Dr. Kiran C. Patel Center For
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"Expanding Local and International Alternative Energy Sales: The Prospects for Small Businesses in Florida"

By

Bradley S. Porter and Alexandria Andrews

Student Team placed at AES Panamá

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The Alternative Energy Backdrop

Prior to the recent U.S. financial crisis, alternative energy appeared to be making headway amidst the traditional hydrocarbon incumbents. "After decades on the fringe," said a mid-2008 Reuter's article, "solar power is closing in on America's mainstream as surging fossil fuel prices and mounting concern over climate change spur states, businesses and homeowners into a quickening embrace with alternative energy."[1] Biofuel developments also looked promising. "The Americas already account for 80% of world biofuel production, most of which comes from Brazil and the United States," noted the Council on Foreign Relations.[2] And some thought that with greater U.S./Latin American collaboration, progress could only increase.[3]

However, the U.S. financial crisis soon hit, and the alternative energy outlook changed dramatically. "Dark Days for Green Energy," read the headline of a February 2009 *New York Times* article. It outlined the fact that America's now faltering banks, that had previously invested in solar and wind projects because of substantial government tax incentives, would no longer be able to maintain their financial commitments.[4] As a result, "Wind and solar developers [were] left starved for capital," says the article.[5] Less capital led to reduced production, fewer sales and installation, and ultimately layoffs. Furthermore, an overabundance of both solar panels and wind turbines surfaced, as cash-strapped consumers found themselves less capable of buying alternative energy products.

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[1] "As Energy Costs Soar, US Looks to Solar," *Reuters*, June 6th, 2008, <http://classic.cnbc.com/id/25002911/?site=14081545>, accessed June 15th, 2010

[2] Hanson, Stephanie, "Biofuels in the Americas," Council of Foreign Relations podcast, June 8, 2007, <http://www.cfr.org/publication/13550/biofuels_in_the_americas.html>, accessed June 17th, 2010

[3] Philippidis, George, "Energy Security Achievable with Biofuels Made in the Americas," *Ethanol Producer Magazine*, Aug. 2008

[4] Galbraith, Kate, "Dark Days for Green Energy," *The New York Times*, February 3rd, 2009, <http://www.nytimes.com/2009/02/04/business/04windsolar.html>, accessed June 15th, 2010

[5] Ibid.

Biofuel producers were similarly hard hit. Because both businesses and individuals were pinched on finances, they reduced their fuel consumption, resulting in lesser demand for oil, lower oil prices, and ultimately less viability for the biofuel industry, which had hedged its bets on an entrenched high oil price (one that reached $145 a barrel during the summer of 2008).[6]

There was hope that President Obama's economic stimulus package – particularly its distribution of monies towards the development of green jobs – could revitalize the industry. *New York Times* columnist Thomas Friedman believed the money would effectively kick-start the alternative energy industry and allow "E.T." (Energy Technology) products to be sold all over the world.[7] Regrettably, however, these realities have yet to effectively materialize, and low gas prices remain a large challenge to the industry.

To get back into the game, a coalition of labor, business, environmental and community leaders known as Apollo Alliance recommends that, "The U.S. should pass comprehensive clean energy and climate legislation, sending a signal to clean energy businesses that there is a long-term domestic commitment to cleaner technologies. Such measures should create substantial and long-term demand for clean energy products and might include putting a price on carbon or adopting a strengthened national renewable energy standard…"[8] They also call for direct financial assistance from the federal government, in the form of several programs: $30 billion in loans from the Investments

[6] Krauss, Clifford, "Ethanol, Just Recently a Savior, is Struggling," *The New York Times*, February 11th, 2009, <http://www.nytimes.com/2009/02/12/business/12ethanol.html?scp=19&sq=&st=nyt>, accessed June 15th, 2010

[7] Friedman, Thomas L., "And Then There Was One" *The New York Times*, Sep. 2, 2008, <http://www.nytimes.com/2008/09/03/opinion/03friedman.html>, accessed June 17th, 2010

[8] "Winning the Race: How America Can Lead the Global Clean Energy Economy," Apollo Alliance, pg. 12, March 2010, <http://apolloalliance.org/wp-content/uploads/2010/03/wtr3-2010final.pdf>, accessed June 17th, 2010

for Manufacturing Progress and Clean Technology (IMPACT) Act, designed to help small and medium-sized businesses attain energy efficiency and develop clean energy component parts; the expansion of the Advanced Energy Manufacturing Tax Credit to $5 billion; and finally, additional investment into alternative energy jobs training.[9] These spending programs may indeed help the development of alternative energy products and services in the United States. The only problem with ongoing government assistance, however, is when it is the primary impetus carrying the industry. According to *The Economist*, "[today's] green-energy industry is still policy-driven rather than market driven."[10] The United States is wise to keep investing in alternative energy. However, the most important policies the government can implement are those that will both encourage private investment and at last successfully integrate the alternative energy industry into the market.

Objective in Panama

It is within this context that the University of South Florida sent small student teams to both Panama and the Dominican Republic to seek out alternative energy opportunities abroad (while domestic efforts and policies mentioned above continue to be crafted). The goal was to identify international markets where small business in Florida could export their alternative energy products and services. To carry this out in Panama, students were placed within the country's Secretariat of Energy; the International Center for Sustainable Development (CIDES), located within the City of Knowledge (former location of the U.S. military base); and finally, Applied Energy and Services (AES)

[9] Ibid.
[10] "Green-energy Blues," The Economist, June 1st, 2010, <http://www.economist.com/node/16245724?story_id=16245724>, accessed June 17th, 2010

Panamá, a subsidiary of Arlington-based AES Corporation that specializes in the generation of hydro-electric power.

This paper was written by the two students placed at AES Panamá. It first describes Panama's general energy market, with an emphasis on the electricity sector, and its potential for expansion. This is followed by detailed analyses of the country's hydroelectric, solar, wind, geothermal, and biofuels developments. Small alternative energy business owners are kept in mind throughout the entirety of the paper, and opportunities to these businesses, when they exist, are outlined. Although the paper concludes that Panama currently holds few opportunities for small businesses in Florida, various positive developments are explained, and a final opinion is offered on how this student team believes the alternative energy industry can further development within the state of Florida.

Panama's Energy Market

In order to know the alternative energy market in Panama, it is first necessary to understand the general structure and state of the electric market. Since 1990, the energy market has been defined by a rapid growth in consumption (5% per year), a limited diversification of the primary energy demand, and a growth in petroleum derived products (5.8% per year)[11]. Currently, the energy used for electricity in Panama is represented by 51.7% thermal plant (fossil fuel) generation and 48.3% hydroelectric generation.[12] However once transportation is taken into account, total energy use is represented by a startling 85.4% from petroleum derivatives, 14.4% from hydroelectric

[11] Secretaria Nacional de Energia, *Plan Nacional de Energia 2009-2023*, pg. 37, May 2009
[12] AES presentation, "Panama's Electric Market", April 22nd, 2010

and .2% from other sources.[13] As a point of reference, the U.S.'s total energy consumption for 2008 can be broken up as follows: 37.1% petroleum derivatives, 23.8% natural gas, 22.5% coal, 7.3% renewable energy (including solar, geothermal, wind, biomass, and hydroelectric) and 8.5% nuclear energy.[14] Although Panama has shifted to renewable energy (namely hydroelectric) faster than the U.S. in terms of total percentage, Panama's deficiency in energy diversity must be addressed, especially with regards to petroleum dependence, in order to keep it from experiencing economic and environmental vulnerability.

Prior to 1997, the electricity market was owned and operated entirely by the state-owned company Instituto de Recursos Hidráulicos y Electrificación (IRHE). By the end of 1997 the International Finance Corporation was helping Panama take steps towards the privatization of their electric industry and by 1999 the process was complete. The four generators that had been owned by the government were sold as follows: 49 % of EGE Bayano and EGE Chiriquí were sold to AES Corp, 51% of Bahia las Minas was sold to Enron International, and 49% of Fortuna was awarded to a conglomerate of Coastal Power and Hydro-Quebec, with the government maintaining the balance of the equity in all cases. [15] In addition to the partial sale of the four generators, the sole transmitter became state-owned Empresa de Transmision Electrica, S.A. (ETESA), the prime Panamanian company involved in domestic and international interconnection. Finally, the three distributors who won the new bid to sell electricity to the general public were

[13] Secretaria Nacional de Energia, *Plan Nacional de Energia 2009-2023*, pg. 12, May 2009
[14] Energy Information Administration "Figure 2.0" *Annual Energy Review 2008* <http://www.eia.doe.gov/emeu/aer/pdf/pecss_diagram.pdf>, accessed June 20th, 2010
[15] International Finance Corporation, "Panama: Instituto de Recursos Hidraulicos y de Electrificacion", December 2008, <http://www.ifc.org/ifcext/psa.nsf/AttachmentsByTitle/PPPseries_IRHE/$FILE/CIA_PPPseries_IRHE.pdf>, accessed June 16th, 2010

EDEMET, EDECHI and Elektra Noreste, each specific to a geographical region in the country. Along with about 8 other smaller distributors that have arisen since the privatization of the industry, the above-mentioned companies compose the entirety of Panama's electric market.

With the demand for energy growing the way it has been in Panama, some of Panama's generators have begun new projects to raise the shrinking margin between total energy demand and total energy availability. AES, for example, is in the process of creating another hydroelectric plant, Changuinola I, in the Chiriquí region. Once completed, it will add an additional 223 MW of power to the electric grid, giving AES a leading market share with an estimated 30-35%. It will also be the first plant over which AES has 100% ownership. [16] Along with this project, as many as fourteen other small hydroelectric plants between 9 and 86 MW as well as two thermal plants (34.4 and 150 MW) are expected to start operation within the 5 year period of 2009- 2014. This electricity expansion will add a total of 917.8 MW, a figure representing 50% of the current maximum demand. As a point of reference, Panama's current installed capacity is 1858.04 MW.[17]

The overarching entity that controls the electricity market in Panama is the Centro Nacional de Despacho (CND). It is responsible for regulating energy distribution based on the auditable cost of production. The normal order of dispatch for hydroelectric is run-of-river plants followed by reservoir plants. The markets in which electric units are sold are the contract market and the spot market. The contract market is the market for energy capacity between generators and distributors in which distributors are required to sell

[16] AES presentation, "Panama's Electric Market", April 22nd, 2010
[17] AES presentation, "Presentacion Mercado", May 26th, 2010

electricity to meet 100% of the demand of the final consumers but are also allowed to self-generate up to 15% of their requirements. This suggests the potential for alternative energy production that could be sold back to the grid. In the spot market, prices are higher since it relates to supply based on hourly demand and short-term marginal costs. During any hour of the day, the price of electricity can be calculated using three steps. First the CND determines the quantity of physical dispatch in a given hour. Then the contracted energy is sold at its contracted price. Lastly, any excess (or shortfall) of energy is sold on the spot market at a set price for that hour (based on the most expensive plant called on to generate at a given time). [18]

Due to the structure of the contract market and spot market, the percentage breakdown of the final price of electricity to the consumer is allotted as follows: 63% to the generator, 3% to ETESA, and 34% to distributors. This rough percentage breakdown is seen in the data from the first semester of 2010 for the final price of electricity. The average price for the first six months was .17947 B /USD per kilowatt-hour. Of this amount, $.1171, or more than half, goes to the generators, $.0399 goes to distribution, $.0104 is for transmission, and $.0121 is lost. One of the goals of some current electrical projects is to reduce the electrical losses along the way.[19]

Electrical Interconnections

In an ever-globalizing world, collaboration between nations on many different levels is becoming increasingly important for maximizing development and creating 'win-win' situations between countries. For smaller nations with fewer resources this is

[18] Ibid.
[19] AES presentation, "Panama's Electric Market", April 22nd, 2010

especially important. There are two interconnection projects developing right now that are sure to affect the price and efficiency of the electricity market in Panama and the region. They are Sistema de Interconexión Eléctrica de los Países de America Central (SIEPAC) and Interconexión Eléctrica Colombia Panama (ICP).

SIEPAC, which is the electrical interconnection between the six Central American countries of Nicaragua, Honduras, El Salvador, Guatemala, Costa Rica and Panama, is scheduled to draw to completion in approximately one year, despite having been held up by a lack of sufficient investment in Costa Rica.[20] The operations of SIEPAC are overseen by Empresa Proprietaria de la Red (EPR) which is a network of the transmission companies from each of the participating countries. The majority of the investment needed for this project ($495 million) has been funded by the International Development Bank (IDB) and CABEI, a Central American open-ended investment fund.[21] One way for small businesses in Florida to expand financially could be simply through investing in alternative energy projects. The construction of the project has contributed to social sustainability by creating 1,100 jobs, generating $20 million of tax revenue and planting 200,000 trees along the way. The connection will initially allow 300 MW to be transmitted from south to north and vice versa. The creation of these interconnecting power lines and stations will allow countries who are producing a surplus of energy at certain times to sell their electricity to consumers from neighboring nations who are at high points of demand or who can purchase it cheaper than they can within their own country. With this new international market, the cost of energy distribution

[20] Conversation with Ricardo Quijano at the Secretariat of Energy, June 3rd, 2010
[21] CABEI Central American Fund, <http://cabei-ca-fund.com/index.php?/about/>, accessed July 6th, 2010

could be lowered by 20% and Central America will be inching towards creating economies of scale within the electric sector.[22]

Similarly, ICP has been in the process of being negotiated since 2001 and is expected to begin construction of its 614 km connection by the end of this year and finish in 2014. Like SIEPAC, ICP is anticipated to have a 300 MW capacity in the first stage, and eventually a possible 600 MW capacity.[23] Panama consumes 98% of its current electric capacity and has no room for error (or maintenance) without potential shortages,[24] while Colombia has a much larger (and growing) margin between consumption and capacity. This connection will thus allow Colombia to supply Panama during peak demand and afford Panama a margin of error in the event of capacity diminution. Additionally, this affords Colombia market expansion opportunities, and Panama is given lower prices than it is able to generate internally.

Like most projects, ICP has faced numerous obstacles and points of debate along the way. The main unresolved issue has to do with an approximately 40-kilometer stretch between Colombia and Panama that has very stringent environmental standards protecting the famous Darien rainforest. Currently, ICP is discussing a first-ever submarine route to avoid terrestrial degradation.[25] Once finalized and completed, this interconnection will actually link the electricity markets of South America to those of Central and North America. This electrical integration will favor the economic development of Latin America.

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[22] SIEPAC website, <http://www.eprsiepac.com/descripcion_siepac_transmision_costa_rica.htm >, accessed June 23rd, 2010
[23] ICP, "Caracteristicas del Proyecto," pg. 1
[24] Winner, Don, "Electric companies Fear General Shortfalls" February 9, 2006 <http://www.panama-guide.com/article.php/20060209080810413?query=hydroelectric+>, accessed July 9th, 2010
[25] Presentation by ICP, "Proyecto Interconexión Eléctrica Colombia-Panamá" June 2010

The future implications of the two above-mentioned interconnections are relevant to businesses interested in exporting to Panama as they could either hinder the need for alternative energy sources or, on the flip side, they could expand opportunities through electrical collaboration with other countries.

Hydroelectric Power

With consideration to alternative energy, Panama has developed extensively in hydroelectricity but has barely tapped into solar, wind, geothermal, or biofuels. A country normally optimizes when it works with the geography and natural resources it has been given; and Panama, as one engineer put it, has been given rivers. Whatever else that could possibly be converted into electricity has for the most part been ignored, either because of high costs of exploration and technology or because there is not a sense of a dire need to expand the renewable energy market.

Currently, there are ten hydroelectric plants varying in capacity from just 675 kWh up to 284 MW.[26] The U.S. Corporation AES owns four of the five large hydroelectric plants, and therefore holds the largest market share in the industry. With their fifth plant, (Changuinola I) in production, they will soon be set to generate a total of 704.96 MW between 5 plants.[27]

With estimated total hydroelectric potential for Panama at 3282 MW and only about 25% of that utilized at the present date, the expansion of hydroelectricity is a trend that will continue to be seen for years, or perhaps decades to come.[28] There is push for this development both from the government and businesses due to hydroelectric plants

[26] Secretaria Nacional de Energia, *Plan Nacional de Energia 2009-2023*, May 2009, pg. 49
[27] AES presentation, "Panama's Electric Market", April 22nd, 2010
[28] AES presentation, "El Desarrollo de Centrales Hidrolicos en Panamá," received June 2010

having greater appeal than thermal plants. Hydroelectric plants are renewable, cleaner, more efficient, and most of all, that they are cheaper. By 2015, the ratio of thermal plant generation to hydroelectric generation will go from 5:5 to somewhere around 1:9.[29] Overall, hydroelectricity is a business that Panama knows well, and with respect to project development, there seems to be little they are lacking.

Solar Energy

One of the most globally available and nonexpendable resources for energy generation is the sun. Its annual output to Earth could produce enough energy to fulfill the entire world's electricity demands 15,000 times. In the tropics between 4 and 6 kWh of energy falls on each square meter every day. In Panama, this number is, on average, 4.8 kWh/ day. [30] Although Panama's proximity to the equator may seem to make it an appealing candidate for solar energy development, its annual climate typically includes 9 months of rain and clouds and only 3 dry months.[31] Solar energy is produced in two forms: thermal solar power, which functions to solely produce heat, and electric solar power, which generates electricity through photovoltaic (PV) devices. A new law that is currently being discussed in Panama, (La Ley de Normas de Construcción para Edificios y Viviendas), will aim to have new buildings designed for the use of solar energy to heat water. Additionally, this law would prohibit both public and private swimming pools from being heated by electricity from petroleum-derived products. If eventually passed, this law could create a new demand for solar energy. In a country that has only a few

[29] Ibid.
[30] Secretaria Nacional de Energia, *Plan Nacional de Energia 2009-2023*, pg. 74, May 2009
[31] Central Intelligence Agency, "Panama", *CIA World Factbook* <https://www.cia.gov/library/publications/the-world-factbook/geos/pm.html>, accessed July 9th, 2010

solar companies with a very small market this orchestrated demand could cause the need for solar components to be imported from abroad.

With regards to the extension of PV solar cells in Panama to be used for electric production, the market is far from favorable. Coupled with the aforementioned climate conditions that would cause inconsistency throughout the year, the exceptionally high price of PV solar cells in comparison to other renewable sources are the principal reasons why businesses are so quick to dismiss it.[32] Although the government is able to subsidize electricity to consumers who use less than 500 kWh per month through employing some of the taxes paid from generators, it cannot afford such luxuries as subsidizing the steep costs of purchasing and installing PV solar cells.[33] Until the price of this technology falls, Panama will not have the means or desire to consider electrical solar power.[34]

Wind

Wind energy development in Panama had not been a topic of discussion until fairly recently. In 2008, twenty licenses were granted to conduct preliminary feasibility studies for wind energy, and most of these were carried out in the provinces of Colón, Coclé, Veraguas, and Chiriquí.[35] During the process, wind maps were created that showed where the wind is strongest, as well as where it is most consistent on a daily and annual basis. Other factors that were considered in this process and that help determine total potential of megawatt production were discovering and analyzing the exact locations

[32] Secretaria Nacional de Energia, *Plan Nacional de Energia 2009-2023*, pg. 20, May 2009
[33]Winner, Don, "President Ricardo Martinelli Taking on the Power Companies" August 24th, 2009 <http://www.panama-guide.com/article.php/20090824151618130?query=hydroelectric> accessed June 24, 2010
[34] Conversation with AES Panamá Corporate Affairs Director, Humberto A. Gonzalez, AES Panamá headquarters, June 24th, 2010
[35] "Panama promotes Eolian Energy" *Inside Costa Rica*, <http://insidecostarica.com/dailynews/2008/august/20/reg01.htm>, accessed June 25th, 2010

of wind valleys, the land area, the topographic conditions, the direction and speed of wind etc.[36] The firm Lahmeyer International gathered much of the information that details the country's geographic capability of having wind energy. From this information it was decided that project development would only be considered in areas with wind speed of 6.5 m/s or more. Also excluded from development are locations that are designated protected forests, reservations, national parks, military land, and areas too far from or inaccessible to the electric grid. With all of these viability classifications, the total disposable land for wind energy production is 897.61 km^2.[37]

A consortium of companies including Wind 7 AG from Germany and Panamanian Aerogeneradores Cerro Azul Ltd has looked into developing a 200 MW wind project in Colón with an estimated cost of $400 million. A plan for the actual construction of this project however has not begun. The only project that currently has momentum is the Toabré project by Spanish company Fersa. It is expected to bring up to 225 MW to the grid by 2011.[38] Because of the attractiveness of this particular area's wind consistency, other companies such as Innovent, Union Eolica Panama, and 3E are looking at the sites near Fersa's to expand the wind park.[39] In years to come, wind energy will be Panama's largest and most viable renewable resource after hydroelectricity. However, for Florida companies to compete in this segment they will need to have considerable scale in their operations to be cost competitive. Additionally, American companies should expect to have to partner with a Panamanian company in order to receive a concession.

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[36] Secretaria Nacional de Energia, *Plan Nacional de Energia 2009-2023*, pg. 73, May 2009
[37] Ibid., pg. 74
[38] Fersa, "Portfolio in the Rest of the World", <http://www.fersa.es/index.php?leng=en&id=14&id_submenu=73>, accessed July 9th, 2010
[39] ETESA document, "Parque Eolico Penonome y Anton" received June 22nd, 2010

Geothermal Energy

World Bank energy experts Magnus Gehringer and Fernando Lecaros say that, due to the existence of two large, adjacent tectonic plates located below the surface of Central America, there is a huge potential for geo-thermal energy within the region.[40] Gehringer believes this potential to be around 4,000 MW, and Lecaros says that by 2013, the figure could be as high as 13,000 MW.[41] Lecaros does admit that the potential is still largely unknown, however, and that estimates are still being conducted. [42] El Salvador is seen as having the largest potential, followed by Nicaragua, Guatemala, and Honduras.[43] The long volcanic ridge traversing Nicaragua's Western coast offers a series of extraction opportunities. For example, Nicaraguan locations El Hoyo-Montegalan, Masaya-Granada-Nandaime, Tipitapa, Ometepe, and Managua-Chiltepe are all said to have potential, and are currently within the exploration stage. San Jacinto-Tizate and Momotombo Volcano, on the other hand, are already in the production stages and currently generating 9 MW and 32 MW, respectively.[44]

However, despite Central America's large geothermal potential, it is currently producing only around 500 MW, says Gehringer.[45] Much of this is due to the inherent financial challenge faced by all would-be geo-thermal producers. "Geo-thermal requires

[40] Magnus Gehringer and Fernando Lecaros, World Bank Conference, "Retos y oportunidades del sector energético en los paises del SICA," Panama City, Panama, May 25th, 2010
[41] Ibid.
[42] Ibid.
[43] Xiaoping Wang and Fernando Lecaros, World Bank Conference, "Retos y oportunidades del sector energético en los paises del SICA," Panama City, Panama, May 25th, 2010
[44] Ernesto Martinez Tiffer (Executive Director of Nicaraguan electricity company ENEL, World Bank Conference, "Retos y oportunidades del sector energético en los paises del SICA," Panama City, Panama, May 25th, 2010
[45] Magnus Gehringer, World Bank Conference, "Retos y oportunidades del sector energético en los paises del SICA," Panama City, Panama, May 25th, 2010

a lot of investment up front," says Lecaros, "at least 12% to 13% of your total cost."[46] Lots of initial activities have to be carried out as well. "Three to four years of 'calibrating' have to be done first before production," he says.[47] This raises important questions about how to pay for these start-up costs. According to Lecaros, three distinct models, or methods for payment, exist in Central America today. Costa Rica holds the state model, which directs the state to develop the resources and takes all of the risks associated with development. In effect this puts public, rather than private capital at risk. In contrast, Nicaragua, Guatemala, and Honduras utilize a private model that asks private companies to assume the risks. El Salvador has a public participation model, in which the state holds some ownership (as well as risk), but not all. It could be said to be a mixed public/private model.[48]

As for Panama, it, along with Costa Rica, holds the least amount of potential for the region's geo-thermal energy production.[49] J. Enrique Tellez, a Senior Trade Specialist at the U.S. Embassy in Panama, goes so far as to say that, "Geothermal is out of the question in Panama," because, he says, "There are no volcanoes."[50] However, Panama Secretary of Energy, Mr. Juan Manuel Urriola, puts it differently: "We have been lagging in geo-thermal energy," he says, "[but] we're moving forward with it, with some 30 MW."[51] Indeed, according to ETESA, the aforementioned electric transmission company, Panama's mountainous Valle de Antón region shows significant potential for

[46] Fernando Lecaros, World Bank Conference, "Retos y oportunidades del sector energético en los paises del SICA," Panama City, Panama, May 25th, 2010
[47] Ibid.
[48] Ibid.
[49] Ibid.
[50] Conversation with Senior Trade Specialist J. Enrique Tellez, United States Embassy in Panama, June 9th, 2010
[51] Juan Manuel Urriola, Secretary of Energy (Panama), World Bank Conference, "Retos y oportunidades del sector energético en los paises del SICA," Panama City, Panama, May 25th, 2010

geo-thermal energy production.[52] However, assessments in the form of geophysical, geochemical, and geo-volcanic studies must still be conducted. Interestingly enough, Panama began these studies over ten years ago. However, according to ETESA, Panama's Autoridad Nacional del Ambiente (ANAM), or National Authority for the Environment, put a stop to them.[53] Additionally, the local Valle de Antón population continues to raise concerns over geo-thermal electricity generation. They do not wish to see extensive studies and large production projects interfere with their consistently successful tourist industry.[54]

Biofuels

Panama's biofuels industry, like many of the others mentioned thus far, is a relatively nascent one, and is still in the beginning stages of its development. According to a 2007 study by the United Nations Economic Commission for Latin America, "the Panamanian agro-industry would have difficulty expanding enough to make ethanol production feasible."[55] This is primarily because Panama's sugar industry is so small. At the time, "The Panamanian sugarcane industry [was] the smallest in Central America," and even declining, says the landmark Inter-American Development Bank (IDB) biofuels report, "A Blueprint for Green Energy in the Americas."[56] The country's legal and regulatory framework for biofuels was also relatively absent earlier within the decade, as demonstrated by the same report in the passage below:

[52] ETESA PowerPoint, "Plan de Expansión – Energía Renovable," date unknown, received on June 25th, 2010
[53] Ibid.
[54] Conversation with Empresa de Transmisión Eléctrica (ETESA) employee, Jorge Fisher Miller, Technical Director of Planning, ETESA headquarters, Panama City, Panama, June 25th, 2010
[55] Garten Rothkopf, "A Blueprint for Green Energy in the Americas," Inter-American Development Bank, 2009, <http://www.gartenrothkopf.com/publications.asp>, accessed May 17th, 2010
[56] Ibid.

> "Due to an underdeveloped agroindustry and a lack of political will, Panama has not yet proposed enforceable biofuels legislation. In October 2002, draft legislation was introduced that would have prohibited the use of MTBE (a gas-additive with negative environmental effects) and required that all automotive gasoline contain at least a 10% bioethanol blend utilizing ethanol produced from renewable sources in Panama. A provision of the legislation stated that the percentage of bioethanol used in gasoline would not be treated as fuel and, as such, would not be taxed. The Legislative Assembly did not consider the tax exemption feasible and, as a consequence, the project failed. While the Assembly agreed that there should be no restriction on the use of ethanol as an additive, the package was deemed too ambitious."[57]

Only recently has new legislation been introduced, prepared by Panama's Secretariat of Energy. "Ethanol will be a reality in 2012," reads the headline of a recent article from the Panamanian financial news publication, *Capital*, which describes the legislation.[58] The new bill calls for an ethanol/gasoline blend of 5% ethanol and 95% gasoline, with future plans to gradually increase the ethanol side of the ratio to 7% and eventually 10% by 2015.[59] [60] These mixes, as well as the provision of permits, will be controlled by the creation of a new regulatory body.[61] As for the stepped process of increasing biofuel percentages within blends, it mirrors the overall bill, which itself plans for the production and sale of biofuels in stages; for example, attention will first be devoted to bioethanol, followed by biodiesel, and eventually biogas.[62]

The entire process is being helped along by the Brazilians, who have collaborated with the Panamanians for the past three years – recent meetings have taken place with

[57] Ibid.
[58] Casorla, Migdalia, "Etanol será una realidad en 2012," *Capital*, May 17th – 23rd, 2010, <http://www.capital.com.pa/cf_archivo/2010/mayo/23/economia2374110.html>, accessed June 21st, 2010
[59] Ibid.
[60] Conversation with Ricardo Quijano at the Secretariat of Energy, June 3rd, 2010
[61] Casorla, Migdalia, "Etanol será una realidad en 2012," *Capital*, May 17th – 23rd, 2010, <http://www.capital.com.pa/cf_archivo/2010/mayo/23/economia2374110.html>, accessed June 21st, 2010
[62] Ibid.

Petrobras Biocombustibles; Rio de Janeiro's Military Institute of Engineering; Brazil's National Agency of Petroleum, Natural Gas and Biofuels; their Ministry of Mines and Energy; and their Ministry of Foreign Relations.[63] Assistance has been given in the form of technical legal support, specifically through revision of the biofuels bill; advice regarding policy-implementation; and additionally, advice concerning the incentives and benefits that are associated with biofuel promotion, development, and use.[64] Finally, Brazil's own sugarcane-derived ethanol will be imported and sold to Panamanian consumers while Panama works to develop its own means of production.[65]

Regarding another business opportunity for both Panama and Brazil, there had once been talk of using Panama as a "stop-over" for the transport of Brazilian ethanol. As stated by the aforementioned IDB report, Panama could "capitalize on its strategic location and become a biofuels hub, providing final processing and exporting services for Brazil and other renewable energy exporters."[66] With this arrangement in place, Panama could garner profits from the import/export process, and Brazil could potentially benefit from a pending U.S. – Panamanian free trade agreement, or even the Caribbean Basin Initiative (CBI). For example, a Panamanian biofuels hub could create an avenue for Brazil to deliver its sugarcane-derived ethanol to the U.S. market without the $0.54 per gallon trade tariff that it currently faces. Simply stated, the Brazilian tariff could be bypassed by directing sales through Panama. However, when asked about this possible project between Panama and Brazil, neither Ricardo Quijano of Panama's Secretariat of

[63] Ibid.
[64] Ibid.
[65] Conversation with Ricardo Quijano at the Secretariat of Energy, June 3rd, 2010
[66] Garten Rothkopf, "A Blueprint for Green Energy in the Americas," Inter-American Development Bank, 2009, <http://www.gartenrothkopf.com/publications.asp>, accessed May 17th, 2010

Energy, nor Senior Commercial Officer Daniel T. Crocker of the U.S. Embassy in Panama, had heard of any such developments taking place.[67]

As far as the exportation of biofuel products from Florida, it is unlikely that the southern state's small businesses have the capacity to transport and sell biofuels to locations as far away as Panama. Brazil may be able to do it, with its massive sugarcane output and long-term ethanol production, but small businesses lack the infrastructure and funds to sell biofuels at such great distances. As outlined in Brian Madigan's 2010 business report, entitled "Developing and Expanding Florida Small Businesses' Alternative Energy Export Markets," "Feedstocks need to be in close proximity to where the biofuel is being produced. Additionally, the final consumer needs to be in close proximity to the production facility."[68] Only with much larger production capabilities could the story change.

Looking to the future, small businesses in Florida with capacity to develop biofuel processing plants may wish to monitor developments in Panama. While the biofuels market is still in its incipient stages, processing plant technologies might later be desired should the biofuels market pick up and grow. At the moment, the country's first biodiesel processing plant will soon be a reality thanks to the assistance of the IDB.[69]

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[67] Conversations with Ricardo Quijano at the Secretariat of Energy, and Senior Commercial Officer Daniel T. Crocker at the United States Embassy in Panama, June 3rd, 2010 and June 9th, 2010, respectively

[68] Madigan, Brian, "Developing and Expanding Florida Small Businesses' Alternative Energy Export Markets," Dr. Kiran C. Patel Center at the University of South Florida, 2010

[69] Casorla, Migdalia, "Etanol será una realidad en 2012," *Capital*, May 17th – 23rd, 2010, <http://www.capital.com.pa/cf_archivo/2010/mayo/23/economia2374110.html>, accessed June 21st, 2010

Conclusion

Humberto A. González, Corporate Affairs Director at AES Panamá, is confident that in approximately ten years, Panama will have many available sources of alternative energy.[70] Today however, the story is different. Alternative energy is expensive and needs to be subsidized by the government, he explains, yet the Panamanian government is small and unable to pay for its development.[71] The same can be said for the private sector. The costs are still just too high, says Daniel Crocker of the U.S. Embassy. "You have to look at the business logic, and make a business case," he says. "Panamanians are not going to pay double to 'go green.'"[72] As long as hydro and thermal energy costs remain cheaper to produce and consume, they will continue to be the primary energy sources that dominate the Panamanian market. "Hydro is the real winner," he says. In order to distance itself from the volatility associated with fluctuating gas prices, Panama is expanding its hydroelectric capacity and minimizing its dependence on thermal-generated electricity.[73] "By 2015," says a recent article in Panama's *La Prensa*, "the government plans to have 90% of the country's power supply provided by hydro plants."[74]

As for the alternative energy investment climate, hydro and thermal dominance make foreign direct investment (FDI) into alternative energy developments highly risky. Mr. Crocker makes it clear that he does not recommend for small businesses in Florida to invest in Panamanian alternative energy projects. "Unless [these] small Florida

[70] Conversation with AES Panamá Corporate Affairs Director, Humberto A. Gonzalez, AES Panamá headquarters, June 24th, 2010
[71] Ibid.
[72] Conversation with Senior Commercial Officer Daniel T. Crocker, United States Embassy in Panama, June 9th, 2010
[73] Ibid.
[74] "Rising Fuel Prices Mean Increases in Energy Subsidies," La Prensa, July 15th, 2010, <http://www.prensa.com/>, accessed July 15th, 2010

businesses have a high risk profile and really know what they're doing, I'm not recommending it," he says. Either way, he suggests that highly interested companies first consult the embassy.[75]

As a whole, this report describes a current reality that offers few prospects for small businesses in Florida to either invest in Panama's alternative energy development, or to export alternative energy products and services to the country. However, positive developments do also exist:

(1) Because the Panamanian government is small and lacks capacity to subsidize large-scale alternative development, it continues to promote private sector incentives, initially established by "Ley 45" on August 4th, 2004.[76] [77] With this law – first put into place to encourage greater development of mini hydro-electric projects – new energy producers incur no distribution or transmission charges on their first 10 MW of capacity produced, for a period of ten years.[78] Furthermore, as a company develops and maintains a new energy plant's first 500 kWh of installed capacity, it receives exemption from import duties, tariffs, taxes, contributions and levies, and fees associated with the importation of construction and equipment.[79] Finally, companies can acquire various tax incentives worth up to 25% of the direct investment put into a project, depending on the amount of carbon dioxide emissions their project reduces per year.[80] While it appears that most of these incentives have thus far assisted the development of hydro projects, as

[75] Conversation with Senior Commercial Officer Daniel T. Crocker, United States Embassy in Panama, June 9th, 2010
[76] Conversation with AES Panamá Corporate Affairs Director, Humberto A. Gonzalez, AES Panamá headquarters, June 24th, 2010
[77] Panama's Gaceta Oficial, Año C, No. 25,112, August 10th, 2004
[78] Castillo Duarte, Edith, "Los Incentivos Que Otorga La Ley 45," *La Prensa*, October 3rd, 2004, < http://mensual.prensa.com/mensual/contenido/2004/10/03/hoy/negocios/40773.html>, accessed July 12th, 2010
[79] Ibid.
[80] Ibid.

it was primarily designed to do, it looks likely that the Panamanian government's Secretariat of Energy will continue to deepen these incentives, and provide additional ones that can help foster the development of additional sources of alternative energy.

(2) Although Mr. Crocker does not currently recommend for small outsiders to make alternative energy investments in Panama, he does say that various sub-contracting opportunities exist. For example, if the Panamanian government, or an entity within the private sector, puts out a bid for the provision of a set number of wind turbines, small businesses in Florida could export products to meet that production demand. These kind of specific arrangements hold some of the greatest potential for Florida businesses to sell their products to Panama. As for turning these prospects into realities, Mr. Crocker says he is happy to help establish connections between Panamanian buyers and small business producers.[81]

(3) The expansion of the Panama Canal – with construction currently underway to allow much larger container ships to pass through, with a scheduled completion date of 2014 – offers great prospects to Florida business in general. "Of what Panama imports," says Mr. Crocker, "the United States provides 30% of it, with much of it passing through Florida." And once larger container ships can make it through the Canal, Florida may be the greatest beneficiary, he says. Currently these larger container ships transport their products to Long Beach, California, and from there, the goods are railed to other parts of the country. Geographically, however, Florida is much closer than Long Beach. Additionally, if more products could be brought into the country through Florida, rail transportation from Long Beach to the East could also be diminished. Therefore, once

[81] Conversation with Senior Commercial Officer Daniel T. Crocker, United States Embassy in Panama, June 9th, 2010

the expansion of the Canal in finally completed, shipping routes will be significantly altered, and many more products will become destined for Florida's ports. As a whole, this offers great news for Florida business.[82]

Editorial Note

However, because these developments still offer limited opportunities for small alternative energy businesses in Florida, we recommend for the Florida legislature to follow in the footsteps of both California and the northeastern United States, and to adopt a statewide cap-and-trade system that places both a limit on carbon output, and a price on additional output thereafter. If traditional hydrocarbon energy producers must pay to emit carbon dioxide when they exceed pre-assigned limits, alternative energy products will become much more competitive, and as a result, find themselves in a much greater position to sell their products to energy consumers. Should this scenario materialize, small alternative energy businesses in Florida could greatly expand their domestic sales, long before thinking about the need to export to places such as Panama. However, given this opportunity to expand domestic sales, these businesses would continue to grow, become larger companies, and therefore be even better positioned to export products in the future. California capped its greenhouse gas emissions in 2006, under the Global Warming Solutions Act.[83] The Northeast's Regional Greenhouse Gas Initiative – formed by ten states within the past decade – is currently pursuing similar actions, with a goal of

[82] Ibid.
[83] Berger, Matthew, "California Continues Forward as Climate Change Role Model for Country and World," *IPS New Agency*, December 22nd, 2009, <http://www.newjerseynewsroom.com/nation/california-continues-forward-as-climate-change-role-model-for-country-and-world>, accessed July 14th, 2010

reducing their region's greenhouse gas emissions 10% by 2018.[84] Beyond greenhouse gas caps, energy enterprises in California benefit from the state's renewable portfolio standard, which requires a certain percentage of the state's electricity needs to be met by renewable energy products.[85] "It [aimed] for 20% renewables by 2010 and 33% by 2020," says *IPS News Agency*; as a result, "Projects for increasing renewable energy capacity are being proposed or approved on almost a weekly basis."[86] In hindsight, Ruben Veek of the non-profit solar installer SunWork believes that it was California's energy legislation that in the end effectively connected solar projects to the state's electricity grid.[87] Similar legislative requirements could be adopted in Florida to provide similar benefits to small alternative energy businesses.

The most ideal scenario, of course, would be for United States Federal Government to pass comprehensive clean energy and climate legislation, as suggested by Apollo Alliance and others.[88] This is particularly important because, as mentioned in this paper's introduction, energy subsidies and direct financial assistance from the government – although beneficial – has its limits. A policy for a nation-wide cap-and-trade system, however, will effectively boost alternative energy businesses and successfully integrate their industry into the market. Yet since no such national-level reality currently exists, and because an international climate change agreement failed to materialize in Copenhagen in 2009, the state of Florida should follow the lead of California and the Northeast, and act on its own.

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[84] Ibid.
[85] Ibid.
[86] Ibid.
[87] Ibid.
[88] "Winning the Race: How America Can Lead the Global Clean Energy Economy," Apollo Alliance, pg. 12, March 2010, <http://apolloalliance.org/wp-content/uploads/2010/03/wtr3-2010final.pdf>, accessed June 17th, 2010

Such a system would not only advance existing alternative energy businesses; it would create new business as well. AES has a subsidiary known as Agcert International that captures greenhouse gas emissions and makes a profit along the way.[89] The company goes to swine farms in countries such as Brazil, Argentina, Chile, and Mexico, and installs biodigestors to capture the methane gas put off by the farms. These farms receive multiple benefits from the process – such as reduced odor, usable manure, and the conversion of methane to heat – and Agcert is able to sell the Certified Emission Reductions (CERs) they capture to high-output carbon emitters in Europe, for example.[90] Such initiatives can currently take place within Florida itself. There is an entire report published by the University of Florida's School of Natural Resources and Environment, entitled, "Opportunities for Greenhouse Gas Reduction Through Forestry and Agriculture in Florida."[91] The difference between the current system, and what could be, however, is that with a statewide cap-and-trade system, CERs could be sold locally to large carbon emitters within the state of Florida itself. In effect, this would allow carbon-capturing biodigestor companies in Florida to see a direct, local impact of their work, most likely generating additional domestic interest, and additional domestic business.

Therefore, it is with great conviction that this student team recommends for the state of Florida to adopt its own sub-national cap-and-trade system, as well as its own renewable standard portfolio. This, we believe, will have the greatest positive impact on the growth of small alternative energy businesses in Florida. It will dramatically increase

[89] Agcert International Website: http://www.agcert.com/global/index?page=home&view=AGCERT, accessed July 14th, 2010
[90] See video, "Agcert International: Meet the Management," <http://video.yahoo.com/watch/352554/2210883>, accessed July 14th, 2010
[91] Mulkey, Stephen; Alavalapati, Janaki; Hodges, Alan; Wilkie, Ann C.; Grunwald, Sabine; "Opportunities for Greenhouse Gas Reduction Through Forestry and Agriculture in Florida," University of Florida, April 2008

domestic sales, allow companies to expand, and as a result, make the overall U.S. ability to export that much stronger.

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