Model Earth - Optimizing Ecosystem Enhancement

Model Earth, Inc. (MEI) serves land owners, investors, and water consumers who are seeking to create additional value through ecosystem enhancement. We use sophisticated, validated modeling software to recommend management changes on specific tracts of land that will yield additional water values through ecosystem enhancement.

A recent study shows that 53% of water in the US comes from forested watersheds. According to the US Drought Monitor, 100% of California is now in one of the three worst stages of drought. Costs are estimated to exceed $7.48B with ~20,000 job losses tied to 800,000 acres of idled farmland. Drought has also resulted in a long and intense wild-fire season with consequences on wildlife habitat, water quality and fire-fighting costs. Several fish populations, such as Central Coast Coho salmon, are also at risk due to blocking of crucial water passages. There is emerging consensus that forest watershed functions are essential for reliable, high quality water supplies in the face of climate change; however, many USFS National Forests are characterized by overcrowded, unhealthy stands highly susceptible to fire, disease and pests. These stands are also more susceptible to increased stress from accelerating climate change.

We propose to use new, sophisticated modeling techniques to quantify forest eco-services to create a market-driven forest management system that will ensure and secure forest watersheds by improving water capture and retention, leading to greater, more even and longer season stream-flow. Emerging research suggests that tree density and shade patterns can be designed to optimize water retention and run-off, yielding up to 10% improvement in water retention, driving tremendous value creation at modest cost. Other advantages are: less intensity of wildfires; reduced erosion; and better water quality.

The key to success will be to position ecosystem enhancement as a good investment opportunity. As a result, a staged approach will be used that first leverages grant-funding and later crowd funding while the requisite changes in water rates are implemented leading to breakeven for MEI early in year 4.

Zylon

Zylon is a company that possesses a breakthrough technology to create nylon from non-petroleum sources. Its peer-reviewed process provides Zylon the technical capability to produce adipic acid, the precursor to nylon and other products, from glucose, and has it poised to enter the $6.1 billion adipic acid market. The company is comprised of professional degree students from Duke University with expertise in start-ups, engineering, and environmental sciences, and is backed by researchers from the prestigious Duke Cancer Research Center with the ultimate goal of commercializing patented research from Duke University.

Zylon will license a patent from Duke University by vehicle of an option letter to license the patent exclusively for use on a mutated enzyme-biocatalyst that is the missing link in a theorized pathway for creating adipic acid from glucose instead of petroleum, specifically benzene. The resulting adipic acid is chemically identical to adipic acid from traditional reactions, costs less due to a cheaper feedstock, and is carbon balanced. The reaction is more environmentally friendly, less wasteful, and reduces human health risks associated with handling benzene.

For a 5% revenue license fee, current adipic acid producers will be able to use Zylon's enzyme in their own factories to create a chemically identical adipic acid. There will be an upfront cost for new or retrofitted equipment that will be more than offset by lower operating costs, cheaper feedstock prices, and new sales generated by a differentiated "green" product. This will ensure a smooth entry into the traditional adipic acid market and fulfill demand for those looking to produce nylon with a lower carbon and environmental footprint.

Currently, Zylon is an early stage startup in the technology validation process. Lab trials are currently underway at the Duke Cancer Research Center and led by our CTO, M.D./Ph.D. candidate Bill Diplas, who has worked in conjunction with Zach Reitman, the M.D./Ph.D. who first discovered the enzyme mutation. This research is funded by a grant from the North Carolina Biotechnology Center, and will produce adipic acid in the lab by July 2015.

From there, Zylon is looking to raise $1.2 million in venture funding to refine the production process, line up like minded producers, and begin full-scale test production at a contracted lab. There are ample grants from the federal government, local governments, and biotechnology organizations to cover additional research expenditures that will arise along the production scaling process.

Zylon's current competition includes Verdezyne and Rennovia. Both companies have already raised significant amounts of capital and are in later research phases. However, neither has been able to successfully produce non-petroleum based adipic acid at production scale. Verdezyne and Rennovia are pursuing different pathways that have neither been patented nor accepted by peer-reviewed journals as theoretically possible. If lab trials are successful, Zylon will be catapulted in front of these two companies who have had years to get to market.

There is inherent risk in an early stage startup whose valuable technology is still in the validation stage; the pathway may not function to perfection at this time. While Zylon initially intended on incorporating in the United States for locality purposes, the team is very open to incorporating in China to co-develop with a Chinese partner due to the nature of the nylon market in Asia. On the production side, the process may not lend itself to scaling. If that is the case, additional research funding and time may be required to fine-tune the process, which could jeopardize Zylon's potential place in the market. However, we are confident in our team and technology, and believe that with an initial investment of $1.2 million, Zylon will have a production-ready process to be licensed in the next 5 years.