California Energy Commission
October 18, 2023 Business Meeting
Backup Materials for Agenda Item No 16:
California Grinding, Inc.

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: 23-1018-16

STATE OF CALIFORNIA

STATE ENERGY RESOURCES
CONSERVATION AND DEVELOPMENT COMMISSION

RESOLUTION: **California Grinding, Inc.**

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 ARV-23-001 with California Grinding, Inc. for a $1,629,962 grant to perform an engineering evaluation to determine the optimal pathway to convert forest and woody biomass waste to transportation fuel at the existing Fresno Renewable Energy System facility. This approval will fund a technical, economic, and environmental analysis of three different technologies being considered for fuel production; 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 10/2022)

GRANT REQUEST FORM (GRF)

A. New Agreement Number

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

New Agreement Number: ARV-23-001

B. Division Information

1. Division Name: Fuels and Transportation
2. Agreement Manager: Pilar Magaña
3. MS-: 27
4. Phone Number: 916-477-1546

C. Recipient's Information

1. Recipient's Legal Name: California Grinding, Inc.
2. Federal ID Number: 27- 3638931

D. Title of Project

Title of project: Fresno Forest Waste to Fuel (FW2F) Project

E. Term and Amount

1. Start Date: 10/18/2023
2. End Date: 1/30/2025
3. Amount: $1,629,962

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: Pilar Magaña
5. Time Needed for Business Meeting: 5 minutes
6. The email subscription topic is: Clean Transportation Program

Agenda Item Subject and Description:

California Grinding, Inc. Proposed resolution approving agreement ARV-23-001 with California Grinding, Inc. for a $1,629,962 grant to perform an engineering evaluation to determine the optimal pathway to convert forest and woody biomass waste to transportation fuel at the existing Fresno Renewable Energy System facility, and adopting staff's determination that this action is exempt from CEQA. This approval will fund a technical, economic, and environmental analysis of three different technologies being considered for fuel production. (Clean Transportation Program Funding) Contact: Pilar Magaña (Staff Presentation: 5 minutes)

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: If Agreement is considered a "Project" under CEQA skip to question 2. Otherwise, provide explanation.

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 under Cal. Code Regs., tit. 14, § 15301

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, sect. 15301 consists of the operation, repair, maintenance, permitting, leasing, licensing or minor alteration of existing structures, facilities, mechanical equipment or topographical features involving negligible or no expansion of existing or former use. Under this project, the grant recipient will install a gasifier and reactive absorption system to enhance an existing anaerobic digester. All installation activities will take place inside an existing renewable energy facility in Fresno, CA. The grant recipient will also conduct an engineering evaluation to determine the optimal pathway to convert forest and woody biomass waste to transportation fuel at an existing renewable energy facility. These activities will not result in any disturbance to an environmental resource and minor alterations to an existing facility that involves negligible or no expansion of existing or former use of the facility. For these reasons, the project will have no significant effect on the environment and is categorically exempt under section 15301.

The project 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.

No

IMPORTANT: consult with the legal office to determine next steps.
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	No

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
Bero Environmental	$75,000	$0
DBG Energy LLC	$30,000	$30,000
Jacobs Engineering Group	$99,618	$33,409
Michael D. Brown Consulting Engineers	$96,000	$36,000
USC Mork Family Department of Chemical Engineering & Materials Science	$709,344	$373,810
Virentis Advisors II LLC	$0	$30,000
West Coast Waste Co. , Inc.	$32,000	$31,000
TBD: Engineering, pilot testing, installation & testing management & technical assistance	$100,000	$125,000

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
TBD (Gasifier vendor)	$300,000	$50,000
TBD (Transport fuel converter vendor)	$50,000	$450,000
Richie Bros and Bejac Equipment	$0	$400,000

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
ARFVTF	2021-2022	601.118N	$1,629,962

TOTAL Amount: $1,629,962

R&D Program Area: N/A

Explanation for "Other" selection N/A

Reimbursement Contract #: N/A

Federal Agreement #: N/A

L. Recipient's Contact Information

1. **Recipient's Administrator/Officer**
   Name: David Balakian
   Address: 3077 S. Golden State Frontage Road

   City, State, Zip: Fresno, CA 93725
   Phone: 559-307-2070
   E-Mail: Davidbalakian@sbcglobal.net
2. **Recipient's Project Manager**
   Name: David Balakian
   Address: 3077 S. Golden State Frontage Road

   City, State, Zip: Fresno, CA 93725
   Phone: 559-307-2070
   E-Mail: Davidbalakian@sbcglobal.net

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-22-608
First Come First Served Solicitation #	N/A
Other	N/A

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	Yes

Approved By

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

Agreement Manager: Pilar Magaña

Approval Date: 09/1/2023

Office Manager: Charles Smith

Approval Date: 9/5/2023

Deputy Director: Melanie Vail

Approval Date: Deputy Director's Approval Date

EXHIBIT A
SCOPE OF WORK

TECHNICAL TASK LIST

Task #	CPR	Task Name
1		Administration
2	X	System Engineering Review
3		Project Fact Sheet

KEY NAME LIST

Task #	Key Personnel	Key Subcontractor(s)	Key Partner(s)
1	David Balakian	MDB Engineers	None
2	David Balakian	Jacobs Engineering, USC	None
3	David Balakian	None	None

GLOSSARY

Specific terms and acronyms used throughout this scope of work are defined as follows:

Term/ Acronym	Definition
AB-M	Advanced Bio-Methanation
AD	Anaerobic Digester
CAM	Commission Agreement Manager
CAO	Commission Agreement Officer
CEC	California Energy Commission
CM	Catalytic Methanation
CTP	Clean Transportation Program
CPR	Critical Project Review
EPC	Engineering, Procurement and Construction
E-RIN	Renewable Identification Number certificate earned by producing electricity for EV charging

Term/ Acronym	Definition
EV	Electric vehicle
FTD	Fuels and Transportation Division
FW2F	Forest Waste to Fuel
GPD	Gallons per day
GHG	Greenhouse Gas
H_2	Fuel-Grade Hydrogen gas
IRA	Inflation Reduction Act
LCFS	Low Carbon Fuel Standard
LCOE	Levelized Cost of Electricity
MSW	Municipal Solid Waste
O&M	Operations & Maintenance
P&IDs	Process and Instrument Diagrams
RAS	Reactive Absorption System
Recipient	California Grinding, Inc
RINs	Renewable Information Numbers
RNG	Renewable natural gas
RTF	Renewable Transportation Fuel
TPD	Tons Per Day

Background

Assembly Bill (AB) 118 (Núñez, Chapter 750, Statutes of 2007), created the Clean Transportation Program. The statute authorizes the California Energy Commission (CEC) to develop and deploy alternative and renewable fuels and advanced transportation technologies to help attain the state's climate change, clean air, and alternative energy policies. AB 8 (Perea, Chapter 401, Statutes of 2013) re-authorizes the Clean Transportation Program through January 1, 2024. The Clean Transportation Program has an annual budget of approximately $100 million and provides financial support for projects that:

- Reduce California's use and dependence on petroleum transportation fuels and increase the use of alternative and renewable fuels and advanced vehicle technologies.
- Produce sustainable alternative and renewable low-carbon fuels in California.
- Expand alternative fueling infrastructure and fueling stations.
- Improve the efficiency, performance and market viability of alternative light-, medium-, and heavy-duty vehicle technologies.

- Retrofit medium- and heavy-duty on-road and non-road vehicle fleets to alternative technologies or fuel use.
- Expand the alternative fueling infrastructure available to existing fleets, public transit, and transportation corridors.
- Establish workforce training programs and conduct public outreach on the benefits of alternative transportation fuels and vehicle technologies.

On February 03, 2023, the CEC released a Grant Funding Opportunity (GFO) entitled "*Ultra-Low-Carbon Fuel: Demonstration- and Commercial-Scale Production Facilities Utilizing Forest Biomass*." This competitive grant solicitation was to support ultra-low-carbon fuel in two funding categories: demonstration-scale and commercial-scale production facilities utilizing forest biomass. In response to GFO-22-608, the Recipient submitted application #1 which was proposed for funding in the CEC's Notice of Proposed Awards on June 21, 2023. GFO-22-608 and Recipient's application are hereby incorporated by reference into this Agreement in their entirety.

In the event of any conflict or inconsistency between the terms of the Solicitation and the terms of the Recipient's Application, the Solicitation shall control. In the event of any conflict or inconsistency between the Recipient's Application and the terms of CEC's Award, CEC's Award shall control. Similarly, in the event of any conflict or inconsistency between the terms of this Agreement and the Recipient's Application, the terms of this Agreement shall control.

Problem Statement:

This project will resolve aspects of the principal barriers, key unresolved issues, and knowledge gaps that hinder the development and widespread use of systems to cost effectively and reliably convert forestry and other woody biomass systems into useful transportation fuel. Principal barrier aspects include, but are not limited to the following:

- Scientific and technological
- Market
- Institutional
- Environmental
- Cost and financial hurdles

These barriers should be addressed at this time because significant new forestry and other woody biomass disposal needs as well as increased renewable fuel supplies are critical. With California's continued and escalating wildfires and the demise of biomass combustion plants this type of Forest Waste to Fuel (FW2F) system could provide the needed forestry waste disposal capacity, encouraging the use of best forest waste management practices. Simultaneously, a significant new source of renewable, bio-based transportation fuel will be created, furthering California's goal of weaning away from fossil fuel usage.

Goal of the Agreement

The goal of this Agreement is to demonstrate that FW2F projects are technically, economically, and environmentally feasible at a commercial scale. This goal will be met by analyzing the best available gasification and syngas to usable fuel pathways to provide a stable outlet for producers of forestry and other woody biomass wastes while simultaneously producing renewable transportation fuels.

Commercial scale demonstration of this FW2F technology will provide a cost-effective solution for organic waste disposal and transportation fuel production. This project will effectively convert organic materials that would otherwise be wasted into renewable natural gas (RNG), hydrogen (H_2) and/or electricity for electric vehicle (EV) charging to be used locally to offset fossil fuel consumption in heavy-duty, on-road vehicles.

Objectives of the Agreement

The objectives of this Agreement are to:

- Document analyses and recommendations of available gasification and syngas conversion systems.
- Test the viability of the Reactive Absorption System (RAS) proprietary technology at scale for extraction of H_2 from syngas and enhance anaerobic digester (AD) operation by recirculating the remaining carbon and hydrogen rich off gas into the VERDE enhanced AD plant.
- Demonstrate and document the RAS technology's technical and cost effectiveness of producing an estimated 1,100,000 diesel gallon equivalent (DGE) of transportation fuel in the form of RNG, H2 and/or electricity for EV charging as determined by Task 2 evaluations described below.
- Provide a stable, cost-effective method for beneficial utilization of 50,000 tons per year (TPY) of forestry and other appropriate woody wastes.
- Significantly reduce greenhouse gas production resulting from displaced fossil fuel consumption estimated at over 30,000 metric tons of carbon dioxide equivalents ($MTCO_2e$) per year.
- Significantly reduce criteria air contaminants in San Joaquin Valley air basin.

TASK 1 ADMINISTRATION

Task 1.1 Attend Kick-off Meeting

The goal of this task is to establish the lines of communication and procedures for implementing this Agreement. The Commission Agreement Manager (CAM) shall designate the date and location of this meeting and provide an agenda to the Recipient prior to the meeting.

The Recipient shall:

- Attend a "Kick-Off" meeting with the CAM, the Commission Agreement Officer (CAO), and a representative of the CEC Accounting Office. The Recipient shall bring their Project Manager, Agreement Administrator, Accounting Officer, and any others determined necessary by the Recipient or specifically requested by the CAM to this meeting.

- Provide a written statement of project activities that have occurred after the notice of proposed awards but prior to the execution of the agreement using match funds. If none, provide a statement that no work has been completed using match funds prior to the execution of the agreement. All pre-execution match expenditures must conform to the requirements in the Terms and Conditions of this Agreement.
- Discuss the following administrative and technical aspects of this Agreement:
    - Agreement Terms and Conditions
    - Critical Project Review (Task 1.2)
    - Match fund documentation (Task 1.6) No reimbursable work may be done until this documentation is in place.
    - Permit documentation (Task 1.7)
    - Subawards needed to carry out project (Task 1.8)
    - The CAM's expectations for accomplishing tasks described in the Scope of Work
    - An updated Schedule of Products and Due Dates
    - Monthly Calls (Task 1.4)
    - Quarterly Progress Reports (Task 1.5)
    - Technical Products (Product Guidelines located in Section 5 of the Terms and Conditions)

Recipient Products:

- Updated Schedule of Products
- Updated List of Match Funds
- Updated List of Permits
- Written Statement of Match Share Activities

Commission Agreement Manager Product:

- Kick-Off Meeting Agenda

Task 1.2 Critical Project Review (CPR) Meetings

CPRs provide the opportunity for frank discussions between the CEC and the Recipient. The goal of this task is to determine if the project should continue to receive CEC funding to complete this Agreement and to identify any needed modifications to the tasks, products, schedule or budget.

The CAM may schedule CPR meetings as necessary, and meeting costs will be borne by the Recipient.

Meeting participants include the CAM and the Recipient and may include the CAO, the Fuels and Transportation Division (FTD) program lead, other CEC staff and Management as well as other individuals selected by the CAM to provide support to the CEC.

The CAM shall:

- Determine the location, date, and time of each CPR meeting with the Recipient. These meetings generally take place at the CEC, but they may take place at another location or remotely.
- Send the Recipient the agenda and a list of expected participants in advance of each CPR. If applicable, the agenda shall include a discussion on both match funding and permits.
- Conduct and make a record of each CPR meeting. Prepare a schedule for providing the written determination described below.
- Determine whether to continue the project, and if continuing, whether or not modifications are needed to the tasks, schedule, products, and/or budget for the remainder of the Agreement. Modifications to the Agreement may require a formal amendment (please see section 8 of the Terms and Conditions). If the CAM concludes that satisfactory progress is not being made, this conclusion will be referred to the Lead Commissioner for Transportation for his or her concurrence.
- Provide the Recipient with a written determination in accordance with the schedule. The written response may include a requirement for the Recipient to revise one or more product(s) that were included in the CPR.

The Recipient shall:

- Prepare a CPR Report for each CPR that discusses the progress of the Agreement toward achieving its goals and objectives. This report shall include recommendations and conclusions regarding continued work of the projects. This report shall be submitted along with any other products identified in this scope of work. The Recipient shall submit these documents to the CAM and any other designated reviewers at least 15 working days in advance of each CPR meeting.
- Present the required information at each CPR meeting and participate in a discussion about the Agreement.

CAM Products:

- Agenda and a list of expected participants
- Schedule for written determination
- Written determination

Recipient Product:

- CPR Report(s)

Task 1.3 Final Meeting

The goal of this task is to closeout this Agreement.

The Recipient shall:

- Meet with CEC staff to present the findings, conclusions, and recommendations. The final meeting must be completed during the closeout of this Agreement.

This meeting will be attended by, at a minimum, the Recipient and the CAM. The technical and administrative aspects of Agreement closeout will be discussed at the meeting, which may be two separate meetings at the discretion of the CAM.

The technical portion of the meeting shall present an assessment of the degree to which project and task goals and objectives were achieved, findings, conclusions, recommended next steps (if any) for the Agreement, and recommendations for improvements. The CAM will determine the appropriate meeting participants.

The administrative portion of the meeting shall be a discussion with the CAM about the following Agreement closeout items:

- What to do with any equipment purchased with CEC funds (Options)
- CEC request for specific "generated" data (not already provided in Agreement products)
- Need to document Recipient's disclosure of "subject inventions" developed under the Agreement, if applicable
- "Surviving" Agreement provisions
- Final invoicing and release of retention

- Prepare a schedule for completing the closeout activities for this Agreement.

Products:

- Written documentation of meeting agreements
- Schedule for completing closeout activities

Task 1.4 Monthly Calls

The goal of this task is to have calls at least monthly between 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.

Task 1.5 Quarterly Progress Reports

The goal of this task is to periodically 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 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, and to form the basis for determining whether invoices are consistent with work performed.

The Recipient shall:

- Prepare a Quarterly Progress Report which summarizes all Agreement activities conducted by the Recipient for the reporting period, including 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.

Product:

- Quarterly Progress Reports

Task 1.6 Identify and Obtain Matching Funds

The goal of this task is to ensure that the match funds planned for this Agreement are obtained for and applied to this Agreement during the term of this Agreement.

The costs to obtain and document match fund commitments are not reimbursable through this Agreement. Although the CEC budget for this task will be zero dollars, the Recipient may utilize match funds for this task. Match funds must be identified in writing and the associated commitments obtained before the Recipient can incur any costs for which the Recipient will request reimbursement.

The Recipient shall:

- Prepare a letter documenting the match funding committed to this Agreement and submit it to the CAM at least 2 working days prior to the kick-off meeting. 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 such 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 each cash match fund, its source, including a contact name, address and telephone number and the task(s) to which the match funds will be applied.

    - Amount of each in-kind contribution, a description, documented market or book value, and its 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 shall identify its owner and provide a contact name, address and telephone number, and the address where the property is located.

- Provide a copy of the letter of commitment from an authorized representative of each source of cash match funding or in-kind contributions that these funds or contributions have been secured. For match funds provided by a grant a copy of the executed grant shall be submitted in place of a letter of commitment.
- Discuss match funds and the implications to the Agreement if they are reduced or not obtained as committed, at the kick-off meeting. If applicable, match funds will be included as a line item in the progress reports and will be a topic at CPR meetings.
- Provide the appropriate information to the CAM if during the course of the Agreement additional match funds are received.
- Notify the CAM within 10 days if during the course of the Agreement existing match funds are reduced. Reduction in match funds must be approved through a formal amendment to the Agreement and may trigger an additional CPR meeting.

Products:

- A letter regarding match funds or stating that no match funds are provided
- Copy(ies) of each match fund commitment letter(s) (if applicable)
- Letter(s) for new match funds (if applicable)
- Letter that match funds were reduced (if applicable)

Task 1.7 Identify and Obtain Required Permits

The goal of this task 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. Although the CEC budget for this task will be zero dollars, the Recipient may budget match funds for any expected expenditures associated with obtaining permits. Permits must be identified in writing and obtained before the Recipient can make any expenditure for which a permit is required.

The Recipient shall:

- Prepare a letter documenting the permits required to conduct this Agreement and submit it to the CAM at least 2 working days prior to the kick-off meeting. If there are no permits required at the start of this Agreement, then state such in the letter. If it is known at the beginning of the Agreement that permits will be required during the course of the Agreement, provide in the letter:
    - A list of the permits that identifies the:
        - Type of permit

        - Name, address and telephone number of the permitting jurisdictions or lead agencies
    - The schedule the Recipient will follow in applying for and obtaining these permits.
- Discuss the list of permits and the schedule for obtaining them at the kick-off meeting and develop a timetable for submitting the updated list, schedule and the copies of the permits. The implications to the Agreement 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 the Progress Reports and will be a topic at CPR meetings.
- If during the course of the Agreement additional permits become necessary, provide the appropriate information on each permit and an updated schedule to the CAM.
- As permits are obtained, send a copy of each approved permit to the CAM.
- If during the course of the Agreement permits are not obtained on time or are denied, notify the CAM within 5 working days. Either of these events may trigger an additional CPR.

Products:

- Letter documenting the permits or stating that no permits are required
- A copy of each approved permit (if applicable)
- Updated list of permits as they change during the term of the Agreement (if applicable)
- Updated schedule for acquiring permits as changes occur during the term of the Agreement (if applicable)
- A copy of each final approved permit (if applicable)

Task 1.8 Obtain and Execute Subawards

The goal of this task is to ensure quality products and to procure subrecipients required to carry out the tasks under this Agreement consistent with the Agreement Terms and Conditions and the Recipient's own procurement policies and procedures.

The Recipient shall:

- Manage and coordinate subrecipient activities.
- If requested by the CAM, submit a draft of each subaward required to conduct the work under this Agreement to the CAM for review.
- If requested by the CAM, submit a final copy of the executed subaward.
- If Recipient intends to add new subrecipients or change subrecipients, then the Recipient shall notify the CAM.

Products:

- Letter describing the subawards needed, or stating that no subawards are required

- Draft subcontracts (if requested)
- Final subcontracts (if requested)

TECHNICAL TASKS

TASK 2 SYSTEM ENGINEERING REVIEW

The goal of this task is to complete an engineering evaluation leading to a recommendation for selection of one (or a combination) of three pathways to convert forest and other woody biomass wastes into at least 1,100,000 DGE of transportation fuel. The feedstock shall include no less than 60 percent forest waste. The balance shall include other organic waste feedstocks as identified and allowable per GFO-22-608 requirements including and not limited to green and landscaping waste, agricultural wastes, and the dried digestate waste from the AD plant being constructed at the project site.

The three pathways to be considered are:

1. Bio-Methanation
2. Catalytic Methanation, and
3. Electricity production for EVs

To accomplish this, the Recipient shall complete the following five (5) subtasks:

SUBTASK 2.1 GASIFIER REVIEW AND SELECTION

The goal of this subtask is to review available gasifiers from a technical, economic, and environmental standpoint and recommend the best system for the forest and other biomass conversion to transportation fuel project at the Fresno site.

The Recipient shall:

- Obtain and review available information from gasifier vendors, regulatory agencies and others, including to the extent possible actual operating records, emission testing, and other factual data.
- Compare and contrast the pros and cons of each system evaluated from a technical, economic, and environmental standpoint for its use to drive one or more of the three transportation fuel production methods under consideration. This shall include capital and operating costs, feedstock requirements, syngas quantity and compositional outputs and technology readiness assessment.
- Prepare findings, conclusions, and recommendations as to gasifier selection and include in a *Gasifier Review and Recommendations Report.*

Products:

- Gasifier Review and Recommendations Report

SUBTASK 2.2 PATHWAY 1 – ADVANCED BIO-METHANATION (AB-M)

The goal of this subtask is to evaluate Advanced Bio-Methanation as a pathway for transportation fuel production from the gasifier(s) recommended in Subtask 2.1 above. AB-M, involves injecting syngas from the gasification of woody biomass into the VERDE hyper-

thermophilic bacterium C. bescii enhanced AD system that is being developed at the same site as the project site. This methodology would simultaneously produce pure hydrogen and enhance the AD system's biogas production (both quantity and methane content) for conversion into additional RNG for transportation fuel use.

The Recipient shall:

- Perform lab and pilot testing at University of Southern California (USC) as needed.
- Install a gasifier, as recommended from Subtask 2.1.
- Design, construct and install an appropriately sized USC RAS.
- Modify the existing demonstration scale VERDE/AD plant at the Fresno site as needed and interconnect it to the gasifier/RAS system.
- Operate and test this system for three to six months.
- Develop and submit an *Advanced Bio-Methanation (AB-M) Pathway Commercialization Report* and provide a scale-up commercialization analysis based on the test results, including degree of technical readiness and effectiveness in converting woody biomass (including at least 60 percent forest waste) to H_2 and RNG transportation fuels, costs, and environmental attributes.

Products:

- AB-M Pathway Commercialization Report

SUBTASK 2.3 PATHWAY 2 - CATALYTIC METHANATION (CM)

The goal of this subtask is to prepare a technical, economic, and environmental analysis of viability of the CM system as a pathway to convert woody biomass directly to transportation fuel. In the second pathway to be investigated, Catalytic Methanation, the syngas goes through a series of steps to remove contaminants and create the pipeline quality RNG. The output of this system would be injected into PG&E's adjacent pipeline near the FW2F Facility in Fresno.

The Recipient shall:

- Obtain and review available information from CM vendors including but not limited to the Wood Company's Vesta system utilizing catalyst supplied by Clariant, regulatory agencies and others, including to the extent possible actual operating records, emission testing and other factual data.
- Compare and contrast the pros and cons of each system evaluated from a technical, economic, and environmental standpoint for its use to convert the syngas produced by the recommended gasifier from Subtask 2.1 into RNG meeting PG&E's pipeline quality specifications. This shall include projected capital and operating costs, feedstock requirements, syngas quantity, and compositional outputs and technology readiness assessment.
- Prepare findings, conclusions and recommendations as to the suitability of CM as the pathway and include information in a *Catalytic Methanation Evaluation Report.*

Products:

- Catalytic Methanation Evaluation Report

SUBTASK 2.4 PATHWAY 3 – SYNGAS CONVERSION TO ELECTRICITY FOR EVs

The goal of this subtask is to prepare a technical, economic and environmental analysis of the viability of using the syngas produced from the forest and other biomass waste gasified to be converted to electricity for EV charging, as a pathway to convert woody biomass to transportation fuel. In this third pathway to be investigated, the syngas is oxidized and used to turn a turbine to produce electric power. Waste heat can also be produced and used on-site for feedstock drying and AD heating.

The Recipient shall:

- Obtain and review available information from syngas to power system vendors including but not limited to steam and organic Rankine cycle turbines, regulatory agencies and others, including to the extent possible actual operating records, emission testing, and other factual data.
- Compare and contrast the pros and cons of each system evaluated from a technical, economic, and environmental standpoint for its use to convert the syngas produced by the recommended gasifier from Subtask 2.1 into electricity for EV charging. This shall include projected capital and operating costs, feedstock requirements, syngas quantity and compositional outputs and technology readiness assessment.
- Prepare findings, conclusions and recommendations as to the suitability of electricity production for EV charging as the pathway and include in an *Electricity Production for EV Charging Report.*

Products:

- Electricity Production for EV Charging Report

SUBTASK 2.5 COMPARE PATHWAYS AND MAKE IMPLEMENTATION RECOMMENDATIONS

The goal of this subtask is to compare the results of the evaluation of the three pathways as indicated in the subtasks above. The comparisons shall cover technical, economic, and environmental considerations and a recommendation as to which pathway or combination of pathways best suits the goals of this program at the Fresno site. An implementation plan for the recommended next step of the project shall also be developed, showing appropriate phasing toward full commercialization, necessary steps, timelines, and costs.

The Recipient shall:

- Compare the technical, economic, and environmental analysis of the three pathways evaluated above.
- Provide findings, conclusions and recommendations for the preferred pathway to convert forest (at least 60 percent) and other approved biomass waste materials, including the dried digestate from the Fresno AD plant.

- Define the next appropriate step in commercializing the recommended system. This is anticipated to be a single, commercial scale modular gasifier and appropriately sized syngas to fuel conversion system.
- Develop an implementation plan for the project, including phasing, steps, timelines, and costs. Update, if and as necessary, the remaining Tasks in this Scope of Work and submit these revisions to the CAM for approval.
- Develop and submit a *Pathway Implementation Report* that will incorporate findings, conclusions and recommendations regarding the best forest and other biomass conversion to transportation fuel, implementation plan and, if needed, Scope of Work modifications to implement the recommended next phase of project commercialization.

Products:

- Pathway Implementation Report

[CPR WILL BE HELD IN THIS TASK. See Task 1.2 for details]

TASK 3: PROJECT FACT SHEET

The goal of this task is to develop an initial project fact sheet that describes the CEC-funded project and the expected benefits resulting from the project for the public and key decision makers.

The Recipient shall:

- Prepare an Initial Project Fact Sheet at start of the project that describes the project and the expected benefits. Use the format provided by the CAM.

Product:

- Initial Project Fact Sheet
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