Photo by Ricardo Funari/BrazilPhotos

A beachfront wind farm in Ceará State, Brazil.

ALTERNATIVE ENERGY

Latin America's Cleantech Future

by Christian E. Casillas

In spite of being flush with renewable energy resources, Latin America has attracted little cleantech investment relative to global trends. Worldwide, investment in the clean-energy sector has remained high over the past several years, despite the economic downturn. According to the United Nations Environmental Programme's *Global trends in sustainable energy investment 2010*, roughly $162 billion was spent on clean energy in 2009, and estimates suggest that spending in 2010 will be closer to a record $200 billion. Yet only 10 percent of new financial sector investments in 2009 occurred in South America, most of them (67 percent) in Brazil, Latin America's cleantech leader.

Dr. Luis Aguirre-Torres would like to see these investment trends in Latin America change. The CEO and president of GreenMomentum, a California firm dedicated to understanding and promoting clean-energy investments in Latin America, Aguirre-Torres recently moderated the panel "Cleantech Outlook in Latin America" at UC Berkeley's Haas School of Business. The inaugural event for the student initiative "Renewable Energy Latin America" drew close to 100 students and professionals looking for insight into Latin America's cleantech future.

According to panelist Adam Mendelson, a manager for Sunpower, companies develop projects where profit margins are largest. In the case of the solar industry, which has seen installed capacity grow by an average of 60 percent per year since 2004, margins are greatest where government policies allow solar to compete with conventional generation sources, such as coal, nuclear or large hydro power.

Europe has been a hot spot for solar investment, with generous feed-in tariff policies that provide guaranteed grid access and long-term price contracts. In contrast, as of 2009, the only Latin American countries with feed-in

tariffs were Argentina, the Dominican Republic, Ecuador and Nicaragua, and most of these programs were limited in scope. Argentina provides a premium of $0.23/kilowatt-hour (kWh) for solar photovoltaics in addition to the regulated electricity price. This is much less attractive than the feed-in tariffs offered by a number of European countries which range from $0.40 to $0.65/kWh.

Although feed-in tariffs are arguably among the most effective policies, there are many alternatives, such as quotas, capital subsidies, tax credits, net metering, favorable financing and public competitive bidding. Mandated quotas, or renewable portfolio standards, are used in the United States, and have been adopted by Chile and Uruguay. Chile recently passed a standard requiring that 5 percent of new generation contracts come from renewable energy sources, increasing to 10 percent by 2024. Developers will only receive government financial support for feasibility studies, however, which account for a small percentage of a project's total cost.

Despite its relatively few subsidies, Chile's excellent solar resources have spurred the development of a 1 mega-Watt (MW) solar plant in Calama, a city in the Atacama Desert. This project will be notable for being the largest solar installation in South America, having the highest rate of energy production per installed capacity in the world and being the first industrial-scale solar plant built without subsidies. The Calama project notwithstanding, Mendelson remained doubtful that continued investment growth would occur without sufficient subsidies.

Mexico and Brazil provide examples of the success that can result when governments combine a number of policy approaches. Following the oil crisis of 1973, Brazil sought to reduce the dependence of its transportation sector on imported oil. It now has over 30 years of demonstrated success, with 50 percent of its gasoline demand displaced by ethanol derived from sugarcane. Although Brazil's land and climate provide a comparative advantage for high sugarcane yields, the transformation would not have occurred without direct subsidies, tax preferences, protective tariffs and government mandates, leading to the evolution of one of the most efficient production systems for ethanol on the planet.

According to Richard Chow, president of the geothermal exploration company Thermasource, risk aversion and the scarcity of capital are additional barriers to cleantech investment in Latin America. Energy projects require enormous investments, Chow noted, ranging from hundreds of millions to billions of dollars. The frequency of natural disasters and political instability has likely also made investors reluctant to commit such large sums. In Latin America, private investment has historically taken a backseat to financing from international lenders, such as the World Bank, the Inter-American Development Bank and country development banks.

The Export-Import Bank of the United States is an alternative lender stimulating cleantech investment south of the U.S.–Mexico border. The Ex-Im Bank takes on credit and financing risks that the private sector is unwilling to accept, targeting projects that create or maintain jobs in the United States. Earlier this year, it funded a 68 MW wind project in Oaxaca, Mexico. Clipper Wind, a California-based turbine manufacturer, benefitted from $80.66 million in direct loans for the project, which is the largest wind farm in Latin America to utilize U.S.-made turbines. Panelist Robert Guthrie of the Ex-Im Bank said that the loan was provided with extremely favorable conditions: a 13.5-year payback period and an interest rate of 3.85 percent. Most banks are unwilling to lend money to projects that have a timeline greater than 10 years, Guthrie pointed out, and interest rates are typically four times the lending rate for the Mexico project.

Guthrie believes that there are a number of factors that will result in a rapidly expanding cleantech sector in Mexico, not least of which is the country's decreasing supply of oil. The United States is certain to be Mexico's primary industrial partner in project development, given its close proximity and favorable trade regulations. Mexico has rich wind and geothermal resources. In fact, Mexico already has the fourth-largest installed capacity of geothermal generation in the world, with 960 GW, and the project in Oaxaca is located on one of the planet's best wind sites. There are plans in the works for additional wind farms to be added in the same location.

Another factor holding back cleantech investment in Latin America is the hesitancy of companies to be among the first movers, Chow asserted. Risks manifest in foreign currency fluctuations, poorly enforced regulations, undeveloped business networks and the possibility of corruption. Because energy projects require significant infrastructure investment, Mendelson explained, they are not equivalent to just "moving money around." Before a company like Sunpower becomes involved in a project, it needs to put in place a substantial amount of its own infrastructure and manufacturing capabilities, and it depends on favorable government policies.

The panelists seemed to be in agreement that once the roadblocks to financing are reduced and companies gain in-country experience, cleantech investment in Latin America could blossom. While the majority of global cleantech investments in 2009 went to wind (56 percent)

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Photo by Shane Runquist.

Geothermal energy is tapped for power in several sites near Los Azufres, Michoacán.

and solar (12 percent), Latin America also has abundant resources in biomass, hydro and geothermal energy. Chow explained that, in the western hemisphere, the so-called Pacific "ring of fire" extends from Alaska down to the tip of South America and is a hotbed of geothermal activity. Contrary to the intermittent nature of wind and solar generation, geothermal power can substitute for coal and hydro to fulfill baseload demand and has proven to be cost competitive with conventional production, without generation subsidies.

According to Chow, geothermal is a mature technology that has been shown to have minimal environmental impact. He argued that in countries such as Chile, the population's experience with the mining industry complements geothermal production. Not only do local companies have substantial experience with resource extraction, but there is familiarity with permitting and regulating mineral resources, making geothermal a natural fit. However, while several projects are in the planning stages, the country does not yet have any geothermal production. Chow explained that even though Chile is home to excellent geothermal resources, firms rarely want to be the first to take on the upfront exploration and drilling costs needed to verify a site's potential. Countries such as the U.S. and Iceland have found that government subsidies for exploration and drilling are critical for encouraging geothermal development.

Bill Mott of Agland Investment Services pointed out that the massive and growing transportation sector desperately needs low-carbon liquid fuels. He believes that second generation biofuels are right around the corner. These depend on new technologies for economically transforming high-cellulosic materials, such as sugarcane bagasse or fast-growing grasses, into ethanol. Mott said that Brazil already has a number of second-generation pilot projects, many of which are receiving money from both venture capitalists and oil companies. While Brazil continues to dominate ethanol production, Colombia, Peru and Ecuador are all producing biodiesel from African Palm. Mott maintained that the primary challenge faced by Latin American countries is figuring out how to produce at large scales and low costs.

Large-scale projects raise concerns, however. Along with large-scale hydro, the production of biofuels often brings environmental and social challenges, usually related to the magnitude at which these projects are implemented. Panelist Brian Orion, a lawyer from San Francisco who focuses on environmental law, noted that it is critical that the cleantech industry in Latin America be developed in a manner that adheres to existing legal statutes and provides adequate environmental protection.

While the panel's primary focus was to explore how U.S. companies can capitalize on opportunities for cleantech investment in Latin America, Orion sought to add nuance to the discussion. He raised the question of how the development of cleantech markets might also benefit Latin American industrialization, preparing domestic companies to compete in external markets.

As if to drive home the need for a more balanced inquiry into the role of cleantech development in Latin America, one of the last questions of the night came from a Ph.D. student who had just returned from Brazil. There, he had witnessed local opposition to several wind projects, and he asked the panelists what role local communities and local politics will play in the development of the cleantech industry.

Mendelson, who previously worked for the Inter-American Development Bank and has also witnessed heated meetings related to the development of wind and solar projects, acknowledged that there will inevitably be winners and losers. One or two individuals may stand to benefit by renting land to a project, while the surrounding neighbors receive nothing but construction dust. These projects are never black and white, he argued. There is almost always some segment of the population that is left out. It is critical, however, that developers recognize the needs and realities of local stakeholders, Mendelson continued. He noted that in his work with Brazil's National Development Bank, projects were required to set aside social funds that guaranteed a percentage of revenue for public goods such as community schools.

As the global economy regains momentum and technologies continue to mature, there is little doubt that within the next decade, international policies will be put in place to provide incentives for companies and nations to transition away from carbon-intensive fossil fuels. Increasing streams of revenue will also be available to developing countries through instruments such as the United Nation's Clean Development Mechanism. Among the many stakeholders, from international investors to local community members, it remains to be seen who will be the winners and losers in the development of cleantech in Latin America.

The panel discussion "Cleantech Outlook in Latin America: Opportunities and Challenges for California Companies" was held at UC Berkeley's Haas School of Business on November 16, 2010.

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A solar farm in Chile's Atacama Desert.

Photo by Jaim Peña.