

ATTACHMENT 2 Executive Summary Form

Project Title: Modular Biomass Power Systems to Facilitate Forest Fuel Reduction Treatments

Project Applicant: West Biofuels

Project Team: INSER S.P.A., UC San Diego, TSS Consultants, Placer County APCD, Holt of California, Caterpillar Inc., Engine Fuel and Emissions Engineering, Soper-Wheeler, Christiana Darlington, Nevada County Fire Safe Council, Yuba County Fire Safe Council

Project description:

This project will develop a modular system that can be rapidly deployed to communities across California to promote and support fire safe management activities. The project team proposes to develop a pilot-scale modular biomass gasification system integrated with a high-efficiency Caterpillar G3500 series lean-burn engine in order to convert forest residues into renewable grid power to reduce the cost and increase the benefits of forest fuel reduction projects in California's high fire risk regions.

West Biofuels has constructed the patented CircleDraft® gasification with Italian partner INSER, S.P.A. at their facility in Woodland, CA. The purpose of this project is to identify the appropriate supporting equipment for the pilot-scale thermochemical conversion of wood feedstock to syngas and syngas to electricity. Unlike biomass gasification in the agricultural settings, forest biomass feedstock is more costly to recover and is comprised of tops, limbs, branches, and sub-merchantable timber (as opposed to whole tree removal of orchard wood). To address the changes in feedstock sources and the greater need for efficiency, the project will:

- Configure a processing line to prepare feedstock for optimal feedstock uniformity;
- Test the CircleDraft® gasification system with forest sourced feedstock to identify optimal feedstock characteristics and operating conditions;
- Configure and test state-of-the-art lean-burn engine-generator to characterize performance and efficiency;
- Assess cost effective interconnection opportunities of synchronous and inverter-based configurations; and
- Identify preferred areas of implementation accounting for grid infrastructure, forest-sourced feedstock availability, and project economics.

Project goals and objectives:

Project goals and the objectives to achieve them are identified below including:

Goal	Objective
Create high quality, uniform feedstock from forest-sourced material for optimal gasifier performance	Design, build, and install a system to process incoming forest-sourced feedstock to create a uniform feedstock without fines, overs, an inorganic material (e.g., rock and dirt).
Optimize gasifier operating conditions for the production of high quality syngas	Test the INSER CircleDraft® gasifier already installed to determine operating conditions for optimized efficiency and syngas quality
Increase the efficiency of electricity production by using a lean-burn engine generator system and assess interconnection solutions	Install and test a Caterpillar internal combustion engine generator under various operational settings to identify the optimal configuration for syngas fuel from gasifier system

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<i>Goal</i>	<i>Objective</i>
Develop a system that complies with CARB and Regional Air District standards	Install and test a CompactSCR™ system to demonstrate control of emissions from the engine system to ultra-low levels
Identify preferred target deployment sites of modular technology based on fire risk and grid infrastructure	Research the potential to site modular community-scale biomass gasification projects in the forest/urban interface factoring grid infrastructure and high fire risk areas
Develop a modular, replicable, economically-viable, environmentally-sound, bioenergy solution to promote sustainable forest management practices throughout California	Assess production readiness and perform economic analysis to evaluate feasibility for deployment of modular bioenergy technology in California forest areas of high risk for forest fires

Explanation of how project objectives will be achieved, quantified, and measured:

For each objective above, quantifiable targets have been identified and will be measured by the project team using accepted industry methodology. UC San Diego will be responsible for third-party monitoring and verification (M&V) to establish whether targets have been met.

Project task description:

The project is divided into the following tasks that address each of the above objectives:

- Task 1: General Project Tasks - administration and reporting tasks for the project;
- Task 2: Feedstock Characterization & Processing - determine best practices for creating consistent clean ¼" to 3" wood chip feedstock for the system;
- Task 3: Configure and Test CircleDraft® Gasifier System - test and optimize gasifier system for making high-quality syngas from forest residue feedstock;
- Task 4: Configure and Test Engine-Generator System - test and optimize the performance of the lean-burn engine-generator system for making power;
- Task 5: Modular Bio-power System Feasibility Study - study the feasibility of placing bio-power systems in high-risk areas for reducing forest fuel loading;
- Task 6: Evaluation of Project Benefits - report the benefits resulting from this project particularly benefits to California's ratepayers and the general public;
- Task 7: Technology/Knowledge Transfer Activities - make the knowledge gained and lessons learned available to the public and key decision makers; and
- Task 8: Production Readiness Plan – demonstrate that the modular bio-power systems can be manufactured and replicated based on the project's results.

Agreement management description:

The project will be managed by West Biofuels with technical support on forestry and utility policy from TSS Consultants and measurement and verification support from UC San Diego. A Technical Advisory Committee of community, forestry, power industry, and utility experts will advise and guide the project team.