

"We are developing joint ventures to build and operate bioenergy zones"

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Though VayuGrid's initial projects are in emerging economies, it is seeing increasing demand for projects in developed nations. This start-up has focused its efforts on building bioenergy plantations around VayuSap in markets such as Asia, Africa and the Middle East, besides India. Mr Douglas Peterson, CEO, VayuGrid, in an interview to BioSpectrum's Raj Gunashekar shares more insights about the company's India operations.

How do you see India as an emerging/growing market in the biofuel sector?

The challenge for biofuels has always been finding agriculture solutions that can economically scale without competing or damaging other concerns, be it with food, forests, or marine ecosystems. India being a global leader in oilseed production, along with India's large tracks of unproductive lands, along with India's native plant species that enjoy arid climates and marginal soils, make for the ideal conditions for significant developments in biofuels.

In fact, India has a rich history in biofuels, with biofuels being used for thousands of years for lighting, cooking, and even more recently for operating machinery. There is an opportunity for India to be a leading biofuel producer with biodiesel, green coal, and a carbon sequestration model, and with millions of farmers as beneficiaries.

Tell us something about creating BioEnergy Zones in Haiti? How did it all begin?

VayuGrid's partner for community scale biodiesel refining in India, The BioCube Corporation from Canada, was working in Haiti and introduced VayuGrid to the key players in Haiti. We quickly developed a partnership with Sonamar S. A. who has been working post the recent Haiti tragedies to bring technology and agriculture projects to help accelerate the rehabilitation of the environment and develop opportunities to drive economic growth. Sonamar recently signed an agreement with the Ministry of Agriculture in Haiti for the development of biofuels and has access to significant land in Haiti - both arable and non-

arable.

Jointly VayuGrid and Sonamar developed a plan for implementation of BioEnergy Zones in multiple stages to meet the needs of the Haitian people, environment, and economy.

Do you have any plans in creating BioEnergy Zones in India?

Yes, we just started a project with a mining company in Rajasthan to establish a large BioEnergy Zone as part of their mining reclamation and CSR statutory compliance. Over the next several years we expect this to scale to thousands of acres.

We are also in discussion with several other India mining companies across India, based on the unique properties of VayuSap to remediate the land, produce clean energy, and develop a sustainable platform for jobs to remote communities. Therefore, all the environmental and community compliances are addressed in a financial model that brings 60 years of benefits to the mining operations.

Do you think the concept of biofuels is still at an embryonic stage in India? Explain.

The technology concept is well beyond embryonic as it has been well researched and developed to a commercial scale. Millions of elite biofuel trees are being produced today and government, industry, and non-profits have independently validated the economic, environmental, and social benefits.

The implementations themselves are still embryonic in terms of the scale we expect them to achieve over the next 5 years. For instance, in the mining sector alone, we see potentials of millions of reclamation acres of BioEnergy Zones producing tens of billions of liters of biodiesel, whereas today we are working in the thousands of acres. This is precisely the opportunity since India has the unproductive, unused land assets and the right biofuel platform. If India doesn't take the opportunity, other countries will execute and then there is no turning back.

What are your major challenges in growing energy crops in India?

The two major challenges we face are, first the traditional competition between food and fuel, and second the traditional reliance of biofuels on government subsidies. The VayuSap solution was carefully selected and validated for growing on lands not suitable for food crop, thus avoiding the food vs fuel debate.

Further, VayuGrid has carefully validated the economies of scale of VayuSap through various independent government research and industry. Thus, the model is assured to achieve the profits without subsidies which is a first for the industry.

How can we advance and encourage the use of biofuels in developing nations like India?

Having come from the IT industry, the IT industry flourished in India when there was a strong educational base, a global and open marketplace to which India could quickly participate, and minimal protectionist barriers. Biofuels can similarly flourish when there is education to displace the mis-perceptions, an open and global marketplace to exchange biofuel commodities, and minimal protectionist barriers.

Tell us something about Elite Pongamia (VayuSap) and Pongamia biofuels. How is it different from normal Pongamia?

We look at this both from the technology and the business standpoint.

The agro-technology of VayuSap is based on 25 years of research by our chief scientist, Dr. MVR Prasad in India, Africa, and Central America. He developed elite varieties of Pongamia which have half the gestation period and four times the output as average Pongamia trees. The VayuSap trees will start yielding in year 3 and produce predictable high yield for over 60 years.

The business innovation around VayuSap improves the ability to scale the supply chain through a reduced risk model by linking the downstream demand to the upstream supply through demand agreements. This model de-risks the downstream energy needs by providing a known energy cost, and de-risks the plantation by assuring an uptake on the plantation produce.

Can you explain the environmental friendliness of VayuSap Biofuels?

VayuSap biofuels as an energy source do not increase carbon in the atmosphere because of the unique properties of the VayuSap to perennially produce fuel, to extract both carbon and nitrogen from the atmosphere at very high levels, to avoid the use of chemical fertilizers, and to process into biodiesel without the use of petroleum.

Additionally, the VayuSap biofuels eliminate the sulfur and ash which are released when burning diesel and coal. Thus the atmosphere is significantly improved through VayuSap biofuels as there is a reduction in greenhouse gasses, particulates, and acid rain.

VayuSap also improves the soil while growing the biofuels. The trees are an inclusive species that fix nitrogen into the soil, thus increasing soil productivity. Further, VayuSap is a very effective plant for phytoremediation of mined and landfill soils, and other similar land reclamation projects. The trees will re-establish a natural ecosystem of plants and micro-organisms in the soil while the damaging hard metals are taken up and dissipated through natural means.

How do you intend to work with the Indian rural communities, government and industry in the area of biofuels?

We are developing joint ventures (JV) to build and operate the BioEnergy Zones with all partners having an equity stake in the success of the projects. The rural communities, as JV partners, are key for building and operating the plantations to scale. Government, as a JV partner, provides land and policies and oversight to meet standards of operation. And industry, as a JV partner, provides the capital and demand for the yield of the BioEnergy Zones. Thus all three are critical to the long term success and value generation.

Can you tell us about how you worked with farming communities oilseeds across Karnataka's village?

We have been working with farming communities across Karnataka for over 5 years. We have worked to improve their production of oilseeds through methods developed by Dr. Prasad. We also use rural villages in Karnataka exclusively today for production of our VayuSap saplings. We have found them to be productive and careful in working with VayuGrid as we have scaled over the last several years.

Can you discuss about the 'Triple Bottomline'?

The first bottom line is the economic bottom line, which is the standard bottom line in business. The key for the economic bottom line is to assure that all players in the BioEnergy Zone Value chain - the farmers, processors, investors, etc., all operate at a profit without government subsidies.

The second bottom line is the environmental bottom line, which is the measurable environmental benefits of the BioEnergy Zones. The environmental benefits are measured in the atmosphere, soil, and water.

The third bottom line is the social bottom line, which is the measurable social benefits to the rural communities. The BioEnergy Zones convert unproductive lands to productive land and provide jobs, entrepreneurial opportunities, and equity for over 60 years to the rural communities.

VayuGrid is focusing its efforts on building BioEnergy Plantations around VayuSap in markets such as Asia, Africa and the Middle East. Is VayuGrid only targeting emerging economies and developing nations? If yes, why? What about developed nations who tend to contribute more carbon footprints?

Independent research shows that two-thirds of the increased global greenhouse emissions over the next 10 years is expected to come from emerging economies. Additionally, it has been shown that lack of energy access is a significant inhibitor of growth in emerging economies. So taking action with emerging economies to support the economic growth in a socially responsible model, while at the same time heading off the increased emissions is something that can be accomplished. Therefore, because of these factors many of VayuGrid's initial projects are in emerging economies.

However, VayuGrid also is seeing increasing demand for projects in developed nations. The biofuel blending mandates in the Americas and Europe account for 94 percent of the total biofuel blending mandates across the globe. Biofuel projects are being developed to meet these mandates, while at the same time meeting non-biofuel related targets.

For instance, phytoremediation, organic fertilizers, jobs and other BioEnergy Zone properties in combination make for a multi-dimensional benefit in developed economies similar to emerging economies.

What is the viability of biofuels vs fossil fuels? Can biofuel manufacturing be cheaper than extracting fossil fuels. Discuss.

The costs of extracting fossil fuels continues to increase, as they go deeper in the ocean and to more extravagant processes to extract the oil. Today the fossil fuel extraction costs are approaching US \$30 per barrel. At the same time, the costs for producing biofuels is dropping quickly. For instance, just this year, the cost of the equipment to process vegetable oil to

biodiesel has dropped in half.

Therefore, as the feedstocks, such as VayuSap are becoming more productive, the costs of manufacturing biofuel is also approaching the \$30/barrel. The net result is biofuels are now competing at a level playing field with fossil fuels, so production can scale at a much faster rate than in the past.

Are biofuels/bioenergy here to stay? Discuss.

Biodiesel has grown at an annual rate of 24 percent over the past 4 years and analysts expect it to continue a strong growth rate over the next 10 years. There are blending requirements for biofuels in 52 countries today which will increase the annual demand to over 35 billion gallons of biofuels in the next 9 years. Therefore, biofuels are definitely here to stay. Even if solar and wind energy were perfected to their optimal efficiency, it would not eliminate the need for biofuels.

What are your recent collaborations in India and other countries?

Other than the Haiti project with Sonamar S. A. which we just announced, we have also been doing projects in Ethiopia, Kenya, Zambia, and Kuwait. The Zambia project is being funded by EU countries to develop a template for scaling VayuSap across the region. Kenya has started investing in biofuels to bring jobs and energy. We are also working on new strategic projects in the US and Africa that we expect to announce soon.

How is the future outlook of biofuels in India and other countries? What is the current status of fossil fuel depletion across the globe and how can biofuels be a better alternative?

Biofuel accounts for 5 percent of the global fuel demand today, and we expect it to increase to 17 percent by 2030. In India, domestic fossil fuel production only accounts for 25 percent of the nation's consumption. As part of the national biofuels policy, the Government of India has implemented a blending target of 20 percent by 2017, where it is at 3 percent today. The policy also calls for an approach to develop biofuels which are non-food feedstock and on barren, non-arable lands. Thus, we see significant growth inside of India and across the globe for biofuels.

Are biofuels in competition with other renewable energies like solar, wind, tidal and geothermal?

No, they are not in competition. They are complimentary as a portfolio. Today, there are a variety of fuels - from a variety of fossil fuels, to nuclear and hydro, which serve a variety of energy needs based on application, costs, transportability, and a number of other factors. We expect the same to happen in the renewable energy space, where there will be some application which are more effective for one platform, while some applications will be more effective for others. We welcome all the developments in this space.