Special to Advanced Biofuels USA

Global Survival at a Crossroads

by Larry R. Knight* (Reciclaje Pura Vida for Advanced Biofuels USA)

There are those who would argue that global warming is not occurring. While the evidence suggests otherwise, it would be political and intellectual suicide to argue that our global population is not outgrowing the neighborhood. In the process, the availability of fossil fuels becomes exponentially finite. Indeed, current projections suggest that fossil fuels will be fully depleted by 2050, requiring a replacement well before that. " … biofuels are the only alternative available between now and 2050 for all modes of motor transport." (Renewable Energy Magazine, February 3, 2011). Leaving the global warming debate aside, there is little doubt that another energy source, or a combination of sources, must be developed to ensure the peaceful, unfettered survival of the only planet we have. Global survival is at a crossroads, and the seeds for progress are being sewn in a small, peaceful country known to some as the "Switzerland of the Americas" – Costa Rica.

It is a rare time in human history that government, academia, private enterprise, and individuals can come together for the benefit of humanity. But in Costa Rica, government has provided the incentives for collaboration toward that end, mandating that the local petroleum company, RECOPE, purchase all biofuel produced in Costa Rica. The system is further incentivized by a demand for 1,000,000 gallons per day of biofuel for jet fuel, and by mandates from 127 countries. Only by serendipitous coincidence did Costa Rica happen to be the beneficiary of an indigenous plant ideal for use as a biofuel. It appears that Jatropha Curcas will provide a sustainable contribution to the challenge, with the potential to transform the global economy.

Coffee - One of Costa Rica's biggest export commodities.

Biofuels eliminate the need for multi-million dollar drilling rigs that result in short-term financial gains for a few beneficiaries, while jeopardizing the long-term socioeconomic and peaceful existence of the planet. The biofuels sector spreads the benefits over a broader spectrum while leaving the environment fundamentally intact. Hence, unlike the fossil fuel sector, the benefits don't stop with the investor – they begin with the investor. It is here that biofuel sustainability begins to show its true promise.

These words are excerpted from an article I wrote in early 2012 (with the title "Global Survival at a Crossroads") at the request of the owner a real estate venture in Costa Rica using Jatropha crops as a selling point. The full article was a sales pitch disguised as an opinion piece published in a Costa Rica English language digital news feed, with a modified version run in a biodiesel publication.

Naivete has no doubt been the catalyst of many a frustrated entrepreneur – for me it came in spades. Much of the above, as I was to learn, while not necessarily untrue, was at best wishful thinking sprinkled with rumor and partial truths, designed to tell the truth in the most favorable manner (to sell). But I digress. For the benefit of perspective, let us roll the clock back a few years.

Development of a Vision of Environment and Development

At the professional level, most of my adult life has been marked by entrepreneurial pursuits - some successful, and some not, in small businesses that included hot air balloons, restaurant/bar, home healthcare companies, printing/publishing/graphic design, and various sales and contracting efforts. In 2008, the economic bottom fell out, and after 30 years of chasing the ever-elusive dollar, I had had enough. With one company sold and the other shut down, I returned to college (with my daughter in her third year at the same university) at the ripe old age of 50 years, to complete a bachelor's degree and, most importantly, to get qualified, so I thought, for a "real" job and paycheck.

With a freshly minted Social Science bachelor degree in *Global and Area Studies*, I wanted to secure employment with an international company that would place me in Costa Rica, or at least Central America, preferably in a development capacity. Alas, the prospects for a 50+ year old with one of those nefarious Social Science degrees getting any job in a corporate or international environment are dubious at best, and proved impossible for me. So, back to the entrepreneurial route with little money and big student loan debt.

On the upside, I had a new vision – environment and development – and how it interacted with a global society in a socioeconomic context. This would be the beginning of my quest for a place in this sector as an entrepreneur while also adding to the wealth of a nation that has historically relied on an export economy.

Economic Background

Let us digress again for a brief overview of international economics. At the risk of oversimplifying a complex issue, international economists broadly view nations as either having an import economy, or an export economy. To the extent necessary, the former imports raw materials from other countries to manufacture finished products primarily for domestic consumption, but also for export. These countries tend to be "more developed" socioeconomically. Examples would include many of the European and North American countries.

The latter tend to be countries whose Gross Domestic Product (GDP) relies primarily on exporting raw materials. Examples include many countries in Central and South America. These countries tend to be "less developed" socioeconomically. The downside to an export economy is a stratified economic system featuring little, and most often no, middle class, relatively few jobs, and the jobs that do exist tend to provide low wages. Concurrently, the country ends up relying on imports, and with that, heavy import taxation (ostensibly to generate revenues for government coffers, but more often, enriching the patriarchal families of the country), and usually a good helping of blatant corruption (not that corruption

isn't prevalent in more developed countries, it just goes under a different name – "lobbying"comes to mind), which serve to drive prices up for the poorer class, exacerbating an already difficult situation for the society.

The international community attempts to address the challenge of bringing those less developed countries up the socioeconomic ladder. "Development" is the generally accepted term for that effort. Of course, development isn't just about wages and employment. Indeed, it encompasses myriad other factors, like access to healthcare, quality education, food, water, and a term called "agency". These are the "social" part of "socioeconomic". For the purposes of this discussion, those other factors are beyond its scope, so I will only mention them here and move on. Suffice to say, the theory is that as the economic conditions of a country improve, so too will the social conditions.

One way to facilitate development at an economic level, so this part of the theory goes, is for less developed countries to manufacture products internally with their own resources, primarily for internal consumption, and secondarily for export. If the reason for the dichotomy between less developed and more developed countries is a reliable measure, it would seem the theory is sound. Taking the theory further then, one of the benefits of pursuing development is job creation with better wages, in turn increasing the country's GDP and decreasing its reliance on expensive imports.

Putting Theory into Practice

Costa Rica falls in the "less developed" category. During my aforementioned academic effort, I had the pleasure of studying in Costa Rica for 3-months. That was my first experience with this country specifically, and with a "less developed" country generally. From this experience, my interest in development and international work would blossom.

A short while after graduating, I had the opportunity to return to Costa Rica. While there, I became interested in the biodiesel sector while working with a group in late 2011/early 2012 to develop Jatropha as a viable feedstock. After about 6 months of treading water with that effort, it became apparent the project was going in a direction in which I had no interest. Still intent on staying in biofuels, I returned to the U.S. and joined up with an investment banker who specialized in the energy sector.

This informal alliance (which would have become Veritas Energy Group) envisioned a biodiesel production facility located on a 2500-acre plantation utilizing a cultivar of the Millettia pinnata known as Pongamia pinnata. A few features of this project addressed some key issues - namely food-for-fuel and land-for-fuel. Most important for the long-term viability of the project was that a plantation provided a reliable feedstock source at a relatively stable cost. I would soon learn just how critical this can be.

We had identified a tract of land in Florida that could not be used for growing food, and pongamia seemed a viable feedstock as it is not a food source. Our offtake market would be commercial transportation, military, cruise ship, and aviation. It was intended to be a pilot project which, if successful, would be duplicated on a regional basis. With a $50 million capex, it was an aggressive and risky endeavor - not for the faint of heart. Regrettably, even with my partner's contacts in the financial industry, we were not able to raise the $2 million in seed capital needed, due in part to our mutual lack of biofuel industry-specific expertise, and a lack of financial skin in the game.

With that project mothballed, I was determined to learn the biodiesel business from the ground up, and since nobody was hiring an old man with no industry experience (yes, I applied to many), my options were to get out or buy my way in. Perhaps foolishly (hey, at least I'm consistent), I chose the latter approach.

As fate would have it, I located a small biodiesel processing facility in Costa Rica that happened to be for sale. A biodiesel business located in Costa Rica also lent itself to my other desire to get involved in international development work on an informal basis by having a facility that created products for internal consumption, not to mention jobs. To that end, driven by blind desire and a lack of proper due diligence, I dove in head first, purchased the facility (for what turned out to be way too much) packed my bags, and with my wife, a Golden Retriever and two cats, embarked on a major life change and another learning process. The train tracks are vibrating.

That Ominous Light at the End of the Tunnel

Learn I did. It sure seemed like a good idea at the time. The original team consisted of myself and three other investors who would provide operational assistance.

As it was a small project, I didn't formalize too much of that effort, leaving me open to problems.

The first one involved moving forward on the project without the other partners' money in the bank. After committing to the purchase, investors and investment money disappeared, leaving me holding the bag on most of the purchase. The project, with full funding in place from all players, was marginally capitalized to begin with, so this unanticipated development didn't help the situation in any favorable direction. I will leave the resulting avalanche of financial problems, which persist to this day, to the reader's imagination. Suffice it to say, the problems started with day one. I can now see the oncoming train.

Operationally, the inability to fund sufficient feedstock and production supplies to establish a respectable inventory to sell, even if I could find a market, marked my second view of the oncoming train. With a production capacity of about 150,000 gallons per year, the plant is small by industry standards, limiting my ability to achieve any type of viable economies required to serve a large market sector – train view number 3. As it turns out, there isn't a large market in Costa Rica, so that hasn't been an issue – view number 4.

The biodiesel processing facility.

In addition to capitalization challenges, my capabilities are further hampered by regulatory and cultural issues that inhibit legal viability for small companies (The result of engrained patriarchal systems? Thank you, Spain.), high cost of doing business in Costa Rica, coupled with a lack of a viable offtake pipeline and myriad other challenges. I can now hear the train.

None of those challenges are insurmountable, but all take time and money to surmount.

Oh, and did I mention that it is illegal to sell biodiesel as a fuel due to the national petroleum company monopoly?

So, it has been a learning experience, and that's being diplomatic. Looks like a big train as it rounds the bend. On the upside, I did learn how to produce biodiesel. More important, I am getting a handle on the Costa Rican market and cultural business climate. To the extent I have been able to produce biodiesel, I have used waste vegetable oil (WVO) as the feedstock. It was at first not economically feasible to purchase palm oil, an abundant commodity in Costa Rica. When the international price tanked, I found it impossible to find a palm processing facility that would sell to me, in part due to an unspoken, but nevertheless, ever-present prohibition on using palm oil for biodiesel, and, I suspect, my small uptake needs. In an ironic twist, I could have imported palm oil from Malaysia, China, or India, but that would have been like importing petroleum into an oil rich country like the U.S. – oh, wait ….

Taking the road less traveled.

Exacerbating the feedstock issue, it just so happens that WVO is mixed with animal feed to feed livestock in Costa Rica, and there are a few companies with large diesel fleets producing their own biodiesel from WVO. The upshot is WVO is in high demand in Costa Rica, making it expensive for this gringo who didn't know anyone. Onward I go for the feedstock holy grail, seeking out other potential supply sources. That train is getting louder.

I have looked for various alternatives, including hemp oil. Like every commodity, hemp oil also follows the laws of supply and demand. The demand for hemp oil is high in the food sector, for which the revenue potential is also high relative to the potential for use as a fuel (the bane of the biodiesel industry).

While biodiesel can be made from expired and/or waste hemp oil, the prices I am finding even for that are beyond the reach of the biodiesel sector. The only possible exception would be a military market that is willing to pay a premium price. But even that market is questionable based on the pricing that I have found, and since there is no military in Costa Rica, it would require exporting, driving the price up even further. Besides, I think it is only the U.S. military that pays too much for everything it buys.

I suspect the potential for using hemp oil will succumb to the same economic forces to which the promise of algae as a biofuel fell prey. Perhaps this may change over the long-term as more countries legalize hemp and supplies increase, but for now, hemp oil does not appear to be an economically viable option for biodiesel.

Can Theory, Practice and Experience Earn Results in 2017?

Fast forward to April of 2016, the train is precariously close. Circumstances find me returning to the U.S. with my tail between my legs, scrambling to support myself, my wife, and now the debt from not only student loans, but also from financed biodiesel equipment, and the remnants of what business I could drum up in Costa Rica biodiesel sales.

Fortunately, in the interim, I was introduced to, and have developed wonderful personal and business relationships with, a couple of well-connected and intelligent Tico's (Costa Ricans), one of whom is very familiar with the biodiesel production process and has an inroad to inexpensive, and sometimes free WVO. In a couple cases, he is getting paid to remove the WVO. The other has those ever-critical industry and government contacts. They have lived the daily struggles of surviving and doing business in Costa Rica and have been incredible assets and instrumental in my ability to hang on to the company.

While I hang on by a thread as of this writing in April 2017, there are new developments happening in Costa Rica that may change the dynamic for biodiesel. Making business predictions of any kind in Costa Rica is a dubious proposition in the extreme, but things are looking better for those with the contacts, market knowledge, and resources to ensure a viable intake/offtake pipeline.

It appears there will soon be a viable offtake pipeline vis-à-vis the country's petroleum monopoly – yes, the same one that makes it illegal to sell biodiesel.

While specifics are being worked out, and there is an election coming up, and yah-da-yah-da, the upshot is that the monopoly, because of its hydrocarbon mandate, will have to purchase biodiesel from private companies to meet a new blending mandate. Considering the sheer volume of diesel used in the country as a percentage of the petroleum sales, the challenge will be meeting the demand, no matter what the blending mandate turns out to be. There is a substantial opportunity, and challenge, especially for feedstock supplies in this small country. I foresee a feeding frenzy.

Being in the right place at the right time with the right resources is key to the success of any business. Perhaps I am now in the right place, at the right time, but there are many fish vying for the exulted supplier position, most of which are much better connected and financed than I am. That said, the plan is to keep swimming upstream with the resources I do have and get a place in the pond with the big fish. It might be a new train, or I might be on the right track. Can't be sure, but we'll see if this old entrepreneur is able to apply lessons learned and stay ahead of this new train.

In the meantime, our global survival still awaits our response.

** Larry Knight, a biodiesel entrepreneur in Costa Rica, has agreed to share his story with Advanced Biofuels USA, including the ups, downs, the optimism, pessimism, lessons learned, idealism and perseverance that, although unique, also reflect the experiences and purpose of many in the biofuels world who, not content to just talk, dedicate themselves to action to improve the condition of the Earth as best they can. (photos by L Knight)*