California Energy Commission
November 18, 2026 Business Meeting
Backup Materials for Carbon Free Technologies Oy

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

CALIFORNIA ENERGY COMMISSION

PROPOSED RESOLUTION: Carbon Free Technologies Oy

RESOLUTION NO: 26-1118-XX

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-26-012 with Carbon Free Technologies Oy for a $3,218,538 grant. This project will fund testing, validation, and California-market certification of the Carbon Free Technologies Oy's patented recycled concrete aggregate solution, which replaces virgin coarse and fine aggregates with construction and demolition concrete and application-dependent bio-based additives; and

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

APPROVED AND ADOPTED this 18 day of November 2026, by the following vote:

AYE:
NAY:
ABSENT:
ABSTAIN:

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 approved and adopted by affirmative vote of the CEC at a meeting held on November 18, 2026.

Kim Todd
Secretariat

STATE OF CALIFORNIA
CALIFORNIA ENERGY COMMISSION

CEC-270 (Revised 01/2024)

GRANT REQUEST FORM (GRF)

A. New Agreement Number

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

New Agreement Number: EPC-26-012

B. Division Information

1. Division Name: ERDD
2. Agreement Manager: Kevin Mori
3. MS-:51
4. Phone Number: 916-776-0794

C. Recipient's Information

1. Recipient's Legal Name: Carbon Free Technologies Oy
2. Federal ID Number: N/A

D. Title of Project

Title of project: Commercial-Scale Validation of Low-Carbon Concrete with Recycled Concrete Aggregate, Bio-Based Additives, and Digital Platform Control for Industrial Decarbonization

E. Term and Amount

1. Start Date: 12/1/2026
2. End Date: 3/31/2030
3. Amount: $3,218,538.00

F. Business Meeting Information

1. Are the ARFVTP agreements $75K and under delegated to Executive Director? No
2. The Proposed Business Meeting Date: 11/18/2026 .
3. Consent or Discussion? Consent
4. Business Meeting Presenter Name: Kevin Mori
5. Time Needed for Business Meeting: Enter number of minutes. Example: 5 minutes.
6. The email subscription topic is: Electric Program Investment Charge

Project Description:
Carbon Free Technologies Oy. Proposed resolution approving agreement EPC-26-012 with Carbon Free Technologies Oy for a $3,218,538 grant and adopting staff's recommendation that this project is exempt from CEQA. This project will fund testing, validation, and California-market certification of the Recipient's patented recycled concrete aggregate solution, which replaces virgin coarse and fine aggregates with construction and demolition concrete and application-dependent bio-based additives. (EPIC funding) Contact: Kevin Mori

G. California Environmental Quality Act (CEQA) Compliance

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

   If yes, skip to question 2.

   If no, complete the following (PRC 21065 and 14 CCR 15378) and explain why Agreement is not considered a "Project":

Agreement will not cause direct physical change in the environment or a reasonably foreseeable indirect physical change in the environment because:

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: None

CCR section number: None

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, § 15303 ; 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 of Regs., tit. 14, sec. 15301 provides that projects that consist of operation, repair, maintenance, permitting, leasing, licensing, or minor alteration of existing structure, facilities, mechanical equipment, or topographical features, which involves negligible or no expansion of use beyond that existing at the time of the lead agency's CEQA determination. This pCalroject will place down the recycled concrete on land that previously had concrete laid down. Concrete will not be placed in new areas during this project. Therefore, the project is exempt under Cal. Code of Regs., tit. 14, sec. 15301.

Cal. Code of Regs., tit. 14, sec. 15303 provides that projects that consist of construction and location of limited numbers of new, small facilities or structures; installation of small new equipment and facilities in small structures; and the conversion of existing small structures from one use to another where only minor modifications are made in the exterior of the structure, are categorically exempt from CEQA. This project will place small amounts of concrete with recycled concrete aggregate at the location from which the demolition concrete was taken. No new land or structures will be filled with demonstration products. Therefore, the project is exempt under Cal. Code of Regs., tit. 14, sec. 15303.

Cal. Code Regs., tit.14, sec. 15306 provides that projects which 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,

are categorically exempt from the provisions of CEQA. This project will sample demolition concrete and mix in biochar and nano-plastics. The resulting concrete will be tested in strength and durability according to ASTM standards at a laboratory at UC Riverside. There will not be a disturbance to an environmental resource. Therefore, the project is exempt under Cal. Code Regs., tit.14, sec. 15306.

The project does not involve impacts on any particularly sensitive environment; will 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. Is this project considered “Infrastructure”?

No

I. 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
The Regents of the University of California, on behalf of its Riverside campus	$ 480,000	**$**0

Subcontractor Legal Company Name	CEC Funds	Match Funds
Miyamoto International, Inc.	$ 65,000	$0
TBD - Testing and Certification	$ 27,500	$0
TBD - Concrete Testing	$ 37,500	$0
TBD - Technology/Knowledge Transfer	$ 32,000	$0
TBD - Digital Platform Contractor	$ 8,750	$0

J. 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
No vendors to report	$	$

K. 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

L. 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	20-21	301.001H	$ 715,280
EPIC	25-26	301.001M	$ 2,503,258

TOTAL Amount: $ 3,218,538

R&D Program Area: ICMB: IAW

Explanation for "Other" selection Not applicable

Reimbursement Contract #: Not applicable

Federal Agreement #: N/A

M. Recipient's Contact Information

1. Recipient's Administrator/Officer

Name: Laird Cagan

Address: 1230 Sharon Park Dr Apt 62

City, State, Zip: Menlo Park, CA 94025-7044

Phone: 650 823 5559

E-Mail: laird@cmcp.com

2. Recipient's Project Manager

Name: Jukka Makela

Address: 1230 Sharon Park Dr Apt 62

City, State, Zip: Menlo Park, CA 94025-7044

Phone: 358 50 511 6020

E-Mail: jukka@carbonfreetechnologies.com

N. Selection Process Used

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

Selection Process	Additional Information
Competitive Solicitation #	GFO-22-301r3
First Come First Served Solicitation #	Not applicable
Other	Not applicable

O. 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: Kevin Mori

Approval Date: 09/28/2026

Branch Manager: Cody Taylor

Approval Date: 10/01/2026

Director: Cody Taylor for Jonah Steinbuck

Approval Date: 10/01/2026

Exhibit A
Scope of Work
Carbon Free Technologies Oy

I. TASK ACRONYM/TERM LISTS

A. Task List

Task #	CPR[1]	Task Name
1		General Project Tasks
2		CA Feedstock Characterization
3		RCA Processing and Baseline
4		Biochar Optimization
5		Graphene Integration
6	X	Nano-Plastic Enhancement
7		ADP Mix Optimization
8		AI- enhanced Digital Platform (ADP)
9		Pilot Demonstration
10		TEA + LCA
11		Independent M&V
12		Evaluation of Project Benefits
13		Technology/Knowledge Transfer Activities

B. Acronym/Term List

Acronym/Term	Meaning
ADP	AI-enhanced Digital Platform (ADP) is the Recipient's proprietary platform designed to manage and control the recycled concrete value chain, mix design algorithms and LCA/EPD data documentation supporting third-party verification.
AI	Artificial Intelligence
ASTM	American Society for Testing and Materials
ASTM C33/C40/C88/C 136	These four ASTM standards are a core set of specifications and test methods used to evaluate the grading, cleanliness, durability, and physical quality of aggregates (such as sand, gravel, and crushed stone) intended for use in concrete. These standards are widely used both in the USA and in Europe.
C30/37	European (EN 206) structural concrete strength class: minimum characteristic compressive strength of 30 MPa (4,350 psi) measured on cylinders and 37 MPa (5,370 psi) measured on cubes.
ASTM C1609	Standard test method for flexural performance of fiber-reinforced concrete.
C&D	Construction and Demolition
CAM	Commission Agreement Manager
CAO	Commission Agreement Officer
CEC	California Energy Commission
CFT	Carbon Free Technologies, Inc.
CO_2	Carbon Dioxide
CPR	Critical Project Review

[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.

Acronym/Term	Meaning
IOU	Investor-Owned Utility
ISO 14040/ 14044	ISO 14040/14044 are the leading international standards that establish the principles and framework for conducting a Life Cycle Assessment (LCA) and the prerequisite for ISO 14025.
ISO 14025/ 21930	ISO 14025/21930 are the international standards used as framework/rules for verified Environmental Product Declarations (EPDs), which are increasingly required in California concrete procurement, for example in Caltrans projects.
LCA	Life Cycle Assessment
M&V	Measurement and Verification
PCC	Portland Cement Concrete
RCA	Recycled Concrete Aggregate
TAC	Technical Advisory Committee
TEA	Techno-Economic Assessment
UCR	University of California Riverside

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

A. Purpose of Agreement

The purpose of this Agreement is to fund testing, validation, and California-market certification of the Recipient's patented recycled concrete aggregate (RCA) solution, which replaces virgin coarse and fine aggregates with construction and demolition (C&D) concrete and application-dependent bio-based additives. The Agreement is intended to enable use of C&D concrete in new concrete production in California and to support reduced virgin aggregate extraction, lower landfill disposal of C&D concrete, lower energy use and CO_2 emissions associated with aggregate production and transport, and lower concrete production costs without requiring major capital investment.

B. Problem/ Solution Statement

Problem

Concrete is the most utilized material in the world after water[2] and globally represents around 7-8% of all CO_2 emissions[3]. The concrete industry is the second-largest industrial source of CO_2 emissions[4] in California, and concrete production and use are expected to grow by as much as 40% by 2040 in California[5]. This increase in concrete usage and emissions led California to introduce SB 596, requiring the California Air Resources Board (CARB) to establish a strategy to reduce lifecycle GHG emissions from the use of concrete and cement in California by 40% from 2019 levels by 2035 and to achieve carbon neutrality no later than 2045. Furthermore, construction and demolition waste (C&D) concrete is one of the largest sources of solid waste in

[2] California, Cement Industry Impact: PCA, American Cement Associate.
[3] McKinsey, "Laying the Foundation for Zero-carbon Cement".
[4] Hasanbeigi & Springer, Global Efficiency Intelligence, 2019
[5] ClimeWorks, "Deep Decarbonization Roadmap for the Cement and Concrete Industries in California"

California and accounts for over 30% of all solid waste in landfills. In addition, the excavation of virgin concrete aggregates (sand and gravel) and the transportation of both virgin aggregates and C&D concrete cause additional indirect CO2 emissions, create transportation challenges, and have a direct negative impact on biodiversity in California.

Focusing on one solution, such as reducing cement production or carbon capture, is too narrow an approach. To solve the environmental and operational challenges and meet the emissions targets of SB 596, a comprehensive circular economy solution is required. It must address the reduction of both direct and indirect CO2 emissions, the ever-increasing generation of C&D concrete waste, and the large volumes of C&D concrete already in landfills. At the same time, any alternative to traditional Portland Cement Concrete (PCC), whether through reducing cement, capturing additional CO2, and/or replacing sand and gravel with RCA, must match or exceed the performance requirements of PCC while requiring lower costs or investments. It must also ensure that concrete placement in real-life projects is similar to or easier than it is today. The Recipient has already proven its ability to offer this comprehensive circular economy solution.

Solution

The Recipient proposes a circular concrete production solution based on its patented methodology and mix design for producing new concrete using recycled construction and demolition (C&D) concrete and application-dependent bio-based additives (CFT Solution). The solution has been tested in Europe and will be validated for California conditions and ASTM-based requirements through this Agreement. Because the CFT Solution can be used both at conventional concrete plants and in on-site production, it provides flexibility in using C&D concrete sourced directly from project sites or from other local sources.

If deployed more broadly, the CFT Solution could reduce demand for virgin aggregates, lower landfill disposal of C&D concrete, reduce transportation requirements, and lower energy use and CO_2 emissions associated with aggregate production, logistics, and cement demand. The solution is also intended to maintain or exceed the performance of standard Portland Cement Concrete while remaining compatible with existing production methods and without requiring major capital investment.

The Recipient has also developed an AI-enhanced Digital Platform (ADP) to support management of the recycled concrete value chain. The ADP integrates project planning, feedstock and demolition data, mix requirements, carbon reporting, and service-provider coordination into a single operating platform. It supports quality control, traceability, and matching local processing and testing services to project needs, thereby improving deployment readiness and supporting local participation in the recycled concrete value chain.

C. Goals and Objectives of the Agreement

Agreement Goals

The goals of this Agreement are to:

- Demonstrate that CFT's patented methodology produces C30/37 structural concrete using California C&D waste to replace 50–100% of virgin aggregates in concrete production, as well as cement reduction by mass of at least 10%. C30/37 structural concrete meets or exceeds the 4,000 – 4,500 psi structural strength of the conventional California concrete.

- Achieve CO_2 reduction of at least 40% compared to conventional California concrete, verified through an independent LCA in accordance with ISO 14040/14044, which also provides the basis for environmental product declarations (EPDs) under ISO 14025.
- Validate ADP-optimized mix design across heterogeneous California feedstock, achieving more than 95% first-pass specification compliance.
- Deploy the ADP, providing 100% batch traceability compatible with Buy Clean California Act reporting.
- Produce structural elements at a California concrete plant, demonstrating commercial readiness without facility modifications.
- Demonstrate cost savings through the elimination of virgin aggregate quarrying and reduced cement content, targeting lower material costs per cubic meter of at least 15% compared to conventional California concrete.
- Create local employment through the circular economy value chain—demolition, C&D processing, RCA production, and digital platform operation—in IOU service territories.
- Localize concrete supply chains by enabling California C&D waste to replace imported virgin aggregates, reducing transportation distances and strengthening regional material resilience.
- Enable competitive advantage and self-sufficiency for California concrete producers by utilizing locally sourced C&D waste instead of imported virgin aggregates, reducing dependency on out-of-state material supply chains while meeting Buy Clean California Act requirements with zero capital investment.

Ratepayer Benefits

This Agreement is expected to provide California IOU ratepayer benefits through reduced electricity and natural gas demand, lower energy-related system cost pressure, and improved flexibility of certain industrial processing loads. The Agreement will validate a recycled concrete production method that replaces virgin aggregates with recycled construction and demolition (C&D) concrete and reduces cement demand.

Based on current assumptions, the recycled concrete production method is expected to reduce energy use in virgin aggregate quarry operations and logistics, including electricity use by approximately 18–30 kWh per ton of processed C&D concrete, and to reduce natural gas use in cement production by approximately 0.45–0.60 therms per ton of processed C&D concrete. The estimate of energy reduction is largely based on the difference between the energy used to excavate and distribute virgin aggregates and the energy used to process C&D concrete into RCA on-site, and the natural gas estimate is based on the lower cement demand compared with conventional concrete. The virgin aggregate reference values will be included in the independent M&V (Task 11).

These direct energy benefits will be evaluated under California conditions through project data collection, independent measurement and verification (M&V), and related analytical work.

The Agreement is also expected to demonstrate system-level energy benefits. These include reduced logistics associated with hauling demolition concrete away from the site and transporting virgin aggregate back from quarries, as well as reduced energy use associated with virgin aggregate extraction and processing. In addition, recycled concrete aggregate (RCA)

processing may function as a controllable electrical load that can be scheduled outside peak demand periods, supporting load shifting and broader grid flexibility objectives.

The Agreement will further support quantification of broader lifecycle greenhouse gas benefits through reduced cement demand, avoided virgin aggregate extraction and processing, reduced transport requirements, use of bio-based additives, and other material-efficiency effects relative to virgin aggregate-based concrete production. These broader lifecycle benefits are distinct from direct electricity and natural gas savings and will be evaluated through the Project's LCA and M&V framework. By validating technical performance under ASTM-based requirements, demonstrating compatibility with existing production infrastructure, and generating California-specific operational data, this Agreement is intended to reduce barriers to broader deployment in California.

Technological Advancement and Breakthroughs

This Agreement will lead to technological advancement in California through the validation and certification of the Recipient's existing patented technological breakthroughs, thereby helping overcome the obstacles to commercializing those breakthroughs. Statewide implementation and commercialization of these patented technological breakthroughs will lead to significant ratepayer benefits, including helping California achieve its goal of reducing greenhouse gas emissions intensity 40% below the reference levels of using virgin aggregate to produce concrete by 2035.

As part of the Project, the Recipient is also testing additional value-added bio-based additives to further enhance the strength of concrete and further reduce CO2 emissions. The Recipient has already reviewed and analyzed the properties of the targeted additional bio-based additives and has started negotiations with suppliers to secure full access to them by the time the Project starts. The Project is also testing the replacement of steel reinforcement in selected applications with recycled nano-plastics. Utilizing recycled nano-plastics in recycled concrete to increase strength and usability would materially reduce waste streams and indirect CO2 emissions associated with concrete production. Combining the benefits of utilizing C&D concrete to replace concrete aggregates, the benefits of the additional bio-based additives already identified by the Recipient, and the benefits of utilizing nano-plastics in recycled concrete would constitute a comprehensive technological breakthrough and help California achieve its target of reaching carbon neutrality in the concrete industry no later than 2045[6].

Agreement Objectives

The objectives of this Agreement are to:

- Characterize at least 5 distinct California C&D feedstock sources per ASTM C33/C40/C88/C136.
- Achieve 28-day compressive strength of at least 40 MPa (5,801 psi) by replacing at least 50% of virgin aggregates used for conventional California concrete with RCA (mechanically treated in accordance with the CFT solution and combined with a biochar additive), with at least 10% total reduction of cement use by mass.

[6] SB596_Becker_Low-carbonConcrete_FactSheet_20210326.pdf

- Demonstrate the 10% reduction of cement use by mass by adding biochar, while maintaining the strength of the recycled concrete referred to earlier and then the performance metrics with conventional California concrete made with virgin aggregates.
- Corroborate graphene contribution to strength increase and additional cement reduction of 3 – 5 % by mass.
- Demonstrate nano-plastic contribution to basic concrete functions (such as durability and crack resistance) when partly or fully replacing steel reinforcement, with 28-day compressive strength (ASTM C39) at least equal to the baseline recycled concrete (Task 3) and flexural performance (residual strength) per ASTM C1609 at a minimum of three nano-plastic dosages.
- Train and validate ADP-mix optimization achieving more than 95% first-pass specification compliance across at least 5 feedstock sources.
- Deploy ADP capturing 100% of process data with Buy Clean CA Act-ready reporting.
- Produce at least 5 structural elements for independent third-party ASTM testing.
- Execute independent M&V comparing 6-month baseline with 6-month pilot data to quantify electricity savings (savings per ton of processed C&D concrete is expected to be approximately 18–30 kWh per ton) and natural gas savings (savings per ton of processed C&D concrete is expected to be approximately 0.45–0.60 therms per ton), GHG reductions (evaluated by metric tons of CO_2 equivalent per cubic yard of concrete), and cost impacts ($ per cubic yard of concrete), compared with the Agreement goals of at least 40% CO_2 reduction and at least 15% lower material cost, respectively.

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 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 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.

Exhibit A
Scope of Work
Carbon Free Technologies Oy

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 Monthly Calls
The goal of this task is to have calls at least monthly between the CAM and Recipient to verify that satisfactory and continued progress is made towards achieving the objectives of this Agreement on time and within budget.

The objectives of this task are to verbally summarize activities performed during the reporting period, to identify activities planned for the next reporting period, to identify issues that may affect performance and expenditures, to verify match funds are being proportionally spent concurrently or in advance of CEC funds or are being spent in accordance with an approved Match Funding Spending Plan, to form the basis for determining whether invoices are consistent with work performed, and to answer any other questions from the CAM. Monthly calls might not be held on those months when a quarterly progress report is submitted or the CAM determines that a monthly call is unnecessary.

The CAM shall:

- Schedule monthly calls.
- Provide questions to the Recipient prior to the monthly call.
- Provide call summary notes to Recipient of items discussed during call.

The Recipient shall:

- Review the questions provided by CAM prior to the monthly call
- Provide verbal answers to the CAM during the call.

Product:

- Email to CAM concurring with call summary notes.

Subtask 1.6 Quarterly 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 *Quarterly 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 reporting period, 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. Progress reports are due to the CAM the 10th day of each January, April, July, and October. The Quarterly Progress Report template can be found on the ECAMS Resources webpage available at: https://www.energy.ca.gov/media/4691
- Submit a monthly or quarterly *Invoice* on the invoice template(s) provided by the CAM.

Recipient Products:

- Quarterly Progress Reports
- Invoices

CAM Product:

- Invoice template

Subtask 1.7 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 1.7.1 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 Products:

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

SUBTASK 1.7.2 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 not 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 1.8 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 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 1.9 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. 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 1.10 Obtain and Execute Subawards and Agreements with Site Hosts

The goals of this subtask are to: (1) procure and execute subrecipients and site host agreements, as applicable, required to carry out the tasks under this Agreement; and (2) ensure that the subrecipients and site host agreements are consistent with the Agreement terms and conditions and the Recipient's own contracting policies and procedures.

The Recipient shall:

- Execute and manage subawards and coordinate subrecipients activities in accordance with the requirements of this Agreement.
- Execute and manage site host agreements and ensure the right to use the project site throughout the term of the Agreement, as applicable. A site host agreement is not required if the Recipient is the site host
- Notify the CEC in writing immediately, but no later than five calendar days, if there is a reasonable likelihood the project site cannot be acquired or can no longer be used for the project.
- Incorporate this Agreement by reference into each subaward.
- Include any required Energy Commission flow-down provisions in each subaward, in addition to a statement that the terms of this Agreement will prevail if they conflict with the subaward terms.
- Submit a *Subaward and Site Letter* to the CAM describing the subawards and any site host agreement needed or stating that no subawards or site host agreements are required.
- If requested by the CAM, submit a draft of each *Subaward* and any *Site Host Agreement* required to conduct the work under this Agreement.
- If requested by the CAM, submit a final copy of each executed *Subaward* and any *Site Host Agreement*.
- Notify and receive written approval from the CAM prior to adding any new subrecipient (see the terms regarding subrecipient additions in the terms and conditions).

Products:

- Subaward and Site Letter
- Draft Subawards *(if requested by the CAM)*
- Draft Site Host Agreement *(if requested by the CAM)*
- Final Subawards *(if requested by the CAM)*
- Final Site Host Agreement *(if requested by the CAM)*

TECHNICAL ADVISORY COMMITTEE

Subtask 1.11 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 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 1.12 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 1.13 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 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

IV. TECHNICAL TASKS

TASK 2: CA FEEDSTOCK CHARACTERIZATION

Feedstock characterization is the primary basis for formulation transferability, ADP model inputs, and consistent pilot performance under California conditions. The goal of this task is to source and characterize C&D concrete from at least 5 California demolition sites and/or concrete landfills.

The Recipient shall:
Provide a *Feedstock Characterization Report* that shall include, but not be limited to:

- Details of the source C&D concrete from at least 5 sites in IOU territories.
- Lists of characterized material per ASTM C33, C40, C88, and C136 in the demolished concrete.
- Discussion identifying and evaluating at least 8 candidate demolition sites or concrete landfills in verified IOU territories based on material age, structural type, and contamination risk.

- Summary of site access agreements with at least 5 site operators, documenting demolition methods and material history.
- Summary of feedstock variability across at least 3 sampling events per source (demolition sites or concrete landfills).
- Discussion of feedstock concrete meeting the acceptance criteria: at least 5 sources (demolition sites or concrete landfills) with complete ASTM C33/C40/C88/C136 data and documented variability.

Products:
Feedstock Characterization Report (draft and final)

TASK 3: RCA PROCESSING AND BASELINE RECYCLED CONCRETE
The goal of this task is to produce local baseline recycled concrete in California to demonstrate that the RCA methodology proven in Europe can be transferred to California by using local feedstock while maintaining similar structural performance under ASTM-based validation. The baseline recycled concrete will have two main features: 1) 30% and 50% of virgin aggregates by mass are replaced with C&D concrete that has been crushed and mechanically treated as per CFT specifications and 2) 2-3% of cement will be replaced with specific locally sourced biochar, similar to what was used in CFT's European recycled concrete formulation.

This task also establishes how the RCA methodology proven in Europe will be transferred to California using local feedstock while maintaining similar structural performance under ASTM-based validation using California feedstock. This baseline recycled concrete is then compared against conventional California concrete that is produced using virgin aggregates and also acts as a reference for the additive trials in Tasks 4–6. During this task, the Recipient will also adjust the methods and protocols to meet local specifications and requirements in California that can then be used in Tasks 4-6.

The Recipient shall:
- Provide an *ASTM Test Plan* that shall include, but not be limited to:
    - Summary of methods used to test baseline recycled concrete.
    - Table on metrics that will be measured and the expected ranges compared to industry standards and conventional California concrete.
    - Summary of the RCA processing protocol for each feedstock source, specifying crushing parameters, gradation targets, and quality control procedures.
- Provide a *Baseline Performance Report* that shall include, but not be limited to:
    - Summary of the methods used to process California C&D concrete into RCA.
    - Discussion of the results from the tests of specimens per ASTM C39, C143, C231, and C469.

Products:
- ASTM Test Plan (draft and final)
- Baseline Recycled Concrete Performance Report (draft and final)

TASK 4: BIOCHAR OPTIMIZATION
The goal of this task is to increase the share of cement replacement with biochar to improve the performance metrics of concrete produced using the recycled concrete aggregate (RCA) in accordance with CFT specifications. As a first step the Recipient will increase the cement replacement with biochar of 2–3% by mass used in the baseline recycled concrete (Task 3) toward 5–10%. The Recipient will also test biochar made from a range of different California feedstocks.

The Recipient shall:
Provide a *Biochar Optimization Report* that shall include, but not be limited to:

- Discussion of biochar dosage parameters for cement replacement trials.
- Discussion of California feedstocks used for biochar dosage trials.
- Summary of results from biochar dosage and varying feedstock trials.
- Summary of ASTM compressive strength, workability, air content, and curing tests on concrete products from trials.

Products:

- Biochar Optimization Report (draft and final)

TASK 5: GRAPHENE INTEGRATION
The goal of this task is to integrate California-sourced graphene into the baseline recycled concrete and the biochar optimized recycled concrete described in Task 4, and test the quality of the graphene enhanced recycled concrete compared against concrete tested in Tasks 3 and 4, as well as against the conventional California concrete and ASTM standards. The objective is to use graphene to enable an additional reduction of cement use of 3–5 percentage points by mass on top of the 10% reduction level in Task 4, bringing the total cement reduction to 13–15% by mass relative to the conventional California concrete, while maintaining the structural performance of the concrete.

The Recipient shall:
Provide a *Graphene Integration Report* that shall include, but not be limited to:

- Discussion of graphene integration into baseline formulations.
- Summary of strength improvement and cement reduction quantifications.
- Summary of graphene integration methods.
- Summary and discussion of results from graphene-biochar integration.

Products:

- Graphene Integration Report (draft and final)

TASK 6: NANO-PLASTIC ENHANCEMENT
The goal of this task is to evaluate recycled nano-plastic contributions to basic concrete functions (such as strength, durability and crack resistance) when partly or fully replacing steel reinforcements. The target is to test 28-day compressive strength (ASTM C39) at least equal to the baseline recycled concrete (Task 3) and flexural performance (residual strength) per ASTM C1609 flexural performance (residual strength) per ASTM C1609. With steel being the most

common method for concrete reinforcement, this task will explore the application of nano-plastics as a potential replacement or enhancement.

The Recipient shall:

- Provide a *Nano-Plastic Enhancement Report* that shall include, but not be limited to:
  - Discussion of recycled nano-plastic sources/suppliers in California, and the potential for integration into baseline recycled concrete.
  - Summary of strength and durability testing of baseline recycled concrete, where steel reinforcements have been partly or fully replaced with nano-plastics.
- Prepare a *CPR Report #1* in accordance with Subtask 1.3 (CPR Meetings).

Products:

- Nano-Plastic Enhancement Report (draft and final)
- CPR Report #1

TASK 7: ADP MIX OPTIMIZATION

The goal of this task is to train and deploy the Recipient's ADP model using the Recipient's completed European test results and at least 200 California test results generated in Tasks 3–6. These test results are used in the ADP model to build a mixture optimizer for the California market for the various types of recycled concrete and additives to produce the desired RCA mix for different end-use applications.

The Recipient shall:

Provide an *ADP Model Validation Report* that shall include, but not be limited to:

- Summary of parameters and datasets from the European test results and the California test results used to train the ADP model.
- List of inputs required to enter into the ADP model.
- Discussion of training process of the ADP model.
- Summary of results of using the trained ADP model on California formulations not used in training.

Products:

- ADP Model Validation Report (draft and final)

TASK 8: AI-ENHANCED DIGITAL PLATFORM (ADP)

The goal of this task is to deploy ADP for feedstock tracking, optimization, carbon accounting, and reporting. ADP serves as the deployment layer connecting feedstock characterization, AI-supported algorithms for application-specific mechanical treatment and mix selection, batch-level traceability, and carbon reporting for commercial-scale California implementation.

The Recipient shall:

Provide a *Platform Deployment Report* that shall include, but not be limited to:

- Discussion of AI utilization in the mix algorithm and ADP.
- Screenshots of the user interface for the ADP.
- Summary of deployment of ADP and usage at the demonstration site.

- Discussion of how batch-level data, captured in ADP on feedstock, additives, mechanical treatment, other methodologies and concrete production support the preparation of Environmental Product Declarations (EPDs) and meeting applicable California reporting requirements.
- Discussion on how ADP supports verification of each step in the RCA value chain both for EPD purposes, for LCA planning and evaluation and other reporting purposes.

Products:
- Platform Deployment Report (draft and final)

TASK 9: PILOT DEMONSTRATION
The goal of this task is to produce at least 5 structural element types at a California concrete plant. Pilot production will be conducted using existing batching infrastructure without requiring facility modifications, demonstrating commercial compatibility with standard California concrete plant operations.

The Recipient shall:
Provide a *Pilot Demonstration Report* that shall include, but not be limited to:
- Summary of structural element production at a Californian concrete plant and at the demonstration site.
- Discussion of ADP verification of the recycled RCA formulas.
- Summary of results of ASTM testing.
- Summary of operational requirements and energy usage.

Products:
- Pilot Demonstration Report (draft and final)

TASK 10: TEA + LCA
The goal of this task is to quantify commercial and environmental performance using pilot data.

The Recipient shall:
Provide a *TEA/LCA Report* that shall include, but is not limited to:
- LCA summary comparing the recycled concrete with conventional California concrete that will include but is not limited to California-specific grid and transport data.
- TEA summary comparing economics at three production scales that will include but is not limited to feedstock cost and carbon credit prices.
- Discussion of California adoption scenarios in which 10%, 25%, and 50% of the C&D concrete generated in California is processed into RCA and used in new concrete in place of virgin aggregates (C&D utilization rate).

Products:
- TEA/LCA Report (draft and final)

Exhibit A
Scope of Work
Carbon Free Technologies Oy

TASK 11: INDEPENDENT M&V
The goal of this task is to execute independent third-party measurement and verification. This task provides independent basis for reporting verified project benefits to CEC and for supporting future California replication with credible operating data.

The Recipient shall:

- Provide an *M&V Plan* that shall include, but is not limited to:
  - Summary of independent third-party contractor acquisition and methodology.
  - List of parameters that will be measured and calculated during the demonstration.
  - Summary of tasks for the independent third-party contractor.
  - Discussion of expectations and potential issues.
- Provide an *Independent M&V Report* that shall include, but not be limited to:
  - Summary of 6-month baseline for conventional California concrete production processes.
  - Summary of virgin aggregate production and transport reference values (energy use per ton), based on metered data from California aggregate producers where available, California Geological Survey (transportation distances, diesel per ton, etc.) or on published reference values approved by the CAM.
  - Summary of 6-month pilot operation (concrete recycling and recycled concrete production with various feedstocks), which shall include but is not limited to data on electricity, natural gas, and water usage, waste diversion data, logistics data (costs and time savings, and CO_2 reductions) and material costs.

Products:

- M&V Plan
- Independent M&V Report (draft and final)

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 31 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 an 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.