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**Mary D. Nichols, Chair**
**California Air Resource Board**
**PO BOX 2815**
**Sacramento, CA 95812**

**August 31, 2015**

**RE: Comments from Interra Energy on August 5th Natural and Working Lands Symposium**

Dear Chairperson and Board Members,

Interra Energy is concerned with the lack of discussion or focus on biochar production as a part of the climate change solutions related to Natural and Working Lands in California. During the August 5th Symposium, numerous strategies were discussed, but biochar was not one of them. Biochar is created when biomass material is pyrolyzed (heated without oxygen) in a controlled environment (for a detailed overview of biochar please see http://www.biochar-international.org/).

Biochar has been shown to have numerous benefits, which include, carbon sequestration, increased water retention, and increased nutrient retention. Two of the presentations focused on the application of compost to soil as a carbon reduction strategy. Biochar applied to soil works in a similar way, but has more benefits, and last for hundreds to thousands of years as opposed to the 30-100 year time scale suggested for the compost application. Further, compost production only has carbon benefits as opposed to landfilling if the composted material is food waste, or a predominate food waste blend. If green waste is composted there are actually more carbon emissions than landfilling (*see* US EPA GREET model and WARM model - http://epa.gov/wastes/conserve/tools/warm/Warm_Form.html). Thus, there needs to be a solution for the efficient processing of the state's green waste material.

Interra Energy, Inc. is in the pre-commercial stages of development of a thermochemical biomass conversion system. Interra has designed and constructed a patented solution that is deployable at sites throughout the state that will reduce the impact of climate change, via carbon sequestration in biochar and the production of low emission renewable biogas, in addition to efficiently processing organic waste resources into their highest value products. Interra's technology is a clean thermal biomass conversion system that converts biomass (e.g. landscape trimmings, timber residues, construction wood waste, and clean green waste) into a high-methane biogas, readily convertible to renewable baseload electricity or biofuels, and into a high-value agricultural soil enhancer called biochar. The biochar co-product, when utilized in soil enhancement, allows the carbon balance of the bioenergy/biofuels produced to be carbon-negative.

### 1. Net-Negative GHG Emissions - Estimated Total Weight, in tons, of CO2 Displaced/Sequestered by Interra's Project.

Interra's project promises to have the most emission reductions of any biofuel production technology due to the ability to simultaneously produce biochar as a co-product. At the expected throughput of the

proposed project, approximately 3.6 tons/hour, the project would reduce emissions by 26,805 metric tons of $CO_2e$ per year, every year. The co-production of biochar results in the sequestration of GHG, which allows Interra's project to have net-negative emissions. Interra estimated the emission reductions from biochar based the American Carbon Registry (ACR) Methodology for Emissions Reductions from Biochar Projects and consultation with Carbon Consulting, LLC. Per the latest version of the ACR biochar methodology, Interra is using the default baseline scenario of bioenergy production for the calculations in this proposal. Interra is using this baseline as it provides the most conservative emission reduction estimates.

*Indicative Emissions for Interra's Reactor*

| | | Emissions (t $CO_2e$ t-1 DM) | | | | Net Emissions (t $CO_2e$ t-1 DM) |
|---|---|---|---|---|---|---|
| | | Baseline | | | Interra Bioenergy & Biochar | |
| **Feedstock** | **Baseline Management** | **$CH_4$** | **$N_20$** | **Total** | **Process Emissions including Biochar Carbon Removal** | |
| Biomass Residue | Bioenergy | 0.09 | .0009 | 0.091 | -0.66322 | -0.754 |

*Positive values indicate emissions; negative values indicate avoided emissions, or removals.*

Based on these calculations and the operational parameters of Interra's technology, the following GHG reductions result based on the production of 1 million diesel gallon equivalents (DGE) annually:

- 32,900 g $CO_2e$/GGE or 32,899.70 metric tons of $CO_2e$ per year

To put that in perspective, each unit producing 1 million DGEs will reduce emissions that equate to the annual emissions from 6,926 passenger vehicles, the yearly electricity use of 3,002 homes, or the consumption of 3,702,003 gallons of gasoline.

## 2. Reducing the Water Impact of Renewable Technologies

Especially in California, the water impacts of fuel or energy production are critical to the production technology's success. With the ongoing drought, allocating diminishing water resources to fuel production and/or feedstock production does not make sense. Water scarcity in the state led Interra to design the technology with the goal of water-neutral operations.

Though water is used to upgrade the biofuel and wash the biochar out of the Reactor (in a single integrated step), a water recycling system using a sieve bend screen and a dewatering screw press is able to recover enough water from the biochar/water slurry that the process results in net zero water consumption. The water lost to making the biochar wet is constantly replenished since about 1/3 of the pyrolysis reaction product is water. Figure 1 shows the

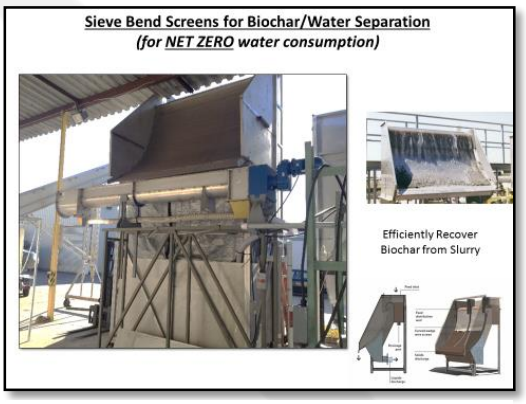


**Figure 1: Water Recycling System**

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enabling water conservation technology related to Sieve Bend Screens. The screens have the dual duty of both recovering the valuable biochar co-product from a slurry mixture generated in the system; and cleaning the water generated during the process to the point where the process water will only pass through one final filter bag in order to be clean enough for re-injection into one of the system's water scrubbing towers. This is an environmental advantage over other bioenergy/biofuel technologies that require injection of water for boiling or cooling, which ultimately has to be discharged causing pollution.

Due to these benefits to the state, we strongly encourage a deeper look into biochar production and application as a way to reduce the water use and carbon emissions in the state. This is especially important on Natural and Working Lands. Please do not hesitate to reach out to our team for a more in-depth discussion into the benefits on biochar or about our particular technology.

Sincerely,

Kenny Key
VP, General Counsel
Interra Energy, Inc.