

GRANT REQUEST FORM (GRF)

CEC-270 (Revised 10/2015)

CALIFORNIA ENERGY COMMISSION

New Agreement PIR-18-001 (To be completed by CGL Office)

ERDD	Abolghasem Edalati	43	916-327-1499
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West Biofuels LLC	20-5974773
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Production of Pipeline Grade Renewable Natural Gas and Value-Added Chemicals from Forest Biomass Residue			
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6/28/2019	3/31/2023	\$ 2,000,000
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<input type="checkbox"/> ARFVTP agreements under \$75K delegated to Executive Director.			
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Proposed Business Meeting Date	5/15/2019	<input type="checkbox"/> Consent	<input checked="" type="checkbox"/> Discussion
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Business Meeting Presenter	Prab Sethi	Time Needed:	5 minutes
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Please select one list serve. NaturalGas (NG Research Program)

Agenda Item Subject and Description

WEST BIOFUELS, LLC. Proposed resolution approving Agreement PIR-18-001 with West Biofuels, LLC for a \$2,000,000 grant to fund the development and demonstration of a pilot-scale system to produce renewable gas (RG) and value-added alcohols by converting forest residue from high hazard zones, and adopting staff's determination that this action is exempt from CEQA. The project will integrate gasification with catalytic upgrading process and a novel gas separation process to demonstrate a full pathway from forest feedstock to RG production and use. .



California Environmental Quality Act (CEQA) Compliance

1. Is Agreement considered a "Project" under CEQA?
 Yes (skip to question 2) No (complete the following (PRC 21065 and 14 CCR 15378)):
 Explain why Agreement is not considered a "Project":
 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:
 a) Agreement **IS** exempt. (Attach draft NOE)
 Statutory Exemption. List PRC and/or CCR section number: _____

Categorical Exemption. List CCR section number: Cal. Code Regs., tit 14, § 15301 ; Cal. Code Regs., tit 14, § 15303

Common Sense Exemption. 14 CCR 15061 (b) (3)
 Explain reason why Agreement is exempt under the above section:

California Code of Regulations, title 14, section 15301 provides that projects which consist of the operation, repair, maintenance, permitting, leasing, licensing, or minor alteration of existing public or private structures, facilities, mechanical equipment, or topographical features, and which involve negligible or no expansion of an existing or former use, are categorically exempt from the provisions of the California Environmental Quality Act. This project will modify an existing gasification system at an existing biofuel production facility. The existing system is housed indoors at a research facility in Woodland, California and all modifications to the system will take place at the same site. The modifications to the existing system will demonstrate, conversion of forest residue from high fire hazard regions to renewable gas and mixed alcohol by-products. The existing gasifier already produces clean syngas from woody feedstock at atmospheric pressure. The project will install a gas compressor approximately the size of a power washer, and gas storage and separation equipment approximately the size of a refrigerator. No trenching or new concrete pad is necessary to install this new equipment. The equipment will be modified as needed to deliver renewable gas and other products. For these reasons, this project is categorically exempt under CEQA Guidelines section 15301.

California Code of Regulations, title 14, section 15303 provides that projects which 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 the provisions of the California Environmental Quality Act. The project will install a gas compressor approximately the size of a power washer, and gas storage and separation equipment approximately the size of a refrigerator. No trenching or new concrete pad is necessary to install this new equipment. This minimal construction is well within the size limits listed in the examples given in 14 C.C.R. § 15303 (e.g., it is less than a single-family residence, duplex, and the 2,500 square feet - or 10,000 square feet in urban areas - for a store, motel, office, restaurant, or similar structure). Therefore, the proposed project will not have a significant effect on the environment and falls under the categorical exemption listed in 14 C.C.R. § 15303

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

- Check all that apply
- Initial Study
 - Negative Declaration
 - Mitigated Negative Declaration
 - Environmental Impact Report
 - Statement of Overriding Considerations

Legal Company Name:	Budget
UC San Diego	\$ 329,318
UC Davis-Sub of UC San Diego	\$ 70,682
DOE- National Renewable Energy Laboratory	\$ 0
Colorado School of Mines	\$ 39,000
Sierra Business Council Small Business Development Center	\$ 25,000
Placer County Air Pollution Control District	\$ 15,000
The Grant Farm, Incs	\$ 10,000
	\$
	\$

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Legal Company Name:

Funding Source	Funding Year of Appropriation	Budget List No.	Amount
NG Subaccount, PIERDD	17-18	501.001L	\$2,000,000
			\$
			\$
			\$
			\$
			\$
R&D Program Area: EGRO: Renewables			\$2,000,000
Explanation for "Other" selection			
Reimbursement Contract #:		Federal Agreement #:	

Name: Kristen Decker	Name: Matthew Summers
Address: 765 Baywood Dr Ste 340	Address: 14958 County Road 100B
City, State, Zip: Petaluma, CA 94954-5507	City, State, Zip: Woodland, CA 95776-9104
Phone: 415-446-2751 / Fax: - -	Phone: 530-207-5996 / Fax: - -
E-Mail: Kristen.decker@headlands.us	E-Mail: matt.summers@westbiofuels.com

<input checked="" type="checkbox"/> Competitive Solicitation <input type="checkbox"/> First Come First Served Solicitation	Solicitation #: GFO-18-501
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1. Exhibit A, Scope of Work	<input checked="" type="checkbox"/>	Attached
2. Exhibit B, Budget Detail	<input checked="" type="checkbox"/>	Attached
3. CEC 105, Questionnaire for Identifying Conflicts	<input checked="" type="checkbox"/>	Attached
4. Recipient Resolution	<input checked="" type="checkbox"/> N/A	<input type="checkbox"/> Attached
5. CEQA Documentation	<input checked="" type="checkbox"/> N/A	<input type="checkbox"/> Attached

Agreement Manager _____ Date _____ Office Manager _____ Date _____ Deputy Director _____ Date _____

EXHIBIT A

Scope of Work

I. TASK ACRONYM/TERM LISTS

A. Task List

Task #	CPR ¹	Task Name
1		General Project Tasks
2	X	Parameter Testing and Optimization
3		Design and Construct Integrated Pilot System
4		Test Pilot System
5	X	Long-Term Pilot Testing
6		Renewable Gas Testing
7		Evaluation of Project Benefits
8		Technology/Knowledge Transfer Activities
9		Production Readiness Plan

B. Acronym/Term List

Acronym/Term	Meaning
CAM	Commission Agreement Manager
CAO	Commission Agreement Officer
CNG	Compressed Natural Gas
CPR	Critical Project Review
HHZ	High Hazard Zone
IOU	Invested Owned Utility
RG	Renewable Gas
TAC	Technical Advisory Committee

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

A. Purpose of Agreement

The purpose of this Agreement is to fund the development of technology that produces renewable gas (RG) from forest residue sources from high hazard zone (HHZ) regions.

B. Problem/ Solution Statement

Problem

The commercial production of RG from forest residues is challenged by the low cost of fossil natural gas and high levels of risk associated with new technologies. In the past, several large-scale cellulosic biomass to biofuels projects have failed, increasing the rigor needed to demonstrate technical viability to stakeholders interested in financing projects. Additionally, limited opportunities have been presented that create multiple value-added products, which could help reduce the financial risk of a new project.

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.

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Solution

The Recipient will demonstrate, at a pilot-scale, a complete system to convert forest fuels from HHZ regions to RG and value-added mixed alcohol by-products. This demonstration will provide important information to validate technical viability of the proposed solution. The proposed technology will generate multiple high-value mixed alcohol products that can be upgraded for use as transportation fuels or in the chemical markets, reducing financial risk. The success of the project will significantly advance the technology towards commercialization, addressing the two main components of project finance: technical risk and financial risk.

C. Goals and Objectives of the Agreement

Agreement Goals

The goals of this Agreement are to:

- Demonstrate a RG separation process to convert biomass feedstock to high quality RG suitable to meet natural gas standards in California investor owned utility (IOU) territories (SoCalGas Rule 30 and PG&E Rule 21).
- Demonstrate and verify that the pilot-scale system is stable and reliable using HHZ forest fuels to produce RG in a California natural gas IOU territory.
- Complete a techno-economic analysis for a commercial facility to validate commercial opportunity for the proposed technology and by-products.
- Validate environmental benefits and the ability to produce a low-carbon transportation fuel(s) that meet California environmental standards from high hazard zone forest fuels.

Ratepayer Benefits: This Agreement will result in the ratepayer benefits of increased natural gas reliability, lower costs, job creation, air emission reductions, and improved forest management and watershed protection:

- **Increased Natural Gas Reliability:** The technology will demonstrate new technology that will allow for the in-state production of RG. Diversification of natural gas and RG will help support the reliability and resiliency of the gas system. Additionally, numerous critical natural gas distribution and transmission lines run through the forested landscape. Projects that support sustainable forest management will reduce the risk of infrastructure damage from wildfire.
- **Lower Cost:** The project seeks to validate a process that can generate multiple products to reduce the cost of RG and ultimately the cost of gas to the consumer.
- **Jobs Creation:** The project will directly create engineering and R&D jobs to perform the testing and develop the technology. The project will develop a commercial technology to be deployed throughout California, which has the potential to create engineering and construction jobs along with long-term operations and feedstock supply jobs. It is estimated that a single commercial project would create 120 direct jobs operating the plant and collecting HHZ forest residuals and 180 indirect community jobs.
- **Improved Forest Management and Watershed Protection:** The Sierra Nevada region supplies more than 60 percent of the state's fresh water supply.² The health of the forested landscape is critical to reducing the risk of catastrophic wildfires that damage watersheds, soil retention and stability, and water hold capacity. This technology directly benefits ratepayers in terms of fire safety and water quality by utilizing HHZ forest fuels generated from forest management. This project will use a small amount of Sierra Nevada feedstock to perform the pilot-scale demonstration in Woodland, CA. These benefits will be more fully realized with commercial deployment of the technology developed in this project.

² <http://www.sierranevada.ca.gov/our-region/ca-primary-watershed>

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- **Air Emission Reductions:** The project will produce RG with a carbon intensity of 75 percent below that of fossil natural gas. Additionally, the project will support the reduction of short-lived climate pollutants through the reduction of open-pile burning.

Technological Advancement and Breakthroughs: This Agreement will lead to technological advancement and breakthroughs to overcome barriers to the achievement of the State of California's statutory energy goals. The project will be the first to evaluate, with a pilot-scale demonstration, the whole system efficiency of cellulosic biomass to RG production using catalytic upgrading of syngas to RG and a potential hydrate-based gas separation for RG refinement.

Agreement Objectives

The objectives of this Agreement are to:

- Demonstrate a pilot scale biomass-to-RG process including gasifier, catalyst reactor and gas separation process.
- Use Sierra Nevada region HHZ forest fuel hauled to the Woodland, CA facility.
- Validate process for tolerance of syngas contaminants.
- Separate methane-rich RG from other products.
- Produce syngas from forest waste biomass at a rate of at least 25 cubic feet per minute.
- Utilize syngas for production of upgraded RG at a rate of at least 2.5 cubic feet per minute.
- Complete more than 500 hours of testing producing RG from syngas. Complete at least two eight-hour steady state operational periods with the full process. These tests will include complete data collection of process parameters and performance.
- Achieve an overall process efficiency of 55 percent with at least 60 percent of energy in the RG product.
- Achieve less than 5 percent degradation of system output and efficiency during the 500 hour test period.
- Leverage by-products to achieve a wholesale cost of RG of \$12/MMBtu or lower.
- Demonstrate key financial metrics for a commercial plant, including a simple payback period of less than 15 years with a plant designed for 30 years of service.
- Complete a feasibility assessment for commercially deploying the technology across the Sierra Nevada region.
- Evaluate the ability for commercial-scale facilities to meet the air emission requirements of air districts across the Sierra Nevada region based on the pilot-scale performance.
- Demonstrate a Low Carbon Fuel Pathway carbon intensity less than 15 grams CO_{2e} per MJ of transportation fuel.

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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)**. 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 Energy Commission’s 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 or CD-ROM.

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

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- 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.
 - Documents intended for public distribution will be in PDF file format.
 - The Recipient must also provide the native Microsoft file format.
 - 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 Energy Commission's Information Technology Services Branch to determine whether the exceptions are allowable.

MEETINGS

Subtask 1.2 Kick-off Meeting

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

The Recipient shall:

- Attend a "Kick-off" meeting with the CAM, the Commission Agreement Officer (CAO), and any other Energy Commission 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.

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

- Terms and conditions of the Agreement;
- 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 and invoices (subtask 1.5);
 - Final Report (subtask 1.6);
 - Technical Advisory Committee meetings (subtasks 1.10 and 1.11); and
 - Any other relevant topics.
- Provide an *Updated Project Schedule, List of Match Funds, and List of Permits*, 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:

- Updated Project Schedule *(if applicable)*
- Updated List of Match Funds *(if applicable)*
- Updated List of Permits *(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 Energy Commission 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 Energy Commission 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 Energy Commission.

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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 Energy Commission, 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 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.
- Submit the CPR Report along with any other *Task Products* that correspond to the technical task for which the CPR meeting is required (i.e., if a CPR meeting is required for Task 2, submit the Task 2 products along with the CPR Report).
- 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* and 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)
- Task Products (draft and/or final as specified in the task)

CAM Products:

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

Subtask 1.4 Final Meeting

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

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The Recipient shall:

- Meet with Energy Commission 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 state-owned equipment.
 - Need to file a Uniform Commercial Code Financing Statement (Form UCC-1) regarding the Energy Commission's interest in patented technology.
 - The Energy Commission'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 *All Draft and Final Written Products* on a CD-ROM or USB memory stick, organized by the tasks in the Agreement.

Products:

- Final Meeting Agreement Summary (*if applicable*)
- Schedule for Completing Agreement Closeout Activities
- All Draft and Final Written Products

REPORTS AND INVOICES

Subtask 1.5 Progress Reports and Invoices

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

The Recipient shall:

- Submit a monthly *Progress Report* to the CAM. Each progress report must:
 - Summarize progress made on all Agreement activities as specified in the scope of work for the preceding month, including accomplishments, problems, milestones, products, schedule, fiscal status, and an assessment of the ability to complete the Agreement within the current budget and any anticipated cost overruns. See the

EXHIBIT A Scope of Work

Progress Report Format Attachment for the recommended specifications.

- Submit a monthly or quarterly *Invoice* that follows the instructions in the “Payment of Funds” section of the terms and conditions, including a financial report on Match Fund and in-state expenditures.

Products:

- Progress Reports
- Invoices

Subtask 1.6 Final Report

The goal of this subtask is to prepare a comprehensive Final Report that describes the original purpose, approach, results, and conclusions of the work performed under this Agreement. The CAM will review the Final Report, which will be due at least **two months** before the Agreement end date. When creating the Final Report Outline and the Final Report, the Recipient must use the Style Manual provided by the CAM.

Subtask 1.6.1 Final Report Outline

The Recipient shall:

- Prepare a *Final Report Outline* in accordance with the *Style Manual* provided by the CAM. (See Task 1.1 for requirements for draft and final products.)

Recipient Products:

- Final Report Outline (draft and final)

CAM Product:

- Style Manual
- Comments on Draft Final Report Outline
- Approval of Final Report Outline

Subtask 1.6.2 Final Report

The Recipient shall:

- Prepare a *Final Report* for this Agreement in accordance with the approved Final Report Outline, 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)

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- Appendices (if applicable) (Create a separate volume if very large.)
 - Attachments (if applicable)
 - Ensure that the document is written in the third person.
 - Ensure that the Executive Summary is understandable to the lay public.
 - Briefly summarize the completed work. Succinctly describe the project results and whether or not the project goals were accomplished.
 - Identify which specific ratepayers can benefit from the project results and how they can achieve the benefits.
 - If it's necessary to use a technical term in the Executive Summary, provide a brief definition or explanation when the technical term is first used.
 - Follow the Style Guide format requirements for headings, figures/tables, citations, and acronyms/abbreviations.
 - Ensure that the document omits subjective comments and opinions. However, recommendations in the conclusion of the report are allowed.
 - Include a brief description of the project results in the Abstract.
-
- 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
 - Consider incorporating all CAM comments into the Final Report. 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 Final Report 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.
 - Submit one bound copy of the *Final Report* to the CAM along with *Written Responses to Comments on the Draft Final Report*.

Products:

- Final Report (draft and final)
- Written Responses to Comments on the Draft Final Report

CAM Product:

- Written Comments on the Draft Final Report

MATCH FUNDS, PERMITS, AND SUBCONTRACTS

Subtask 1.7 Match Funds

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

While the costs to obtain and document match funds are not reimbursable under this Agreement, the Recipient may spend match funds for this task. The Recipient may only spend match funds during the Agreement term, either concurrently or prior to the use of Energy Commission 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 Energy Commission

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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 Energy Commission awarding this Agreement, then provide in the letter:

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

Products:

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

Subtask 1.8 Permits

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

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

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

Products:

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

Subtask 1.9 Subcontracts

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

The Recipient shall:

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

Products:

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

TECHNICAL ADVISORY COMMITTEE

Subtask 1.10 Technical Advisory Committee (TAC)

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

- Provide guidance in project direction. The guidance may include scope and methodologies, timing, and coordination with other projects. The guidance may be based on:

EXHIBIT A Scope of Work

- 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.

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 1.11 TAC Meetings

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

EXHIBIT A

Scope of Work

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.

Products:

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

IV. TECHNICAL TASKS

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

TASK 2: PARAMETER TESTING AND OPTIMIZATION

The goal of this task is to optimize the operating parameters for the catalytic reactor and the gas separation system to design a pilot-scale system for renewable gas production.

The Recipient shall:

- Prepare and provide a *Parameter Test Plan* that shows the parameters to be tested and the range of test conditions to be evaluated. The Parameter Test Plan shall include but is not limited to the following:
 - A description of the processes to be tested including bench-scale catalyst system and bench-scale RG separation systems;
 - The rationale for why the tests are required;
 - Predicted performance based on calculations, modeling or other analyses;
 - Test objectives and technical approach;
 - A test matrix showing the number of test conditions and replicated runs;
 - A description of the facilities, equipment, instrumentation required to conduct the tests;
 - A description of test procedures, including parameters to be controlled and how they will be controlled; parameters to be measured and instrumentation to measure them; calibration procedures to be used; recommended calibration interval; and maintenance of the test log;
 - A description of the data analysis procedures;
 - A description of quality assurance procedures; and

EXHIBIT A Scope of Work

- Contingency measures to be considered if the test objectives are not met.
- Implement the Parameter Test Plan using the existing parameter test system.
- Prepare and provide a *Parameter Test Report* for inclusion in the final report that includes but is not limited to the following:
 - Background information about the experimental design;
 - Materials and methods used during testing;
 - Results and analysis of the testing; and
 - Conclusion about how the results will impact and inform the next project phase.

Products:

- Parameter Test Plan (draft and final)
- Parameter Test Report (draft and final)

TASK 3: DESIGN AND CONSTRUCT INTEGRATED PILOT SYSTEM

The goal of this task is to install the complete integrated system to allow for whole-system operation, and individual unit operations.

The Recipient shall:

- Prepare and provide a *Design Basis Summary* that presents the design criteria for the new RG separation process that must be met to achieve a success and cost-effective project. The Design Basis Summary will include but is not limited to the following:
 - The expectations for the incoming gas stream (derived from the Parameter Test Report in Task 2);
 - Material design criteria (e.g. using standard components sizes and material grades);
 - Identifications of engineering designs standards that will be applicable; and
 - Discussion about designing for safety
- Engineer, procure and construct systems required for syngas compression and storage. System will include a compressor and cylinder storage facilities.
- Design and modify existing reactor system as needed to deliver required renewable gas.
- Engineer, procure and construct the gas separation system and the integration interface. System will include a staged system with a number of separation steps.
- Prepare and provide a *Construction Report* for the integrated facility that will evaluate the actual construction activities and list major project changes. The Construction Report will include but is not limited to the following:
 - A final schedule of completed milestones; and
 - A description of lessons learned.
 - A description of the challenge identified with the original design;
 - A justification for the solution developed;
 - An update on selected equipment/materials; and
 - An update, as necessary, to the project schedule.

Products:

- Design Basis Summary (draft and final)
- Construction Report (draft and final)

EXHIBIT A Scope of Work

TASK 4: TEST PILOT SYSTEM

The goal of this task is to validate that the installed system is ready for safe operations at the design conditions.

The Recipient shall:

- Prepare and provide a *Commissioning Plan* to summarize the operating parameters that must be validated during system commissioning prior to operations. The Commissioning Plan will include but is not limited to the following:
 - Process flow diagrams;
 - Heat and mass balances;
 - Expected performance characteristics;
 - Process for performance validation; and
 - Schedule for commissioning activities.
 - A commissioning data collection plan.
- Commission the synthesis system and show that the outputs meet the objectives.
- Commission the RG separation system and show that the outputs meet the objectives.
- Commission the synthesis system with the RG separation system and show that the outputs meet the objectives.
- Demonstrate the entire process with the gasification system and show that the outputs meet the objectives.
- .
- Once commissioning has been completed, prepare and provide *Written Notification of Successful Commissioning* in the form of a letter. The letter shall:
 - Verify that the system is ready for operations;
 - Document any significant changes challenges encountered during commissioning;
 - Identify any changes made to successfully complete commissioning; and
 - Describe the reason for the changes.
 - Include all process and performance data required in the commissioning data collection plan.

Products:

- Commissioning Plan (draft and final)
- Written Notification of Successful Commissioning (final)

TASK 5: LONG-TERM PILOT TESTING

The goal of this task is to complete 500 hours of complete RG production and testing system including the following processes:

- Generating and compressing sufficient biomass-based syngas for 500 hours of testing on synthesis and RG separation process;
- Catalytic upgrading process to produce stream of alcohols and RG;
- Gas separation processes to condense liquids and separate RG; and
- Storage of RG for utilization

The Recipient shall:

- Prepare a *Long-Term Test Plan* that shows the means and methods for system operation and testing. This plan shall include but is not limited to the following:
 - A description of the process to be tested;
 - The rationale for why the tests are required;

EXHIBIT A Scope of Work

- Predicted performance based on calculations or other analyses;
- Test objectives and technical approach;
- A test matrix showing the number of test conditions and replicated runs;
- A description of the facilities, equipment, instrumentation required to conduct the tests;
- A description of test procedures, including parameters to be controlled and how they will be controlled; parameters to be measured and instrumentation to measure them; calibration procedures to be used; recommended calibration interval; and maintenance of the test log;
- A description of the data analysis procedures;
- A description of quality assurance procedures;
- Contingency measures to be considered if the test objectives are not met.
- A long-term test data collection plan.
- Implement the Long-Term Test Plan including data collection.
- Prepare and provide a *Long-Term Test Report* that includes but is not limited to the following:
 - Background information about the experimental design;
 - Materials and methods used during testing;
 - Results and analysis of the testing; and
 - Comparison of the results against the project objectives.
 - Include all process and performance data required in the long-term test data collection plan.

Products:

- Long-Term Test Plan (draft and final)
- Long-Term Test Report (draft and final)

TASK 6: RENEWABLE GAS TESTING

The goal of this task is to demonstrate the ability to produce RG that meets natural gas quality standards (SoCalGas Rule 30 and PG&E Rule 21) and inject RG into a pipeline, and use in a compressed natural gas (CNG) vehicle.

The Recipient shall:

- Prepare an *RG Test Plan* describing how the produced RG will be upgraded and tested to validate compliance with utility specifications and the process for injecting the RG into the pipeline and for use in a CNG vehicle. The RG Test Plan will include but is not limited to the following:
 - Confirmation of target utility RG specifications;
 - Description of the methodology used for RG upgrading and testing;
 - Proposed site for pipeline injection;
 - Methodology for validating injection into the pipeline;
 - Proposed utilization of RG in a CNG vehicle; and
 - Methodology for validating performance in a CNG vehicle.
 - Renewable gas testing data collection plan.
- Implement the RG Test Plan.
- Provide *Proof of Compliance with Utility RG Specification*, including *photographic evidence for RG Utilization* as appropriate for pipeline injection and utilization in a CNG vehicle.

EXHIBIT A Scope of Work

- Include all process and performance data required in the renewable gas testing data collection plan.

Products:

- RG Test Plan (draft and final)
- Proof of Compliance with Utility RG Specifications (draft and final)

TASK 7: EVALUATION OF PROJECT BENEFITS

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

The Recipient shall:

- Complete three Project Benefits Questionnaires that correspond to three main intervals in the Agreement: (1) *Kick-off Meeting Benefits Questionnaire*; (2) *Mid-term Benefits Questionnaire*; and (3) *Final Meeting Benefits Questionnaire*.
- Provide all key assumptions used to estimate projected benefits, including: targeted market sector (e.g., population and geographic location), projected market penetration, baseline and projected energy use and cost, operating conditions, and emission reduction calculations. Examples of information that may be requested in the questionnaires include:
 - For Product Development Projects and Project Demonstrations:
 - Published documents, including date, title, and periodical name.
 - Estimated or actual energy and cost savings, and estimated statewide energy savings once market potential has been realized. Identify all assumptions used in the estimates.
 - Greenhouse gas and criteria emissions reductions.
 - Other non-energy benefits such as reliability, public safety, lower operational cost, environmental improvement, indoor environmental quality, and societal benefits.
 - Data on potential job creation, market potential, economic development, and increased state revenue as a result of the project.
 - A discussion of project product downloads from websites, and publications in technical journals.
 - A comparison of project expectations and performance. Discuss whether the goals and objectives of the Agreement have been met and what improvements are needed, if any.
 - Additional Information for Product Development Projects:
 - Outcome of product development efforts, such copyrights and license agreements.
 - Units sold or projected to be sold in California and outside of California.
 - Total annual sales or projected annual sales (in dollars) of products developed under the Agreement.
 - Investment dollars/follow-on private funding as a result of Energy Commission funding.
 - Patent numbers and applications, along with dates and brief descriptions.
 - Additional Information for Product Demonstrations:
 - Outcome of demonstrations and status of technology.
 - Number of similar installations.
 - Jobs created/retained as a result of the Agreement.
 - For Information/Tools and Other Research Studies:

EXHIBIT A Scope of Work

- Outcome of project.
 - Published documents, including date, title, and periodical name.
 - A discussion of policy development. State if the project has been cited in government policy publications or technical journals, or has been used to inform regulatory bodies.
 - The number of website downloads.
 - An estimate of how the project information has affected energy use and cost, or have resulted in other non-energy benefits.
 - An estimate of energy and non-energy benefits.
 - Data on potential job creation, market potential, economic development, and increased state revenue as a result of project.
 - A discussion of project product downloads from websites, and publications in technical journals.
 - A comparison of project expectations and performance. Discuss whether the goals and objectives of the Agreement have been met and what improvements are needed, if any.
- Respond to CAM questions regarding responses to the questionnaires.

The Energy Commission may send the Recipient similar questionnaires after the Agreement term ends. Responses to these questionnaires will be voluntary.

Products:

- Kick-off Meeting Benefits Questionnaire
- Mid-term Benefits Questionnaire
- Final Meeting Benefits Questionnaire

TASK 8: TECHNOLOGY/KNOWLEDGE TRANSFER ACTIVITIES

The goal of this task is to develop a plan to make the knowledge gained, experimental results, and lessons learned available to the public and key decision makers.

The Recipient shall:

- Prepare an *Initial Fact Sheet* at start of the project that describes the project. Use the format provided by the CAM.
- Prepare a *Final Project Fact Sheet* at the project's conclusion that discusses results. Use the format provided by the CAM.
- Prepare a *Technology/Knowledge Transfer Plan* that includes:
 - An explanation of how the knowledge gained from the project will be made available to the public, including the targeted market sector and potential outreach to end users, utilities, regulatory agencies, and others.
 - A description of the intended use(s) for and users of the project results.
 - Published documents, including date, title, and periodical name.
 - Copies of documents, fact sheets, journal articles, press releases, and other documents prepared for public dissemination. These documents must include the Legal Notice required in the terms and conditions. Indicate where and when the documents were disseminated.
 - A discussion of policy development. State if project has been or will be cited in government policy publications, or used to inform regulatory bodies.
 - The number of website downloads or public requests for project results.

EXHIBIT A

Scope of Work

- Additional areas as determined by the CAM.
- Conduct technology transfer activities in accordance with the Technology/Knowledge Transfer Plan. These activities will be reported in the Progress Reports.
- When directed by the CAM, develop *Presentation Materials* for an Energy Commission-sponsored conference/workshop(s) on the project.
- Provide at least (6) six *High Quality Digital Photographs* (minimum resolution of 1300x500 pixels in landscape ratio) of pre and post technology installation at the project sites or related project photographs.
- Prepare a *Technology/Knowledge Transfer Report* on technology transfer activities conducted during the project.

Products:

- Initial Fact Sheet (draft and final)
- Final Project Fact Sheet (draft and final)
- Presentation Materials (draft and final)
- High Quality Digital Photographs
- Technology/Knowledge Transfer Plan (draft and final)
- Technology/Knowledge Transfer Report (draft and final)

TASK 9: Production Readiness Plan

The goal of this task is to determine the steps that will lead to the manufacturing of technologies developed in this project or to the commercialization of the project's results.

The Recipient shall:

- Prepare a *Production Readiness Plan*. The degree of detail in the plan should be proportional to the complexity of producing or commercializing the proposed product, and to its state of development. As appropriate, the plan will discuss the following:
 - Critical production processes, equipment, facilities, personnel resources, and support systems needed to produce a commercially viable product.
 - Internal manufacturing facilities, supplier technologies, capacity constraints imposed by the design under consideration, design-critical elements, and the use of hazardous or non-recyclable materials. The product manufacturing effort may include "proof of production processes."
 - The estimated cost of production.
 - The expected investment threshold needed to launch the commercial product.
 - An implementation plan to ramp up to full production.
 - The outcome of product development efforts, such as copyrights and license agreements.
 - Patent numbers and applications, along with dates and brief descriptions.
 - Other areas as determined by the CAM.

Products:

- Production Readiness Plan (draft and final)

V. PROJECT SCHEDULE

Please see the attached Excel spreadsheet.

STATE OF CALIFORNIA

STATE ENERGY RESOURCES
CONSERVATION AND DEVELOPMENT COMMISSION

RESOLUTION - RE: WEST BIOFUELS, LLC

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

RESOLVED, that the Energy Commission approves Agreement PIR-18-001 from GFO-18-501 with West Biofuels, LLC for a \$2 million grant to fund the development and demonstration of a pilot-scale system to produce renewable gas and value-added alcohols by converting forest residue from high hazard zones. The project will integrate gasification with a catalytic upgrading and novel gas separation processes to demonstrate a full pathway from forest feedstock to renewable gas production and use; and

FURTHER BE IT RESOLVED, that the Executive Director or his/her designee shall execute the same on behalf of the Energy Commission.

CERTIFICATION

The undersigned Secretariat to the Commission 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 California Energy Commission held on May 15, 2019.

AYE: [List of Commissioners]

NAY: [List of Commissioners]

ABSENT: [List of Commissioners]

ABSTAIN: [List of Commissioners]

Cody Goldthrite,
Secretariat