California Energy Commission
October 18, 2023 Business Meeting
Backup Materials for Agenda Item No 15:
Twelve Benefit Corporation

The following backup materials for the above-referenced agenda item are available in this PDF packet as listed below:

1. Proposed Resolution
2. Grant Request Form
3. Scope of Work

RESOLUTION NO: 23-1018-15

STATE OF CALIFORNIA

STATE ENERGY RESOURCES
CONSERVATION AND DEVELOPMENT COMMISSION

RESOLUTION: Twelve Benefit Corporation

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 EPC-23-015 with Twelve Benefit Corporation for a $2,792,088 grant to develop and test a novel electrochemical reactor capable of converting carbon dioxide (CO2) into carbon monoxide for use in concrete manufacturing and adopting staff's determination that this action is exempt from CEQA. The test will occur in Alameda, using simulated flue gas from a California cement manufacturer, and will demonstrate the potential long-term storage of CO2 in cement; 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 October 18, 2023.

AYE:
NAY:
ABSENT:
ABSTAIN:

Dated:

_____
Kristine Banaag
Secretariat

STATE OF CALIFORNIA
CALIFORNIA ENERGY COMMISSION

CEC-270 (Revised 9/2022)

GRANT REQUEST FORM (GRF)

A. New Agreement Number

IMPORTANT: New Agreement # to be completed by Contracts, Grants, and Loans Office.

New Agreement Number: EPC-23-015

B. Division Information

1. Division Name: ERDD
2. Agreement Manager: Michael Lozano
3. MS-:51
4. Phone Number: 916-776-0788

C. Recipient's Information

1. Recipient's Legal Name: Twelve Benefit Corporation
2. Federal ID Number: 47-4239185

D. Title of Project

Title of project: Long Duration CO_2 Storage via CO_2-derived Cement Additives

E. Term and Amount

1. Start Date: 11/12023
2. End Date: 3/31/2028
3. Amount: $2,792,088.00

F. Business Meeting Information

1. Are the ARFVTP agreements $75K and under delegated to Executive Director? No
2. The Proposed Business Meeting Date: 10/18/2023
3. Consent or Discussion? Discussion
4. Business Meeting Presenter Name: Michael Lozano
5. Time Needed for Business Meeting: 5 minutes.
6. The email subscription topic is: EPIC (Electric Program Investment Charge).

Agenda Item Subject and Description:

TWELVE BENEFIT CORPORATION. Proposed resolution approving agreement EPC-23-015 with Twelve Benefit Corporation for a $2,792,088 grant to develop and test a novel electrochemical reactor capable of converting carbon dioxide (CO_2) into carbon monoxide for use in concrete manufacturing and adopting staff's determination that this action is exempt from CEQA. The test will occur in Alameda, using simulated flue gas from a California cement manufacturer and will demonstrate the potential long-term storage of CO_2 in cement. (EPIC funding) Contact: Michael Lozano

G. California Environmental Quality Act (CEQA) Compliance

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

   If yes, skip to question 2.

2. If Agreement is considered a "Project" under CEQA answer the following questions.

a) Agreement **IS** exempt?

Yes

Statutory Exemption?
No

If yes, list PRC and/or CCR section number(s) and separate each with a comma. If no, enter "None" and go to the next question.

PRC section number:

CCR section number:

Categorical Exemption?
Yes.

If yes, list CCR section number(s) and separate each with a comma. If no, enter "None" and go to the next question.

CCR section number:
Cal. Code Regs., tit. 14, § 15301, Cal. Code Regs., tit. 14, § 15306

Common Sense Exemption? 14 CCR 15061 (b) (3)
No

If yes, explain reason why Agreement is exempt under the above section. If no, enter "Not applicable" and go to the next section.

Cal. Code Regs., tit. 14, § 15301: A project that consists of operation, repair, maintenance, permitting, leasing, licensing, or minor alteration 2) of existing structure, facilities, or mechanical equipment, 3) which involves negligible or no expansion of use beyond that existing or former use is categorically exempt from CEQA. This project includes the fabrication and assembly of electrolyzer stacks and integration of those stacks into a commercial scale electrolyzer unit for testing. The commercial scale unit is designed to fit in a standard shipping container. The commercial scale electrolyzer will be skid mounted for demonstration inside an existing facility used for research purposes. The project will not involve any construction activities such as excavation or digging. Therefore, this project is exempt from CEQA.

Cal. Code Regs., tit. 14, § 15306: The project includes conducting paper studies for LCA, TEA, and FEL-1 design, and conducting laboratory research on electrolyzer experiments, and design/planning work for CO2-to-formate pathway design and fits within the following criteria: Project consists of basic data collection, research, experimental management, and resource evaluation activities 2) Which do not result in a serious or major disturbance to an environmental resource. This project is exempt from CEQA under section 15306.

This proposed project does not impact an environmental resource of hazardous or critical concern where designated, precisely mapped, and officially adopted pursuant to law by federal, state, or local agencies; 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 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 and this project will not have a significant effect on the environment.

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

No

If yes, answer yes or no to all that applies. If no, list all as "no" and "None" as "yes".

Additional Documents	Applies
Initial Study	No
Negative Declaration	No
Mitigated Negative Declaration	No
Environmental Impact Report	No
Statement of Overriding Considerations	No
None	Yes

H. Subcontractors

List all Subcontractors listed in the Budget (s) (major and minor). Insert additional rows if needed. If no subcontractors to report, enter "No subcontractors to report" and "0" to funds. **Delete** any unused rows from the table.

Subcontractor Legal Company Name	CEC Funds	Match Funds
TBD Measurement and Verification Subcontractor	$	**$15,000**

I. Vendors and Sellers for Equipment and Materials/Miscellaneous

List all Vendors and Sellers listed in Budget(s) for Equipment and Materials/Miscellaneous. Insert additional rows if needed. If no vendors or sellers to report, enter "No vendors or sellers to report" and "0" to funds. **Delete** any unused rows from the table.

Vendor/Seller Legal Company Name	CEC Funds	Match Funds

J. Key Partners

List all key partner(s). Insert additional rows if needed. If no key partners to report, enter "No key partners to report." **Delete** any unused rows from the table.

Key Partner Legal Company Name
No key partners to report

K. Budget Information

Include all budget information. Insert additional rows if needed. If no budget information to report, enter "N/A" for "Not Applicable" and "0" to Amount. **Delete** any unused rows from the table.

Funding Source	Funding Year of Appropriation	Budget List Number	Amount
EPIC	21-22	301.001I	$ 2,792,088

TOTAL Amount: $ 2,792,088

R&D Program Area: EERB: IAW

Explanation for "Other" selection Not applicable

Reimbursement Contract #: Not applicable

Federal Agreement #: Not applicable

L. Recipient's Contact Information

1. Recipient's Administrator/Officer

Name: Theo Gao

Address: 600 Bancroft Way

City, State, Zip: Berkeley, CA 94710-2224

Phone: 603-205-4915

E-Mail: theo.gao@twelve.com

3. Recipient's Project Manager

Name: Simon Stone

Address: 600 Bancroft Way

City, State, Zip: Berkeley, CA 94710-2224

Phone: 617-653-6546

E-Mail: simon@twelve.com

M. Selection Process Used

There are three types of selection process. List the one used for this GRF.

Selection Process	Additional Information
Competitive Solicitation #	GFO-22-301
First Come First Served Solicitation #	Not applicable
Other	Not applicable

N. Attached Items

1. List all items that should be attached to this GRF by entering “Yes” or “No”.

Item Number	Item Name	Attached
1	Exhibit A, Scope of Work/Schedule	Yes
2	Exhibit B, Budget Detail	Yes
3	CEC 105, Questionnaire for Identifying Conflicts	Yes
4	Recipient Resolution	No
5	Awardee CEQA Documentation	No

Approved By

Individuals who approve this form must enter their full name and approval date in the MS Word version.

Agreement Manager: Michael Lozano

Approval Date: 09/7/2023

Branch Manager: Virginia Lew

Approval Date: 09/7/2023

Director: Delegated to Branch Manager

Approval Date: N/A

EXHIBIT A
Scope of Work
Twelve Benefit Corporation (dba Twelve)

I. TASK ACRONYM/TERM LISTS

A. Task List

Task #	CPR[1]	Task Name
1		General Project Tasks
2		CO_2 Electrolyzer Stack Design for Automation
3	X	Stack Automation Prototyping
4		Optimization of Synthetic Pathway for Calcium Formate
5	X	Full Stack Validation and Procurement for Demonstration-Scale CO_2 Electrolyzer
6		FEL-1 Design of CO-to-Calcium Formate System
7	X	Assembly and Commissioning of Demonstration-Scale CO_2 Electrolyzer
8		Performance Testing of Demonstration-Scale CO_2 Electrolysis
9		Testing Industrial Flue Gas as a CO_2 Feedstock
10		Incorporation of CO_2-Derived Calcium Formate to Cement Plant Industrial Processes
11		Techno Economic and Life Cycle Analyses
12		Evaluation of Project Benefits
13		Technology/Knowledge Transfer Activities

B. Acronym/Term List

Acronym/Term	Meaning
CAM	Commission Agreement Manager
CAO	Commission Agreement Officer
CCUS	Carbon Capture, Utilization, and Storage
CEC	California Energy Commission
CO	Carbon Monoxide
CPR	Critical Project Review
DFA	Design for Assembly
DFM	Design for Manufacture
FEL	Front-End Load
LCA	Life Cycle Analysis
TAC	Technical Advisory Committee
TEA	Techno Economic Analysis

[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
Twelve Benefit Corporation (dba Twelve)

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

A. Purpose of Agreement

The purpose of this Agreement is to fund development, scale-up, and testing of a two-step pathway from carbon dioxide (CO_2) to calcium formate, a cement additive used to tailor cement strength and setting time. The outcome will be construction of a demonstration-scale CO_2 electrolyzer that can make industrially relevant amounts of carbon monoxide (CO) as well as scaleup and optimization of a CO to calcium formate system. When fully integrated, this technology platform allows for the conversion of flue gas CO_2 into a valuable cement additive, representing long-term storage of CO_2 in cement.

Problem / Solution Statement

Problem

California's cement and concrete industries result in significant emissions state-wide. They are difficult to decarbonize due to complex, high-temperature processing that cannot imminently rely on electrification. Like many other hard-to-abate sectors, these industries lag in meeting emissions reductions goals.

Solution

The Recipient has developed a novel electrochemical reactor capable of converting CO_2 into carbon monoxide at industry-leading efficiencies using only water and renewable electricity. This pathway opens a suite of opportunities to transform a waste greenhouse gas into valuable end products, as carbon monoxide is a precursor to many industrial chemicals traditionally produced with petroleum. One such example is calcium formate, which can be used in concrete manufacturing to increase concrete durability and lower setting time. The proposed two step pathway can use flue gas CO_2 captured from a cement plant to synthesize CO and subsequently calcium formate, which will be incorporated back into concrete production as a CO_2-derived additive.

B. Goals and Objectives of the Agreement

Agreement Goals

The goals of this Agreement are to:

Develop, test, and manufacture scalable stack hardware based on design for assembly (DFA) and design for manufacture (DFM) principles.

- Optimize and scale up a pilot line capable of synthesizing calcium formate from CO produced through CO_2 electrolysis of industrial GHG emissions.
- Validate that CO_2-derived calcium formate can be incorporated into concrete manufacturing for long-term CO_2 storage.
- Investigate and mitigate the impacts of flue gas particulate contaminants on CO_2 electrolysis in preparation for future flue gas integration.
- Interface with an industry-leading cement manufacturer to uncover and remove barriers to commercial-adoption of carbon capture, utilization, and storage (CCUS) technologies.

Ratepayer Benefits:[2] This Agreement will result in the ratepayer benefits of greater electricity reliability, lower costs, or increased safety by reducing renewable energy overgeneration, reducing CO_2 emissions state-wide, and stabilizing the electric grid. The recipient's technology can switch on and off, taking advantage of overgeneration to reduce overall electricity cost and stabilize by adding a controllable load. The recipient's technology has the potential to remove 8 million metric tons of CO_2 produced by the California cement industry annually, mitigating some of the impacts of climate change for California residents.

Technological Advancement and Breakthroughs:[3] 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 demonstrating and validating the incorporation of highly efficient, electricity driven carbon capture utilization and storage (CCUS) in heavy GHG emission producing industries, thus removing barriers to commercial adoption of this technology. State-wide adoption of CCUS in the cement and concrete manufacturing sector will expand renewable energy demand and generation to help meet California's goal of 100% renewable energy and zero-carbon electricity by 2045.

Agreement Objectives

The objectives of this Agreement are to:

- Lower stack hardware cost for demonstration-scale CO_2 electrolyzers by 500%
- Commission and operate a large-scale CO_2-to-CO electrolyzer that utilizes stack hardware designed for automation.
- Optimize a pilot-scale system for calcium formate production from industrial waste CO_2 to repeatedly produce >95% purity calcium format on the kg scale.
- Complete the FEL-1 design for an industrial-scale CO-to-calcium formate system.
- Quantify the impact of a cement plant flue gas particulate contaminant on the efficiency, lifetime, and overall performance of the Recipients electrolyzer to understand and mitigate barriers to future flue gas integration.
- Demonstrate that the CO_2-derived calcium formate produced herein can be incorporated into industrial concrete production processes through formate admixture testing at industrial partner's facility.
- Execute independent third-party Measurement and Verification to compare 6 months of data for conventional calcium formate production and 6 months of data for calcium formate production using the recipient's approach to measure and quantify project benefits, as indicated in Task 11.

[2] California Public Resources Code, Section 25711.5(a) requires projects funded by the Electric Program Investment Charge (EPIC) to result in ratepayer benefits. The California Public Utilities Commission, which established the EPIC in 2011, defines ratepayer benefits as greater reliability, lower costs, and increased safety (See CPUC "Phase 2" Decision 12-05-037 at page 19, May 24, 2012, http://docs.cpuc.ca.gov/PublishedDocs/WORD_PDF/FINAL_DECISION/167664.PDF).

[3]

EXHIBIT A
Scope of Work
Twelve Benefit Corporation (dba Twelve)

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 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 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 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.

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 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(s)
- 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
- 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.

EXHIBIT A
Scope of Work
Twelve Benefit Corporation (dba Twelve)

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 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 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.

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 Agreement. Reduction of match funds may trigger a CPR meeting.

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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, except for costs incurred by University of California recipients. 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 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 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 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).

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.

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 everyone 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.
- 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 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 section of 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

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IV. TECHNICAL TASKS

TASK 2: CO_2 ELECTROLYZER STACK DESIGN FOR AUTOMATION

The goal of this task is to design stack hardware for automated manufacturing and assembly. This will involve modification of stack components in accordance with DFA and DFM principles, as well as failure mode analysis and certification planning.

The Recipient shall:

- Develop a top-level assembly concept for automated stack hardware.
- Modify existing stack hardware designs for DFM and DFA
- Analyze design and process failure modes.
- Plan certification strategy
- Prepare *Design Summary Report* including but not limited to the following:
    - Summary and Diagrams for assembly concept for automated stack hardware, such as description of the sequence of assembly steps and high-level schematics showing equipment layout and process flow.
    - Summary of design and process failure modes
    - Summary of Plan certification strategy.

Products:

- Design Summary Report

TASK 3: STACK AUTOMATION PROTOTYPING

The goal of this task is to test the manufacturability, specifications, and performance of designs from Task 2 via small volume prototyping.

The Recipient shall:

- Procure stack hardware for short stack testing, approximately 1/10 of the size of the full stack.
- Engage manufacturers regarding large-volume stack hardware manufacturing.
- Assemble and test short stacks based on the stack hardware designed in Task 2
- Evaluate efficacy of stack hardware design, both in terms of stack hardware performance (maximum operating pressure, certification-rated safety factors, etc.) as well as overall electrolyzer performance (voltage and Faradaic yield at a specific current density)
- Iterate on the stack design as needed.
- Prepare a *Stack Automation Prototyping Report* including, but not limited to:
    - High-level executive summary
    - Summary of progress towards high-volume stack component manufacturing
    - Analysis of short stack performance including data tables and relevant spreadsheets
    - Stack design including a summary of design efficacy and a description of any stack design iterations performed, such as percent improvement of the new design compared to the baseline design and summarizing the major changes between the baseline and new design.
- Prepare a *CPR Report* #1 in accordance with subtask 1.3 (CPR Meetings) and participate in a CPR meeting.

Products:
- Stack Automation Prototyping Report
- CPR Report #1

TASK 4: OPTIMIZATION OF SYNTHETIC PATHWAY FOR CALCIUM FORMATE
The goal of this task is to optimize the CO-to-calcium formate synthetic pathway by tuning reaction conditions.

The Recipient shall:
- Perform iterative synthesis experiments to achieve >95% purity of calcium formate using knobs such as reaction temperature, reaction time, reagent concentration, pressure, and flow rates for each sequential process step.
- Evaluate alternate reaction pathways via a paper study.
- Interface with technical experts at industrial partner companies to discuss risks and benefits of available reaction conditions and understand further barriers to on-site integration.
- Prepare *Chemical Analysis of Calcium Formate Purity Report* including but not limited to:
    - High-level executive summary
- Summary of progress towards optimizing the CO-to-calcium formate synthetic pathway including alternate reaction pathways evaluated, relevant tables and references for literature search research, and validated results of purity for calcium formate goal of >95%.

Products:
- Chemical Analysis of Calcium Formate Purity Report

TASK 5: FULL STACK VALIDATION AND PROCUREMENT FOR DEMONSTRATION-SCALE CO_2 ELECTROLYZER
The goal of this task is to validate the functionality, specifications, and long-term performance of the stack hardware designed for automation. Designs will be iterated upon as necessary. Hardware for the demonstration-scale electrolyzer unit will also be procured in this task.

The Recipient shall:
- Complete hardware procurement for the demonstration-scale electrolyzer unit. Including preparing materials list.
- Validate the long-term performance of the stack hardware designed for automation via short stack tests.
- Prepare a *Short Stack Test Plan* summarizing the planned validation experiments and short stack tests.
- Perform a first article inspection on manufactured stack hardware made via large-volume manufacturing techniques.
- Iterate on stack hardware design as needed.
- Prepare and submit documentation for automation certification.
- Prepare *Full Stack Validation and Procurement Report* including but not limited to:
    - High-level executive summary
    - Summary of the validation experiments and short stack tests, including issues observed and how they were resolved.

    - A summary of the list of materials needed for the demonstration-scale electrolyzer unit, such as an abstracted list of components.
    - Copies of mitigation strategies and certifications, such as the following:
        - Discussion of Hazardous Operations and mitigation strategies
        - Workplace safety certifications related to automation, if any
        - Copies of documentation for certification of Twelves' stacks for use as a pressurized device.
- Report the status of the procurement of the hardware and materials needed for the demonstration-scale electrolyzer in monthly progress reports as required in Subtask 1.5
- Prepare *CPR Report #2* in accordance with subtask 1.3 (CPR Meetings) and participate in a CPR meeting.

Products:
- Full Stack Validation and Procurement Report
- Short Stack Test Plan
- CPR Report #2

TASK 6: FEL-1 DESIGN OF CO-TO-CALCIUM FORMATE SYSTEM
The goal of this task is to complete the FEL-1 design of the CO-to-calcium formate system to prepare for future design and installation at customer sites. FEL-1 designs for the CO_2-to-CO electrolyzer are completed; thus, this system will be designed to integrate with the Recipient's existing electrolysis system.

The Recipient shall:
- Complete FEL-1 design for a commercial-scale CO-to-calcium formate system capable of producing tons of calcium formate and integrating with the recipient's existing designs for commercial CO_2 electrolyzers.
- Prepare *Design Package Report* consisting of the following components: preliminary material balance, energy balance, capital expenditure, operating expenditure, equipment conceptual design, plant layout, mock project schedule, and risk mitigation plan.
- Interface with industrial partner to understand further design needs and considerations.
- Report the status of the full-scale chemical plant design in monthly progress reports as required in Subtask 1.5

Products:
- Design Package Report

TASK 7: ASSEMBLY AND COMMISSIONING OF DEMONSTRATION-SCALE CO_2 ELECTROLYZER
The goal of this task is to assemble and then commission a demonstration-scale CO_2 electrolyzer, including a full-sized stack built with stack hardware from high-volume manufacturing.

The Recipient shall:
- Build and verify a full-sized stack built with stack hardware from high-volume manufacturing.
- Assemble demonstration-scale electrolyzer unit and balance of plant (including skid, piping, and major equipment installation) per schedule.
- Commission demonstration-scale electrolyzer unit.

- Prepare *Electrolyzer Assembly and Commissioning Report* including but not limited to:
    - High-level executive summary
    - Summary of the validation experiments and commissioning process, including issues observed and how they were resolved.
- Report the status of the electrolyzer assembly and commissioning in monthly progress reports as required in Subtask 1.5.
- Prepare a *CPR Report #3* in accordance with subtask 1.3 (CPR Meetings) and participate in a CPR meeting.

Products:
- Electrolyzer Assembly and Commissioning Report
- CPR Report #3

TASK 8: PERFORMANCE TESTING OF CO_2 ELECTROLYSIS DEMONSTRATION UNIT
The goal of this task is to test the performance of the stack hardware designed for automation in demonstration-scale electrolyzer in preparation for deployment to customer site.

The Recipient shall:
- Operate the demonstration-scale CO_2 electrolyzer.
- Optimize performance of demonstration-scale CO_2 electrolyzer by tuning operating conditions
- Prepare *Performance Test Summary,* including but not limited to*:*
    - High-level executive summary
    - Summary of the performance characteristic of stack hardware and tables containing the data collected.

Products:
- Performance Test Summary

TASK 9: TESTING INDUSTRIAL FLUE GAS AS A CO_2 FEEDSTOCK
The goal of this task is to assess the impact of industrial flue gas contaminants on electrolyzer performance.

The Recipient shall:
- Receive a compositional analysis of flue gas from the industrial partner.
- Prepare a *Contaminants Test Plan* for analyzing the contaminants within the recipient's experimental electrolysis cells including but not limited to:
    - High-level executive summary
    - Summary of the data collected.
    - Quantify the impact of cement plant flue gas particulate contaminant on the efficiency, lifetime and overall performance of the Recipient's electrolyzer and mitigation plans.
- Test the impact of at least one of the common contaminants on the recipient's electrolyzer performance, with a focus on analyzing catalyst poisoning, side reactions, corrosion, and MEA degradation, among other phenomena.
- Collaborate across the recipient's internal technical development and plant design teams to create mitigation plans to eliminate any negative effects of flue gas contaminants.

Products:
- Contaminants Test Plan

TASK 10: INCORPORATION OF CO_2-DERIVED CALCIUM FORMATE TO CEMENT PLANT INDUSTRIAL PROCESSES

The goal of this task is to integrate CO_2-derived calcium formate from the recipient into the workstream of our industrial partner demonstration site. The recipient will provide kg volumes of calcium formate to the industrial partner and the industrial partner will perform standard analytical tests as well as assess any performance tests for CO_2-derived calcium formate as an admixture.

The Recipient shall:
- Provide calcium formate samples to industrial partner.
- Provide technical assistance to industrial partner as they perform standard tests to assess any potential differences between CO_2-derived calcium formate and traditional calcium formate to evaluate its compatibility with their existing industrial processes.
    - Tests may include but are not limited to evaluation of tensile strength, setting time, and chemical composition.
- Assist partner in preparing formal *Test Result Summary* from project partner, including but not limited to:
    - High-level executive summary
    - Summary of the data collected.
        - Calcium formate (metric tons/yr.) that can be incorporated into concrete manufacturing.
        - Percent purity of calcium formate on the kg scale
        - Benefits of CO2 produced calcium formate with industrial processes.

Products:
- Test Result Summary from Partner

TASK 11: TECHNO ECONOMIC AND LIFE CYCLE ANALYSES AND DISSEMINATION

The goal of this task is to assess the effect of this project on the techno economics and environmental impact of our technology platform. Techno economic and life cycle analyses will be performed following published protocols, focusing on calcium formate production cost and emissions impact respectively. These results will then be broadly disseminated to demonstrate the efficacy of deploying this technology within the California cement industry.

The Recipient shall:
- Use published protocols to develop a techno economic analysis (TEA) and life cycle analysis (LCA) models.
- Incorporate performance and manufacturing data into TEA and LCA models.
- Assess the techno economic and environmental impacts of this project on the recipient's technology platform.
- Prepare a final *Techno Economic Assessment* for the flue gas CO_2-to-calcium formate system to be delivered to the industrial partner, CEC and U.S. Department of Energy.
    - High-level executive summary

    - Summary of the data collected and results from activities performed in preparing the TEA models.
- Prepare a final *Life Cycle Assessment* for the flue gas CO_2-to-calcium formate system to be delivered to the industrial partner, CEC and U.S. Department of Energy.
    - High-level executive summary
    - Summary of the data collected and results from activities performed in preparing the LCA models.
- Discuss results of TEA and LCA with industrial partner to discuss any new roadblocks to on-site deployment uncovered through these analyses.
- Engage in outreach activities led by the recipient's business development and capital projects teams to disseminate the applicability of the recipient's CO_2 electrolysis technology for reducing GHG emissions within the California cement industry and beyond. This will include pursuing meetings, offtake agreements, demonstration agreements, and on-site deployments. The recipient will leverage close partnerships with the California Nevada Cement Association, the demonstration partner, and other cement companies to assist with networking and dissemination.
- Develop *M&V Plan* with input from subrecipient and CAM.
- Implement *M&V Plan* and prepare *M&V Report* to summarize and quantify project benefits to include a 3rd party lifecycle analysis that compares 6 months of data for conventional calcium formate production (baseline) and 6 months of data obtained for calcium formate production using the recipient's approach, to include:
    - Energy use per ton of calcium formate produced using conventional processes versus using recipient's technology in kWh/ton or other energy units as determined in consultation with the CAM.
    - Carbon intensity of calcium formate produced using conventional processes versus using recipient's technology in CO2/ton or other units as determined in consultation with the CAM)

Products:
- Techno Economic Assessment
- Life Cycle Assessment
- M&V Plan
- M&V Report

TASK 12: 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 January 31st of each year. The Annual Survey includes but is not limited to the following information:
    - Technology commercialization progress
    - New media and publications
    - Company growth
    - 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), 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), 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 13: TECHNOLOGY TRANSFER ACTIVITIES

The goal of this task is to ensure the technological learning that resulted from the demonstration(s) is captured and disseminated to the range of professions that will be responsible for future deployments of this technology or similar technologies.

The Recipient Shall:

- Develop and submit a *Project Case Study Plan* that outlines how the Recipient will document the planning, construction, commissioning, and operation of the technology or system being demonstrated. The Project Case Study Plan should include:
    - An outline of the objectives, goals, and activities of the case study.
    - The organization that will be conducting the case study and the plan for conducting it.
    - A list of professions and practitioners involved in the technology's deployment.
    - Specific activities the recipient will take to ensure the learning that results from the project is disseminated to those professions and practitioners.
    - Presentations/webinars/training events to disseminate the results of the case study.
- Present the draft *Project Case Study Plan* to the TAC for review and comment.
- Develop and submit a *Summary of TAC Comments* that summarizes comments received from the TAC members on the draft *Project Case Study 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 *Project Case Study Plan* to the CAM for approval.
- Execute the final Project Case Study Plan and develop and submit a Project Case Study.
- When directed by the CAM, develop presentation materials for a CEC sponsored conference/workshop(s) on the project.
- When directed by the CAM, participate in annual EPIC symposium(s) sponsored by the California CEC.
- 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:

- Project Case Study Plan (draft and final)
- Summary of TAC Comments
- Project Case Study (draft and final)
- High Quality Digital Photographs

V. PROJECT SCHEDULE

Please see the attached Excel spreadsheet.