Attis INNOVATIONS

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Technical Advisory Committee
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Good morning. My name is Helen Petersen and I serve as the Director of Policy for Attis Innovations. My colleagues and I would first like to take the time to thank the committee for giving us the opportunity to speak today as well as your continued vigilance in pushing for a better, more sustainable bioecomony. With your guidance and objective comments, the Biomass Research and Development Board is able to make informed decisions that continue to positively shape our governments policy towards feedstock and biobased product development. We urge you to continue your efforts as we strongly believe that it is in the best interest of the US ecomony, and our country as a whole, to have a strong bioecomony built on renewable feedstocks for biobased products.

Attis Innovations is a company focused on the responsible and sustainable conversion of rapidly renewable biomass into every day, high-value products. Specifically, Attis has developed a technology portfolio that looks to capitalize on cost effectively recovering lignin from biomass at small or large scale to greatly expand the revenue potential for existing biobased industries and exploit rarely used sources of biomass. By employing our technology today in current biomass processing facilities like pulp & paper mills or cellulosic biorefineries, Attis can generate between 35% and 100% more revenue per ton of biomass and drastically improve their profitability and future vitality.

The Attis technology platform is largely in response to the current inefficiencies and outdated technology used in the pulp & paper and cellulosic fuel industries. While the pulp & paper industry has prospered using clean process technologies and sustainable land management practices, its core technology is more than 100 years old and unable to implement efficient separation and bio-refining upgrades. The current antiquated pulp and paper processing methods are designed to only recover and sell about 50% of the processed biomass into high-value applications, meaning that the remaining 50% must be incinerated to recover and recycle the sodium-based solvents.

The cellulosic fuel industry's weakness has been its sole focus on cellulose. Like pulp & paper they too are only able to utilize about 50% of the biomass feedstock effectively and incinerate the remaining as a low grade, low valued energy pellet. These biobased industries are largely inefficient and will be unable to compete with crude oil refineries which have evolved over time to create high value products from 100% of their feedstock stream. Oil refineries convert 92% percent of their feedstock into high-volume low value fuels (gasoline, diesel) and about 8% into materials such as plastics, lubricants, and specialty chemicals accounting for as much as 50% of their revenue. Attis will operate a true integrated biorefinery that targets 100% utilization of biomass into products that displace those made from crude oil.

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Attis's commercial exploitation of lignin is crucial to overcoming the revenue shortfalls faced by the lignocellulosic biofuel industry; the additional value-added uses would improve the competitiveness of biobased fuels versus petroleum-based fuels. Lignin is the most concentrated source of carbon in a plant, and ironically is not being effectively used to replace non-renewable carbon based products.

Attis is able to recover and produce a unique melt-flowing form of lignin. The production of a melt-flowing form of lignin is a major breakthrough that allows an otherwise under-valued lignin stream to capitalize on a host of new market opportunities that were previously thought too difficult to explore. As an example, when used as a high-performance resin extender in thermoplastics, lignin brings a value of $600 to $2,000 per ton, depending on the performance requirements, substantially greater than the $50 per ton value when incinerated

Attis has focused heavily on the displacement of high performance plastic resins like ABS, Polypropylene and other common olefins with our unique lignin. Our goal? To increase the use of biobased materials in every day products like building and construction materials, automotive parts, adhesives and many more. However, Attis has the ability to transform more than just the plastics industry. By taking advantage of the remaining cellulose and hemicellulose from its production process, Attis will be able to manufacture not just a unique lignin, but also a host of green chemicals, cellulosic sugars and specialty pulp fibers for use in a multitude of industries.

Furthermore, Attis is able to cost-effectively build biomass processing systems that range in capacity from 200 to 2,000 tons per day and do so at the same capital intensity per ton as traditional pulp & paper and cellulosic facilities. This allows us to process small volumes of biomass at the same capital intensity, while generating 35% to 100% more revenue.

As cellulose content and scale are no longer business constraints, Attis can build and locate processing systems that reach a wider variety of feedstock opportunities such as peanut shells, rice hulls, corn stover, cotton stems, peach pits, perennial grasses, woody biomass and other crop residuals. These are the types of feedstocks described in the *Billion Ton Report* and without an ability to build scalable processing systems they can never be effectively utilized. Rural America will benefit from the addition of new, green collar jobs and will enable the US to fully realize the potential of a true bioeconomy.

We applaud the USDA and DOE in their commitment to stimulate and support the domestic bioeconomy. It is of our opinion that the key to a successful and self-sustaining biobased enterprise is the targeting of high-value derivative bioproducts.

For decades government and industry forces have joined in a concerted effort to push cellulose-derived products and fuels to drive the biobased industry. Unfortunately, this has left a significant portion of biomass to be categorized as low-value byproducts. To realize the full potential of the *Billion Ton Report*, unbiased funding must be directed toward all-inclusive feedstocks and end-use applications of biomass.

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On behalf of Attis Innovations, I urge the committee to support equitable funding opportunities for all forms of biomass feedstocks, not just those rich in cellulose content, as well as the downstream development of biobased products derived from lignin and hemicellulose. With this all-inclusive approach, funding will be allocated in such a way that enables biomass to be utilized to its full potential, biorefineries to realize additional revenue streams, and tax payer dollars to reap the maximum return.