can be produced on-demand or to meet the needs of much smaller groups of consumers than served by large industrial facilities. As a result, volumes of hydrogen present at any one facility are low. Finally, the proposed modular CNTP system will be highly reliable. Each system will include numerous tubular reactor assemblies working in parallel. If one or more of these reactors fail, the overall system will still function and continue to produce hydrogen.

Technological Advancement and Breakthroughs: This Agreement will lead to technological advancement and breakthroughs to overcome barriers to the achievement of the State of California's statutory energy goals by developing a CNTP technology using dielectric barrier discharge (DBD) plasma to enable the SMR process to take place at substantially lower temperatures (~400 to 500°C) by activating biogas and steam with the DBD plasma. The advantages of performing the SMR process at lower operating temperatures enabled by DBD plasma are 1) lower CO₂ emissions, 2) higher conversion to syngas due to faster kinetics and favorable equilibrium, and 3) higher H₂ concentration in the intermediate syngas. Lower reaction temperature favors the water-gas-shift reaction as the carbon monoxide and steam will be converted to H₂ and CO₂. As a result, shift reactors in the conventional SMR process can be eliminated in the proposed CNTP process, offering a significant reduction in process equipment. The use of DBD plasma maximizes biogas conversion and hydrogen yield. It also provides

² <https://www.edf.org/true-cost-carbon-pollution>

Exhibit A Scope of Work Southern California Gas Company (SoCalGas)

localized heating of the reaction mixture on the catalyst surface, which substantially reduces CO₂ emissions due to the elimination of burning natural gas to provide heat needed for the endothermic reaction in conventional SMR. DBD plasma is generated with an electrical current from a controlled distance between a high-voltage electrode and a ground electrode, which means the CNTF reactor can use renewable electricity as the source of energy to generate the H₂. Furthermore, the proposed process scheme produces a low-carbon H₂ stream and a pure stream of CO₂ ready for sequestration or utilization, potentially rendering the H₂ produced carbon negative.

Agreement Objectives

The objectives of this Agreement are to:

- Demonstrate a bench-scale non-thermal plasma reactor powered by renewable electricity at a location in Southern California Gas Company—a natural gas investor owned utility—service territory.
- Increase the Technology Readiness Level (TRL) of the proposed technology from TRL 3 at the beginning of the project to TRL 5 by the end of the project.
- Achieve an output of up to 5 kilograms of hydrogen or more per day by project conclusion.
- Demonstrate that the innovation would help achieve or exceed the renewable hydrogen cost targets of \$2.50/kilogram hydrogen projected at commercial or industrial scale.
- Achieve fuel cell-grade hydrogen purity of 99.99 percent for end-use operations.
- Perform at least 300 hours (or shorter period as approved in writing by the CAM) of testing measurements and calculations based on the Measurement and Verification protocol for the testing period.

III. TASK 1 GENERAL PROJECT TASKS

PRODUCTS

Subtask 1.1 Products

The goal of this subtask is to establish the requirements for submitting project products (e.g., reports, summaries, plans, and presentation materials). Unless otherwise specified by the Commission Agreement Manager (CAM), the Recipient must deliver products as required below by the dates listed in the **Project Schedule (Part V)**. All products submitted which will be viewed by the public, must comply with the accessibility requirements of Section 508 of the federal Rehabilitation Act of 1973, as amended (29 U.S.C. Sec. 794d), and regulations implementing that act as set forth in Part 1194 of Title 36 of the Federal Code of Regulations. All technical tasks should include product(s). Products that require a draft version are indicated by marking “**(draft and final)**” after the product name in the “Products” section of the task/subtask. If “(draft and final)” does not appear after the product name, only a final version of the product is required. With respect to due dates within this Scope of Work, “**days**” means working days.

The Recipient shall:

For products that require a draft version, including the Final Report Outline and Final Report

- Submit all draft products to the CAM for review and comment in accordance with the Project Schedule (Part V). The CAM will provide written comments to the Recipient on

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the draft product within 15 days of receipt, unless otherwise specified in the task/subtask for which the product is required.

- Consider incorporating all CAM comments into the final product. If the Recipient disagrees with any comment, provide a written response explaining why the comment was not incorporated into the final product.
- Submit the revised product and responses to comments within 10 days of notice by the CAM, unless the CAM specifies a longer time period, or approves a request for additional time.

For products that require a final version only

- Submit the product to the CAM for acceptance. The CAM may request minor revisions or explanations prior to acceptance.

For all products

- Submit all data and documents required as products in accordance with the following Instructions for Submitting Electronic Files and Developing Software:

- **Electronic File Format**

- Submit all data and documents required as products under this Agreement in an electronic file format that is fully editable and compatible with the California Energy Commission's (CEC) software and Microsoft (MS)-operating computing platforms, or with any other format approved by the CAM. Deliver an electronic copy of the full text of any Agreement data and documents in a format specified by the CAM, such as memory stick.

The following describes the accepted formats for electronic data and documents provided to the CEC as products under this Agreement, and establishes the software versions that will be required to review and approve all software products:

- Data sets will be in MS Access or MS Excel file format (version 2007 or later), or any other format approved by the CAM.
- Text documents will be in MS Word file format, version 2007 or later.
- Project management documents will be in Microsoft Project file format, version 2007 or later.

- **Software Application Development**

Use the following standard Application Architecture components in compatible versions for any software application development required by this Agreement (e.g., databases, models, modeling tools), unless the CAM approves other software applications such as open-source programs:

- Microsoft ASP.NET framework (version 3.5 and up). Recommend 4.0.
- Microsoft Internet Information Services (IIS), (version 6 and up) Recommend 7.5.
- Visual Studio.NET (version 2008 and up). Recommend 2010.
- C# Programming Language with Presentation (UI), Business Object and Data Layers.
- SQL (Structured Query Language).
- Microsoft SQL Server 2008, Stored Procedures. Recommend 2008

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R2.

- Microsoft SQL Reporting Services. Recommend 2008 R2.
- XML (external interfaces).

Any exceptions to the Electronic File Format requirements above must be approved in writing by the CAM. The CAM will consult with the CEC's Information Technology Services Branch to determine whether the exceptions are allowable.

MEETINGS

Subtask 1.2 Kick-off Meeting

The goal of this subtask is to establish the lines of communication and procedures for implementing this Agreement.

The Recipient shall:

- Attend a "Kick-off" meeting with the CAM, the Commission Agreement Officer (CAO), and any other CEC staff relevant to the Agreement. The Recipient will bring its Project Manager and any other individuals designated by the CAM to this meeting. The administrative and technical aspects of the Agreement will be discussed at the meeting. Prior to the meeting, the CAM will provide an agenda to all potential meeting participants. The meeting may take place in person or by electronic conferencing (e.g., WebEx), with approval of the CAM.

The administrative portion of the meeting will include discussion of the following:

- Terms and conditions of the Agreement;
- Invoicing and auditing procedures;
- Administrative products (subtask 1.1);
- CPR meetings (subtask 1.3);
- Match fund documentation (subtask 1.7);
- Permit documentation (subtask 1.8);
- Subcontracts (subtask 1.9); and
- Any other relevant topics.

The technical portion of the meeting will include discussion of the following:

- The CAM's expectations for accomplishing tasks described in the Scope of Work;
 - An updated Project Schedule;
 - Technical products (subtask 1.1);
 - Progress reports (subtask 1.5);
 - Final Report (subtask 1.6);
 - Technical Advisory Committee meetings (subtasks 1.10 and 1.11); and
 - Any other relevant topics.
- Provide *Kick-off Meeting Presentation* to include but not limited to:
 - Project overview (i.e. project description, goals and objectives, technical tasks, expected benefits, etc.)
 - Project schedule that identifies milestones
 - List of potential risk factors and hurdles, and mitigation strategy
 - Provide an *Updated Project Schedule, Match Funds Status Letter, and Permit Status Letter*, as needed to reflect any changes in the documents.

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The CAM shall:

- Designate the date and location of the meeting.
- Send the Recipient a *Kick-off Meeting Agenda*.

Recipient Products:

- Kick-off Meeting Presentation
- Updated Project Schedule (*if applicable*)
- Match Funds Status Letter (subtask 1.7) (*if applicable*)
- Permit Status Letter (subtask 1.8) (*if applicable*)

CAM Product:

- Kick-off Meeting Agenda

Subtask 1.3 Critical Project Review (CPR) Meetings

The goal of this subtask is to determine if the project should continue to receive CEC funding, and if so whether any modifications must be made to the tasks, products, schedule, or budget. CPR meetings provide the opportunity for frank discussions between the CEC and the Recipient. As determined by the CAM, discussions may include project status, challenges, successes, advisory group findings and recommendations, final report preparation, and progress on technical transfer and production readiness activities (if applicable). Participants will include the CAM and the Recipient and may include the CAO and any other individuals selected by the CAM to provide support to the CEC.

CPR meetings generally take place at key, predetermined points in the Agreement, as determined by the CAM and as shown in the Task List on page 1 of this Exhibit. However, the CAM may schedule additional CPR meetings as necessary. The budget will be reallocated to cover the additional costs borne by the Recipient, but the overall Agreement amount will not increase. CPR meetings generally take place at the CEC, but they may take place at another location, or may be conducted via electronic conferencing (e.g., WebEx) as determined by the CAM.

The Recipient shall:

- Prepare and submit a *CPR Report* for each CPR meeting that: (1) discusses the progress of the Agreement toward achieving its goals and objectives; and (2) includes recommendations and conclusions regarding continued work on the project.
- Attend the CPR meeting.
- Present the CPR Report and any other required information at each CPR meeting.

The CAM shall:

- Determine the location, date, and time of each CPR meeting with the Recipient's input.
- Send the Recipient a *CPR Agenda* with a list of expected CPR participants in advance of the CPR meeting. If applicable, the agenda will include a discussion of match funding and permits.
- Conduct and make a record of each CPR meeting. Provide the Recipient with a schedule for providing a Progress Determination on continuation of the project.
- Determine whether to continue the project, and if so whether modifications are needed to the tasks, schedule, products, or budget for the remainder of the Agreement. If the

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CAM concludes that satisfactory progress is not being made, this conclusion will be referred to the Deputy Director of the Energy Research and Development Division.

- Provide the Recipient with a *Progress Determination* on continuation of the project, in accordance with the schedule. The Progress Determination may include a requirement that the Recipient revise one or more products.

Recipient Products:

- CPR Report(s)

CAM Products:

- CPR Agenda
- List of Expected CPR Participants
- Schedule for Providing a Progress Determination
- Progress Determination

Subtask 1.4 Final Meeting

The goal of this subtask is to complete the closeout of this Agreement.

The Recipient shall:

- Meet with CEC staff to present project findings, conclusions, and recommendations. The final meeting must be completed during the closeout of this Agreement. This meeting will be attended by the Recipient and CAM, at a minimum. The meeting may occur in person or by electronic conferencing (e.g., WebEx), with approval of the CAM.

The technical and administrative aspects of Agreement closeout will be discussed at the meeting, which may be divided into two separate meetings at the CAM's discretion.

- The technical portion of the meeting will involve the presentation of findings, conclusions, and recommended next steps (if any) for the Agreement. The CAM will determine the appropriate meeting participants.
- The administrative portion of the meeting will involve a discussion with the CAM and the CAO of the following Agreement closeout items:
 - Disposition of any procured equipment.
 - The CEC's request for specific "generated" data (not already provided in Agreement products).
 - Need to document the Recipient's disclosure of "subject inventions" developed under the Agreement.
 - "Surviving" Agreement provisions such as repayment provisions and confidential products.
 - Final invoicing and release of retention.
- Prepare a *Final Meeting Agreement Summary* that documents any agreement made between the Recipient and Commission staff during the meeting.
- Prepare a *Schedule for Completing Agreement Closeout Activities*.
- Provide copies of *All Final Products* on a USB memory stick, organized by the tasks in the Agreement.

Products:

- Final Meeting Agreement Summary (*if applicable*)
- Schedule for Completing Agreement Closeout Activities

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- All Final Products

REPORTS AND INVOICES

Subtask 1.5 Progress Reports and Invoices

The goals of this subtask are to: (1) periodically verify that satisfactory and continued progress is made towards achieving the project objectives of this Agreement; and (2) ensure that invoices contain all required information and are submitted in the appropriate format.

The Recipient shall:

- Submit a monthly *Progress Report* to the CAM. Each progress report must:
 - Summarize progress made on all Agreement activities as specified in the scope of work for the preceding month, including accomplishments, problems, milestones, products, schedule, fiscal status, and an assessment of the ability to complete the Agreement within the current budget and any anticipated cost overruns. See the Progress Report Format Attachment for the recommended specifications.
- Submit a monthly or quarterly *Invoice* that follows the instructions in the “Payment of Funds” section of the terms and conditions, including a financial report on Match Funds and in-state expenditures.

Products:

- Progress Reports
- Invoices

Subtask 1.6 Final Report

The goal of this subtask is to prepare a comprehensive Final Report that describes the original purpose, approach, results, and conclusions of the work performed under this Agreement. When creating the Final Report Outline and the Final Report, the Recipient must use the CEC Style Manual provided by the CAM.

Subtask 1.6.1 Final Report Outline

The Recipient shall:

- Prepare a *Final Report Outline* in accordance with the *Energy Commission Style Manual* provided by the CAM.

Recipient Products:

- Final Report Outline (draft and final)

CAM Product:

- Energy Commission Style Manual
- Comments on Draft Final Report Outline
- Acceptance of Final Report Outline

Subtask 1.6.2 Final Report

The Recipient shall:

- Prepare a *Final Report* for this Agreement in accordance with the approved Final Report Outline, Energy Commission Style Manual, and Final Report Template provided by the

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CAM with the following considerations:

- Ensure that the report includes the following items, in the following order:
 - Cover page (**required**)
 - Credits page on the reverse side of cover with legal disclaimer (**required**)
 - Acknowledgements page (optional)
 - Preface (**required**)
 - Abstract, keywords, and citation page (**required**)
 - Table of Contents (**required**, followed by List of Figures and List of Tables, if needed)
 - Executive summary (**required**)
 - Body of the report (**required**)
 - References (if applicable)
 - Glossary/Acronyms (If more than 10 acronyms or abbreviations are used, it is required.)
 - Bibliography (if applicable)
 - Appendices (if applicable) (Create a separate volume if very large.)
 - Attachments (if applicable)
- Submit a draft of the Executive Summary to the TAC for review and comment.
- Develop and submit a *Summary of TAC Comments on Draft Final Report* received on the Executive Summary. For each comment received, the recipient will identify in the summary the following:
 - Comments the recipient proposes to incorporate.
 - Comments the recipient does propose to incorporate and an explanation for why.
- Submit a draft of the report to the CAM for review and comment. The CAM will provide written comments to the Recipient on the draft product within 15 days of receipt.
- Incorporate all CAM comments into the Final Report. If the Recipient disagrees with any comment, provide a *Written Responses to Comments* explaining why the comments were not incorporated into the final product.
- Submit the revised Final Report electronically with any Written Responses to Comments within 10 days of receipt of CAM's Written Comments on the Draft Final Report, unless the CAM specifies a longer time period or approves a request for additional time.

Products:

- Summary of TAC Comments on Draft Final Report
- Draft Final Report
- Written Responses to Comments (*if applicable*)
- Final Report

CAM Product:

- Written Comments on the Draft Final Report

MATCH FUNDS, PERMITS, AND SUBCONTRACTS

Subtask 1.7 Match Funds

The goal of this subtask is to ensure that the Recipient obtains any match funds planned for this Agreement and applies them to the Agreement during the Agreement term.

Exhibit A Scope of Work Southern California Gas Company (SoCalGas)

While the costs to obtain and document match funds are not reimbursable under this Agreement, the Recipient may spend match funds for this task. The Recipient may only spend match funds during the Agreement term, either concurrently or prior to the use of CEC funds. Match funds must be identified in writing, and the Recipient must obtain any associated commitments before incurring any costs for which the Recipient will request reimbursement.

The Recipient shall:

- Prepare a *Match Funds Status Letter* that documents the match funds committed to this Agreement. If no match funds were part of the proposal that led to the CEC awarding this Agreement and none have been identified at the time this Agreement starts, then state this in the letter.

If match funds were a part of the proposal that led to the CEC awarding this Agreement, then provide in the letter:

- A list of the match funds that identifies:
 - The amount of cash match funds, their source(s) (including a contact name, address, and telephone number), and the task(s) to which the match funds will be applied.
 - The amount of each in-kind contribution, a description of the contribution type (e.g., property, services), the documented market or book value, the source (including a contact name, address, and telephone number), and the task(s) to which the match funds will be applied. If the in-kind contribution is equipment or other tangible or real property, the Recipient must identify its owner and provide a contact name, address, telephone number, and the address where the property is located.
 - If different from the solicitation application, provide a letter of commitment from an authorized representative of each source of match funding that the funds or contributions have been secured.
- At the Kick-off meeting, discuss match funds and the impact on the project if they are significantly reduced or not obtained as committed. If applicable, match funds will be included as a line item in the progress reports and will be a topic at CPR meetings.
- Provide a *Supplemental Match Funds Notification Letter* to the CAM of receipt of additional match funds.
- Provide a *Match Funds Reduction Notification Letter* to the CAM if existing match funds are reduced during the course of the Agreement. Reduction of match funds may trigger a CPR meeting.

Products:

- Match Funds Status Letter
- Supplemental Match Funds Notification Letter (*if applicable*)
- Match Funds Reduction Notification Letter (*if applicable*)

Subtask 1.8 Permits

The goal of this subtask is to obtain all permits required for work completed under this Agreement in advance of the date they are needed to keep the Agreement schedule on track. Permit costs and the expenses associated with obtaining permits are not reimbursable under this Agreement, with the exception of costs incurred by University of California recipients.

Exhibit A Scope of Work Southern California Gas Company (SoCalGas)

Permits must be identified and obtained before the Recipient may incur any costs related to the use of the permit(s) for which the Recipient will request reimbursement.

The Recipient shall:

- Prepare a *Permit Status Letter* that documents the permits required to conduct this Agreement. If no permits are required at the start of this Agreement, then state this in the letter. If permits will be required during the course of the Agreement, provide in the letter:
 - A list of the permits that identifies: (1) the type of permit; and (2) the name, address, and telephone number of the permitting jurisdictions or lead agencies.
 - The schedule the Recipient will follow in applying for and obtaining the permits.

The list of permits and the schedule for obtaining them will be discussed at the Kick-off meeting (subtask 1.2), and a timetable for submitting the updated list, schedule, and copies of the permits will be developed. The impact on the project if the permits are not obtained in a timely fashion or are denied will also be discussed. If applicable, permits will be included as a line item in progress reports and will be a topic at CPR meetings.

- If during the course of the Agreement additional permits become necessary, then provide the CAM with an *Updated List of Permits* (including the appropriate information on each permit) and an *Updated Schedule for Acquiring Permits*.
- Send the CAM a *Copy of Each Approved Permit*.
- If during the course of the Agreement permits are not obtained on time or are denied, notify the CAM within 5 days. Either of these events may trigger a CPR meeting.

Products:

- Permit Status Letter
- Updated List of Permits (*if applicable*)
- Updated Schedule for Acquiring Permits (*if applicable*)
- Copy of Each Approved Permit (*if applicable*)

Subtask 1.9 Subcontracts

The goals of this subtask are to: (1) procure subcontracts required to carry out the tasks under this Agreement; and (2) ensure that the subcontracts are consistent with the terms and conditions of this Agreement.

The Recipient shall:

- Manage and coordinate subcontractor activities in accordance with the requirements of this Agreement.
- Incorporate this Agreement by reference into each subcontract.
- Include any required Energy Commission flow-down provisions in each subcontract, in addition to a statement that the terms of this Agreement will prevail if they conflict with the subcontract terms.
- If required by the CAM, submit a draft of each *Subcontract* required to conduct the work under this Agreement.
- Submit a final copy of each executed subcontract.
- Notify and receive written approval from the CAM prior to adding any new subcontractors (see the discussion of subcontractor additions in the terms and conditions).

Exhibit A

Scope of Work

Southern California Gas Company (SoCalGas)

Products:

- Subcontracts (*draft if required by the CAM*)

TECHNICAL ADVISORY COMMITTEE

Subtask 1.10 Technical Advisory Committee (TAC)

The goal of this subtask is to create an advisory committee for this Agreement. The TAC should be composed of diverse professionals. The composition will vary depending on interest, availability, and need. TAC members will serve at the CAM's discretion. The purpose of the TAC is to:

- Provide guidance in project direction. The guidance may include scope and methodologies, timing, and coordination with other projects. The guidance may be based on:
 - Technical area expertise;
 - Knowledge of market applications; or
 - Linkages between the agreement work and other past, present, or future projects (both public and private sectors) that TAC members are aware of in a particular area.
- Review products and provide recommendations for needed product adjustments, refinements, or enhancements.
- Evaluate the tangible benefits of the project to the state of California, and provide recommendations as needed to enhance the benefits.
- Provide recommendations regarding information dissemination, market pathways, or commercialization strategies relevant to the project products.
- Help set the project team's goals and contribute to the development and evaluation of its statement of proposed objectives as the project evolves.
- Provide a credible and objective sounding board on the wide range of technical and financial barriers and opportunities.
- Help identify key areas where the project has a competitive advantage, value proposition, or strength upon which to build.
- Advocate, to the extent the TAC members feel is appropriate, on behalf of the project in its effort to build partnerships, governmental support and relationships with a national spectrum of influential leaders.
- Ask probing questions that insure a long-term perspective on decision-making and progress toward the project's strategic goals.

The TAC may be composed of qualified professionals spanning the following types of disciplines:

- Researchers knowledgeable about the project subject matter;
- Members of trades that will apply the results of the project (e.g., designers, engineers, architects, contractors, and trade representatives);
- Public interest market transformation implementers;
- Product developers relevant to the project;
- U.S. Department of Energy research managers, or experts from other federal or state agencies relevant to the project;
- Public interest environmental groups;
- Utility representatives;
- Air district staff; and
- Members of relevant technical society committees.

Exhibit A

Scope of Work

Southern California Gas Company (SoCalGas)

The Recipient shall:

- Prepare a *List of Potential TAC Members* that includes the names, companies, physical and electronic addresses, and phone numbers of potential members. The list will be discussed at the Kick-off meeting, and a schedule for recruiting members and holding the first TAC meeting will be developed.
- Recruit TAC members. Ensure that each individual understands member obligations and the TAC meeting schedule developed in subtask 1.11.
- Prepare a *List of TAC Members* once all TAC members have committed to serving on the TAC.
- Submit *Documentation of TAC Member Commitment* (such as Letters of Acceptance) from each TAC member.

Products:

- List of Potential TAC Members
- List of TAC Members
- Documentation of TAC Member Commitment

Subtask 1.11 TAC Meetings

The goal of this subtask is for the TAC to provide strategic guidance for the project by participating in regular meetings, which may be held via teleconference.

The Recipient shall:

- Discuss the TAC meeting schedule with the CAM at the Kick-off meeting. Determine the number and location of meetings (in-person and via teleconference) in consultation with the CAM.
- Prepare a *TAC Meeting Schedule* that will be presented to the TAC members during recruiting. Revise the schedule after the first TAC meeting to incorporate meeting comments.
- Prepare a *TAC Meeting Agenda* and *TAC Meeting Back-up Materials* for each TAC meeting.
- Organize and lead TAC meetings in accordance with the TAC Meeting Schedule. Changes to the schedule must be pre-approved in writing by the CAM.
- Prepare *TAC Meeting Summaries* that include any recommended resolutions of major TAC issues.

The TAC shall:

- Help set the project team's goals and contribute to the development and evaluation of its statement of proposed objectives as the project evolves.
- Provide a credible and objective sounding board on the wide range of technical and financial barriers and opportunities.
- Help identify key areas where the project has a competitive advantage, value proposition, or strength upon which to build.
- Advocate on behalf of the project in its effort to build partnerships, governmental support and relationships with a national spectrum of influential leaders.
- Ask probing questions that insure a long-term perspective on decision-making and progress toward the project's strategic goals.

Exhibit A

Scope of Work

Southern California Gas Company (SoCalGas)

- Review and provide comments to proposed project performance metrics.
- Review and provide comments to proposed project Draft Technology Transfer Plan.

Products:

- TAC Meeting Schedule (draft and final)
- TAC Meeting Agendas (draft and final)
- TAC Meeting Back-up Materials
- TAC Meeting Summaries

Subtask 1.12 Project Performance Metrics

The goal of this subtask is to finalize key performance targets for the project based on feedback from the TAC and report on final results in achieving those targets. The performance targets should be a combination of scientific, engineering, techno-economic, and/or programmatic metrics that provide the most significant indicator of the research or technology's potential success.

The Recipient shall:

- Complete and submit the project performance metrics from the *Initial Project Benefits Questionnaire*, developed in the Evaluation of Project Benefits task, to the CAM.
- Present the draft project performance metrics at the first TAC meeting to solicit input and comments from the TAC members.
- Develop and submit a *TAC Performance Metrics Summary* that summarizes comments received from the TAC members on the proposed project performance metrics. The *TAC Performance Metrics Summary* will identify:
 - TAC comments the Recipient proposes to incorporate into the *Initial Project Benefits Questionnaire*, developed in the Evaluation of Project Benefits task.
 - TAC comments the Recipient does not propose to incorporate with and explanation why.
- Develop and submit a *Project Performance Metrics Results* document describing the extent to which the Recipient met each of the performance metrics in the *Final Project Benefits Questionnaire*, developed in the Evaluation of Project Benefits task.
- Discuss the *Project Performance Metrics Results* at the Final Meeting.

Products:

- TAC Performance Metrics Summary
- Project Performance Metrics Results

Exhibit A
Scope of Work
Southern California Gas Company (SoCalGas)

IV. TECHNICAL TASKS

*Products that require a draft version are indicated by marking “(draft and final)” after the product name in the “Products” section of the task/subtask. If “(draft and final)” does not appear after the product name, only a final version of the product is required. **Subtask 1.1 (Products)** describes the procedure for submitting products to the CAM.*

TASK 2: HYDROGEN PRODUCTION SYSTEM DESIGN

The goal of this task is to complete design on the bench-scale, low-carbon hydrogen production system.

The Recipient shall:

- Conduct site readiness assessment and provide a *Site Readiness Memo* that summarizes the existing site capabilities and any work conducted to prepare the site for the bench-scale hydrogen production system.
- Conduct an initial bench-scale design that includes a Hazard and Operability (HAZOP) analysis.
- Conduct final review of bench-scale design.
- Prepare and provide a draft and final *Hydrogen Production System Design Report* that includes, but is not limited to, the following:
 - Final bench-scale design;
 - Process flow diagram of the bench-scale system;
 - Piping and instrumentation diagram of the bench-scale system;
 - Bill of materials;
 - Heat and material balances;
 - Instrument list;
 - Equipment process data sheet and equipment list;
 - Interlock description;
 - Plant layout and general equipment arrangement;
 - Fluid list and piping class;
 - Safety design criteria;
 - Utility requirements;
 - Safety devices process data sheet;
 - Environmental data; and
 - Detailed engineering documents, including fabrication drawings, specifications, and standards.

Products:

- Site Readiness Memo
- Hydrogen Production System Design Report (draft and final)

TASK 3: PROCUREMENT AND FABRICATION

The goals of this task are to procure all equipment and materials needed and fabricate the bench-scale, low-carbon hydrogen production system.

The Recipient shall:

- Prepare and provide a *Procurement and Fabrication Plan* that includes, but is not limited to, the following:
 - A list of fabrication milestones;
 - A Gantt chart and detailed project schedule;

Exhibit A
Scope of Work
Southern California Gas Company (SoCalGas)

- A description of best management practices to be utilized;
- A risk mitigation strategy;
- Quality control and quality assurance plans;
- Plasma reactor mechanical specification for procurement;
- Steam system specification for procurement;
- Plasma power supply specifications for procurement;
- Piping & Instrumentation specifications for procurement;
- Control system specifications for procurement;
- Equipment list; and
- Other materials necessary for fabrication of the bench-scale system (frames, fixtures, nuts, bolts, etc.).
- Implement the Procurement and Fabrication Plan.
- Prepare and provide a *Procurement and Fabrication Report* that includes, but is not limited to, the following:
 - The process used to assemble the bench-scale test system and any deviations from the Procurement and Fabrication Plan; and
 - High-resolution photos of the fabricated system.
- Prepare and provide *CPR Report #1* in accordance with subtask 1.3 (CPR Meetings).
- Participate in a CPR Meeting.

Product:

- Procurement and Fabrication Plan
- Procurement and Fabrication Report
- CPR Report #1

TASK 4: COMMISSIONING AND SAFETY REVIEW

The goals of this task are to commission the bench-scale, low-carbon hydrogen production system and perform a thorough safety review.

The Recipient shall:

- Prepare and provide a *Cold Testing Plan* for the system that will detail the process, deliverables, and milestones associated with cold testing. Cold testing refers to testing without the biogas material. The *Cold Testing Plan* includes, but is not limited to, the following:
 - A description of the equipment to be tested;
 - A description of the methodology to test the identified equipment;
 - A list of goals and objectives for the test; and
 - A description of the quality control and quality assurance practices for the test methodology.
- Implement the Cold Testing Plan.
- Prepare and provide a *Cold Testing Report* for the facility that will evaluate the cold test results, which includes, but is not limited to, the following:
 - A description of the results of the cold test for the identified equipment; and
 - A description of any major changes that were made based on findings during the cold testing.

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Southern California Gas Company (SoCalGas)

- Prepare and provide a *Hot Testing Plan* for the system that will detail the process, deliverables, and milestones associated with the hot testing of the facility. Hot testing refers to testing with the biogas material. The *Hot Testing Plan* includes, but is not limited to, the following:
 - A description of the equipment to be tested;
 - A description of the methodology to test the identified equipment;
 - A list of goals and objectives for the test; and
 - A description of the quality control and quality assurance practices for the test methodology.
- Implement the Hot Testing Plan.
- Prepare and provide a *Hot Testing Report* for the system that will evaluate the hot test results, which includes, but is not limited to, the following:
 - A description of the results of the hot test for the identified equipment; and
 - A description of any major changes that were made based on findings during the hot testing.
- Prepare and provide *Written Notification of Completion of Commissioning* for the facility that will notify the CAM that commissioning activities have been completed and that the system is ready to commence testing operations.
- Prepare a *Safety Review Plan* that includes but is not limited to:
 - Hazard and operability analysis;
 - Standard operating procedures; and
 - Required personal protective equipment.
- Prepare and provide a *Safety Review Report*.

Products:

- Cold Testing Plan
- Cold Testing Report
- Hot Testing Plan
- Hot Testing Report
- Written Notification of Completion of Commissioning
- Safety Review Plan
- Safety Review Report

TASK 5: HYDROGEN PRODUCTION SYSTEM TESTING

The goals of this task are to conduct both parametric and long-term testing of the proposed bench-scale, low-carbon hydrogen production system.

The Recipient shall:

- Prepare and provide a *Hydrogen Production System Parametric Testing Plan* that includes but is not limited to:
 - Temperature;
 - Feed flow rate;
 - Plasma power and frequency; and
 - Steam/carbon ratio.
- Implement the Hydrogen Production System Parametric Testing Plan.
- Prepare and provide the *Hydrogen Production System Parametric Testing Report* that includes but is not limited to:
 - Syngas composition as a function of parameters tested; and

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- Optimum conditions for maximum syngas production.
- Prepare and provide a *Hydrogen Production System Long-term Testing Plan* that includes but is not limited to:
 - Test duration; and
 - Test conditions.
- Implement the Hydrogen Production System Long-term Testing Plan.
- Perform at least 300 hours (or shorter period as approved in writing by the CAM) of testing measurements.
- Prepare and provide the *Hydrogen Production System Long-term Testing Report* that includes but is not limited to:
 - System performance stability;
 - Catalyst stability; and
 - Plasma reactor stability versus time.
- Prepare and provide *Written Notification of Completion of Testing* for the system that will notify the CAM that testing activities have been completed.
- Prepare and provide *CPR Report #2* in accordance with subtask 1.3 (CPR Meetings).
- Participate in a CPR Meeting

Products:

- Hydrogen Production System Parametric Testing Plan
- Hydrogen Production System Parametric Testing Report
- Hydrogen Production System Long-term Testing Plan
- Hydrogen Production System Long-term Testing Report
- Written Notification of Completion of Testing
- CPR Report #2

TASK 6: MEASUREMENT AND VERIFICATION

The goal of this task is to measure and quantify the benefits resulting from this project. The project team will use a third-party vendor for measurement and verification.

The Recipient shall:

- Enter into agreement with Measurement and Verifications (M&V) subcontractor per Task 1.9.
- Coordinate site visits with the M&V subcontractor at the demonstration site.
- Prepare and provide a detailed *Measurement and Verification Plan* for demonstration site to include but not be limited to:
 - A description of the monitoring equipment and instrumentation that will be used.
 - A description of the key input parameters and output metrics that will be measured.
 - A description of the M&V protocol and analysis methods to be employed.
 - A description of qualification of the independent, third-party M&V subcontractor.
 - A list of project metrics to be measured, including but not limited to:
 - Hydrogen cost production (\$/kilogram-H₂);
 - Rate of hydrogen production (kilogram-H₂/day);
 - GHG emission reduction; and
 - Energy efficiency.
- Perform 300+ hours (or shorter period as approved in writing by the CAM) of testing measurements (and calculations) based on the M&V protocol for the testing period.
- Prepare a *Measurement and Verification Report* that includes but is not limited to:

Exhibit A Scope of Work Southern California Gas Company (SoCalGas)

- M&V protocol employed;
- Measurements and calculations from testing period; and
- Analysis of M&V results.

Products:

- Measurement and Verification Plan
- Measurement and Verification Report

TASK 7: TECHNOECONOMIC ANALYSIS AND LIFECYCLE ANALYSIS

The goals of this task are to update the existing preliminary Technoeconomic Analysis and Lifecycle Analysis to better understand the economic viability and environmental impact of the proposed low-carbon hydrogen system when commercialized.

The Recipient shall:

- Prepare and provide a *Technoeconomic Analysis* of the bench-scale system that includes, but is not limited to, the following:
 - Technical performance of the proposed system;
 - System efficiency;
 - Cost of H₂ production projected at commercial or industrial scale; and
 - Comparison with SMR and electrolysis.
- Prepare a *Lifecycle Analysis* of the bench-scale system using established U.S. Department of Energy Life Cycle Analysis models that includes, but is not limited to study assumptions, results, interpretation, and a comparison to SMR and electrolysis that will characterize Lifecycle GHG emissions.
- Conduct a *Peer-reviewed Validation* of the results from the Technoeconomic Analysis and Lifecycle Analysis that includes, but is not limited to, the following:
 - A cradle-to-cradle perspective; and
 - Comparison of the economic and environmental performance of the proposed technology with SMR and electrolysis.

Products:

- Technoeconomic Analysis
- Lifecycle Analysis
- Peer-reviewed Validation

TASK 8: EVALUATION OF PROJECT BENEFITS

The goal of this task is to report the benefits resulting from this project.

The Recipient shall:

- Complete the *Initial Project Benefits Questionnaire*. The Initial Project Benefits Questionnaire shall be initially completed by the Recipient with 'Kick-off' selected for the 'Relevant data collection period' and submitted to the CAM for review and approval.
- Complete the *Annual Survey* by July 15th of each year. The Annual Survey includes but is not limited to the following information:
 - Technology commercialization progress
 - New media and publications
 - Company growth

Exhibit A
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- Follow-on funding and awards received
- Complete the *Final Project Benefits Questionnaire*. The Final Project Benefits Questionnaire shall be completed by the Recipient with 'Final' selected for the 'Relevant data collection period' and submitted to the CAM for review and approval.
- Respond to CAM questions regarding the questionnaire drafts.
- Complete and update the project profile on the CEC's public online project and recipient directory on the [Energize Innovation website \(www.energizeinnovation.fund\)](http://www.energizeinnovation.fund), and provide *Documentation of Project Profile on EnergizeInnovation.fund*, including the profile link.
- If the Prime Recipient is an Innovation Partner on the project, complete and update the organizational profile on the CEC's public online project and recipient directory on the [Energize Innovation website \(www.energizeinnovation.fund\)](http://www.energizeinnovation.fund), and provide *Documentation of Organization Profile on EnergizeInnovation.fund*, including the profile link.

Products:

- Initial Project Benefits Questionnaire
- Annual Survey(s)
- Final Project Benefits Questionnaire
- Documentation of Project Profile on EnergizeInnovation.fund
- Documentation of Organization Profile on EnergizeInnovation.fund

TASK 9: TECHNOLOGY/KNOWLEDGE TRANSFER ACTIVITIES

The goal of this task is to conduct activities that will accelerate the commercial adoption of the technology being supported under this agreement. Eligible activities include, but are not limited to, the following:

- Scale-up analysis including manufacturing analysis, independent design verification, and process improvement efforts.
- Technology verification testing, or application to a test bed program located in California.
- Legal services or licensing to secure necessary intellectual property to further develop the technology
- Market research, business plan development, and cost-performance modeling.
- Entry into an incubator or accelerator program located in California

The Recipient Shall:

- Develop and submit a *Technology Transfer Plan* that identifies the proposed activities the recipient will conduct to accelerate the successful commercial adoption of the technology.
- Present the *Draft Technology Transfer Plan* to the TAC for feedback and comments.
- Develop and submit a *Summary of TAC Comments* that summarizes comments received from the TAC members on the *Draft Technology Transfer Plan*. This document will identify:
 - TAC comments the recipient proposes to incorporate into the *Final Technology Transfer Plan*.
 - TAC comments the recipient does not propose to incorporate with and explanation why.
- Submit the *Final Technology Transfer Plan* to the CAM for approval.

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- Implement activities identified in *Final Technology Transfer Plan*.
- Develop and submit a *Technology Transfer Summary Report* that includes high level summaries of the activities, results, and lessons learned of tasks performed relating to implementing the *Final Technology Transfer Plan*. This report should not include any proprietary information.
- When directed by the CAM, develop presentation materials for an CEC- sponsored conference/workshop(s) on the project.
- Provide at least (6) six *High Quality Digital Photographs* (minimum resolution of 1300x500 pixels in landscape ratio) of pre and post technology installation at the project sites or related project photographs.

Products:

- Technology Transfer Plan (draft and final)
- Summary of TAC Comments
- Technology Transfer Summary Report (draft and final)
- High Quality Digital Photographs

V. PROJECT SCHEDULE

Please see the attached Excel spreadsheet.

STATE OF CALIFORNIA

STATE ENERGY RESOURCES
CONSERVATION AND DEVELOPMENT COMMISSION

RESOLUTION: SOUTHERN CALIFORNIA GAS COMPANY

RESOLVED, that the State Energy Resources Conservation and Development Commission (CEC) adopts the staff CEQA findings contained in the Agreement or Amendment Request Form (as applicable); and

RESOLVED, that the CEC approves Agreement PIR-21-003 with Southern California Gas Company for a \$750,000 grant to address key challenges associated with developing a low carbon hydrogen production system that is also cost-effective and scalable; and

FURTHER BE IT RESOLVED, that the Executive Director or their designee shall execute the same on behalf of the CEC.

CERTIFICATION

The undersigned Secretariat to the CEC does hereby certify that the foregoing is a full, true, and correct copy of a Resolution duly and regularly adopted at a meeting of the CEC held on June 8, 2022.

AYE:

NAY:

ABSENT:

ABSTAIN:

Liza Lopez
Secretariat