

Marcos A. Vidal
PWR 2 – Rhetoric of Sustainable Energy
Stanford University
Feb/27/2011

*“Of all the forces of nature, I should think the wind contains the greatest amount of power” –
Abraham Lincoln*

Energy is the fundamental catalyst for the development of nations. Without energy, societies are bound to stop growing and eventually decay to nothing. Developing nations, like the Dominican Republic, face many socio-economic issues as they push for progress. “Energy is one of the crucial inputs for socio-economic development” (Mathew 1). According to Volkmar Lauber, professor at the University of Salzburg, Austria, in order for developing nations to achieve sustainable development and alleviate poverty, they must provide access to affordable energy services (83). The proper and sustainable supply of energy is essential to provide a solid foundation for growth for nations like the Dominican Republic. Inadequate energy supply is an invitation for roadblocks and unnecessary struggles that would deter the potential of a nations ability to develop. The Dominican Republic, unfortunately, is a nation that has an inadequate energy supply.

The Dominican Republic suffers from energy problems that thwart development for the Dominican people. One of the energy troubles is the lack of confidence in the energy sector that came from the lack of supply, and as a result of this deficiency, “power outages have affected the country dramatically, causing social unrest and private sector claims. During 2008, an average power of 374 Mega Watts was demanded monthly and not met” (GTZ 82). Professor Lauber states that a “lack of clean and affordable energy has serious consequences for health, quality of life, and the economy” (84). The National Energy Commission of the Dominican Republic effectively describes how not only is there a lack of energy, but there is a “vicious circle” of

cycling financial crisis among distribution companies, lack of investment in energy sources, and constant failure in energy bill payments and fraud (60). Also, high dependency on oil, loss of trust from private investors and consumers, and expensive tariffs on energy prices are issues that accumulate onto the list of energy supply problems in the Dominican Republic (NEC 60). In addition, of the 3,191 Mega Watts that fed the electric grid in 2009, 84% came from fossil fuels, mainly from petroleum-based sources that the nation does not produce (GTZ 82). This means the nation relies on an imported, expensive, and pollutant source that will impede any goal to achieve a sustainable method for energy generation. The Dominican Republic faces many more years of vicious circles, serious consequences, and a dark pollutant path if a more sustainable approach is not taken.

In order to adopt a more sustainable, reliable, and cheaper energy supply, the “vicious circle” must come to an end. In 2000, the nation pumped roughly 39 million¹ pounds of carbon dioxide into the atmosphere due to energy consumption (SEMARENA 98). There are different options to providing energy, however, wind energy could possibly represent a new light and hope. By implementing new technologies, “wind is now one of the most cost-effective methods of electricity generation,” making the wind energy market one of the fastest growing renewable energies (Boyle 244). “Developing countries are increasingly recognizing the various advantages of renewable energy” (Lauber 86) including a clean energy independent from fossil fuel imports capable of providing energy sustainability. The matter is whether the Dominican Republic could develop wind energy while balancing the existing environmental, economical, and societal concerns that may inhibit this clean energy source.

Building on its history, wind energy offers great potential for development in the Dominican Republic. Wind has been used for thousands of years for milling grain, pumping

¹ In 2000, actual carbon dioxide emission was 17,596.74 GigaGrams, or 38,794,171,074.79 pounds.

water, and propelling sails for boats (Mathew 2). Currently, wind energy is being harnessed for electrical generation through wind turbines. The downside to using wind energy however, requires windy land that can provide enough wind velocity to maximize power outlet from a wind turbine. The National Renewable Energy Laboratory (NREL), a branch of the US Department of Energy, conducted a study on the potential the Dominican Republic has to generate energy from the wind. According to the research, about 1,500 square-km of windy land could support more than 10,000 Mega Watts of installed capacity, which can be fully commercialized (see Figure 1). 10,000 Mega Watts can supply the country's electric needs three times over. Another matter is whether it is feasible to exploit the wind and provide new light to the development of the Dominican Republic.

The environmental, economical and societal feasibility of such a plan can be determined by a case study on the current development of the nation's first wind farm. According to José Rodríguez, the Business Development Director at Electric Generator Company Haina, otherwise known as EGE-Haina (Empresa Generadora de Electricidad Haina, S.A in Spanish), the wind farm is divided into two separate projects: "Los Cocos", and "Quilvio Cabrera." Though in the same location, the two projects have different investors. "Los Cocos" will consist of 14 wind turbines, 25.2 Mega Watt generation, and 100% private investment by EGE-Haina. "Quilvio Cabrera" will consist of five wind turbines, 8.25 Mega Watt generation, and 100% private investment by Electric Consortium Punta Cana-Macao or CEPM (Rodríguez). The 19 wind turbines are located in the southwest region of the Dominican Republic, specifically in the province of Pedernales, between the towns of Juancho and Los Cocos (see Figures 2, 3, and 4). The wind farm will require an estimated US \$100 million investment. The project started in March 2010 and will be completed in the summer of 2011 (Rodríguez). These details describe

the wind farm that will be used as a case study to analyze the environmental, economic, and social concerns and possible mitigation responses that exist.

Environmental concerns that revolve around wind farms are just one criticism against wind energy in general, and Los Cocos and Quilvio Cabrera specifically. Concerns include the risk that hurricanes could destroy the physical installations. The wind farm also presents risks for the existing natural habitat, including both flora and fauna. Critiques highlight the potential hazard of bird fatality from flying into the wind turbines' blades. While conceding that these are legitimate concerns regarding the environmental risks involved, there are arguments that mitigate these risks.

Evidence shows that the concerns related to flora, fauna, and hurricanes can be alleviated. Although there are risks regarding birds colliding with turbine blades, on a global level, however, the incidence is relatively low. Bird fatalities resulting from collisions runs at one to two birds per turbine per year at worst, with most sites having much less than this or zero (Boyle 276). This implies a risk of 19 to 38 bird fatalities a year for the Dominican wind farm, however, no risk to migratory routes of birds have been identified. Of the flora and rest of fauna, no threats were presented for any species in the area. Additionally, the wind turbines are prepared to react positively upon the presence of a hurricane (Rodriguez). These are promising responses that ease the environmental concerns. Not only can the concerns be addressed, but also other outcomes exist that create benefits for the environment.

In comparison with fossil fuels, wind affords other environmental benefits that indirectly affect society in a positive way. Los Cocos and Quilvio Cabrera will reduce approximately 70,000 tons of carbon dioxide per year (Rodriguez). The National Energy Commission claims that energy plants that burn fossil fuels emit contaminants that cause environmental problems

related to climate change, acid rain, and deterioration of human health (37). These problems caused by fossil fuel burning can be negated by using wind as a resource. For example, clean wind energy can reduce “health impacts which result not only in physical suffering but also in economic damage through increased health-care costs and reduced productive working days” (Redlinger, Andersen and Morthorst 151). Similarly, by using wind as an energy source, the contaminants that fossil fuels produce would not be released in the air, thus reducing the risk of affecting climate change and creating acid rain. Wind energy offers promising environmental benefits that fossil fuels simply cannot.

Moreover, evaluating the economic anxieties surrounding wind energy in the Dominican Republic is of substantial interest when considering implementation. From a global perspective, “wind energy is capital intensive” (Tiwari and Ghosal 391). This holds true in the Dominican Republic, where “generation costs are higher than those of coal and natural gas plants” (CDM Los Cocos 30). This is of primary concern because wind needs additional incentives to entice investors who may see the expensive capital cost of wind turbines and higher generation costs as a less attractive investment.

Despite the fact that wind energy is one of the fastest growing renewable energy sources worldwide, fossil fuels still have a slight edge because they require less capital investment and less generation costs. Government policy can help by providing more incentive to develop renewable energy sources. Dominican Law No. 57-07, a Law on Incentives for the Development of Renewable Energy Sources and Special Regimes passed in 2007, has provided incentives for companies that develop renewable energy. Examples of incentives provided by the law include 100% exemption over import duties and sales tax for equipment, machinery, and accessories required for renewable energy production (GTZ 88). Another incentive is a 100% 10-year

exemption over income tax for companies or individuals benefited by this law, until the year 2020 (GTZ 88). These laws provide firm incentives for wind energy development that helps persuade investors, and support wind to compete with fossil fuels.

The development of Los Cocos and Quilvio Cabrera contains economic benefits that positively affect the nation. According to César Santos, Business Development Manager at EGE-Haina, the province of Pedernales is in the poorest region of the country, an important percentage of the homes live in poverty and are unemployed. Since wind farms must be built in windy rural areas, it is hopeful that the wind farm will provide a chance for job creation and economic development in the region. If more wind farms would be built, this represents the possibility of bringing development to more poverty-stricken areas of the nation. Opportunities for labor, and technicians to build and maintain the wind turbines will be created. It is important to note that a fossil fuel energy plant can create jobs, however, wind energy creates jobs that have a positive environmental impact. Another economic benefit is that wind comes free of cost, while fossil fuels do not. This fact relieves the dependency on importing expensive fossil fuels, which, will save the government from disbursing subsidies or compensating for the difference when oil prices are frozen. Essentially, despite the qualms related to high capital cost and higher generation cost, wind energy has incentives, and other benefits that fossil fuels cannot offer.

Social concerns are also of great importance due to the direct interaction that wind farms hold with communities. Wind farms generally present issues about noise and visual impact that concern communities (Boyle 270). A wind farm will admittedly change the visual landscape of the physical area in which it is built. Also, the spinning turbines cause increased noise levels. Both impacts can be for good or bad, dependent upon the opinions of the communities affected. Society provides subjective opinions that differ among different places of the world, which can

hurt or help the image of a planned wind farm. Some communities might perceive a wind farm in an open field as a detriment to the natural beauty of the landscape. On the other hand, some might view a wind farm as a potential major tourist attraction because of the aesthetic layout of the turbines. For example, “the British Wind Energy Association notes that wind farms in the United Kingdom are popular tourist attractions, with thousands of people each year flocking to visit them” (North Carolina Wind Energy Group). Overall, the subject of aesthetics is sensitive as the voices of the people can bring down or praise a wind farm.

From a global perspective, research shows that social concerns can be addressed to a certain extent. Complaints that are more resistant due to noise levels caused by turbines can be moderated because as technology progresses, “modern wind turbines are generally much quieter than their predecessors and conform to noise emission level requirements” (Boyle 270). According to the American Wind Energy Association, a wind farm at a distance of 750 to 1,000 feet is no noisier than a kitchen refrigerator (North Carolina Wind Energy Group). Some wind farms will not encounter opposition due to noise levels because the distance from a community to the turbines is sufficient to exclude any noise generated. As for the visual impact of wind turbines in open space – creating a sensitive arena – the beauty or unpleasantness depends on the community members’ perception of beauty and landscape. For Los Cocos and Quilvio Cabrera, community outreach showed positive results regarding the implementation of a wind farm nearby (Santos). There were no groups or individuals opposed to the wind farm. Not only this but the community viewed the wind farm as necessary to foster development in the province. Though society is subjective and opinions differ among countries, wind turbine technology has evolved to assuage noise problems, and wind farm development could be more accepted and

successful in poverty-stricken zones that place greater value on the economic impact of a wind farm.

The potential for wind energy development has an advantageous middle ground in the Dominican Republic. Possible environmental, economical, and social concerns of Los Cocos, Quilvio Cabrera, and general global concerns, have alleviation responses of certain extents. Environmentally speaking, developing wind energy means reducing carbon dioxide emissions in the atmosphere, indirectly improving public health, environmental health, and economic development of the Dominican Republic. Wind energy has the potential to compete with fossil fuels and is financially feasible given the necessary incentives provided by government laws. Also, developing wind provides a key opportunity to develop rural areas that suffer from high poverty levels, like the province of Pedernales. Lastly, from a societal view, despite the high dependence on subjective opinions regarding noise levels and visual impacts, technology improvements can rid the noise level problems. Additionally, communities in third world countries such as the Dominican Republic might value the economic impact over aesthetic difference of a wind farm. Conceding that the case study of Los Cocos and Quilvio Cabrera is not sufficient to generalize that the entire nation will accept wind energy implementation. The province of Pedernales holds the highest potential to generate electrical power from the wind, and Los Cocos and Quilvio Cabrera represent the first step for more wind solutions and collaboration to develop the renewable source. Ultimately, the Dominican Republic has an adequately equipped platform – economical, environmental, and social – to foster wind energy, however, the nation also needs another type of platform.

The other platform is not a matter of qualifying feasibility, but instead pertains to principles of the people. A renowned American environmentalist, Aldo Leopold, wrote

extensively on environmental ethics and provides significant insight to the subject of ethical land use. “For Leopold, environmental problems raise issues to fundamental moral questions about the quality of human society and its direction” (Elliot and Opie). Leopold believed there is a connection between humans and land – thus it is a moral responsibility of humans to maintain the integrity of their land. This is not referring to implementing severe restrictions to land use, but rather to use land for the benefit of the land and the people. “How [people] behave toward their environment reveals their culture” (Elliot and Opie). Nations act responsibly when they take care of their land and use it wisely to improve the quality of life of its people and environment. This is the platform of principle that people must value in order to make better use of land for a better life and environment. The Dominican Republic can be pragmatic about ethical land use by developing wind energy that would improve quality of life, the environment, and foster the nation’s growth.

The Dominican Republic’s development is a reflection of the way the nation uses its resources and land to achieve progress. The nation suffers from a lack of electrical power, dependency on fossil fuel imports, and high-energy prices that hinder Dominican development, personified in the “vicious circle”. The consequences caused by unsustainable energy generation also affect quality of life and the environment. It is in the interest of the nation and the people to improve their quality of life and care for the environment as it provides long lasting results that aid development. The Dominican Republic’s reflection must change in order to achieve more development and progress.

The face of change lies in varying the use of land and resources. It would largely benefit the country, as well as the environment, to make wind a primary source of energy. The development of wind energy means to use land to provide solutions for better quality of life, and

environment. Also, wind energy provides a clean and substantial solution to the energy problem, and can help promote development in the Dominican Republic. The National Energy Commission highlights the importance of diversification of energy sources (9), and also claims that 100% of electrical demand will be met by 2011 (44). Accomplishing this will aid the development and energy security of the nation. However, diversifying energy is necessary. A larger push towards wind energy should be emphasized because of its abundance and ability to achieve greater self-sustained energy generation. Regardless of whether the nation's energy needs are met, this does not expel the ill dependency on imported fossil fuels. Fossil fuel dependency for energy generation will only uphold the vicious circle affecting the nation and deterring its possible growth. Developing wind energy in the Dominican Republic would induce environmental, economic, and social benefits bringing new light to the nation's progress.

Appendix

Figure 1: Wind Electric Potential in the Dominican Republic.

Source: National Renewable Energy Laboratory (NREL).

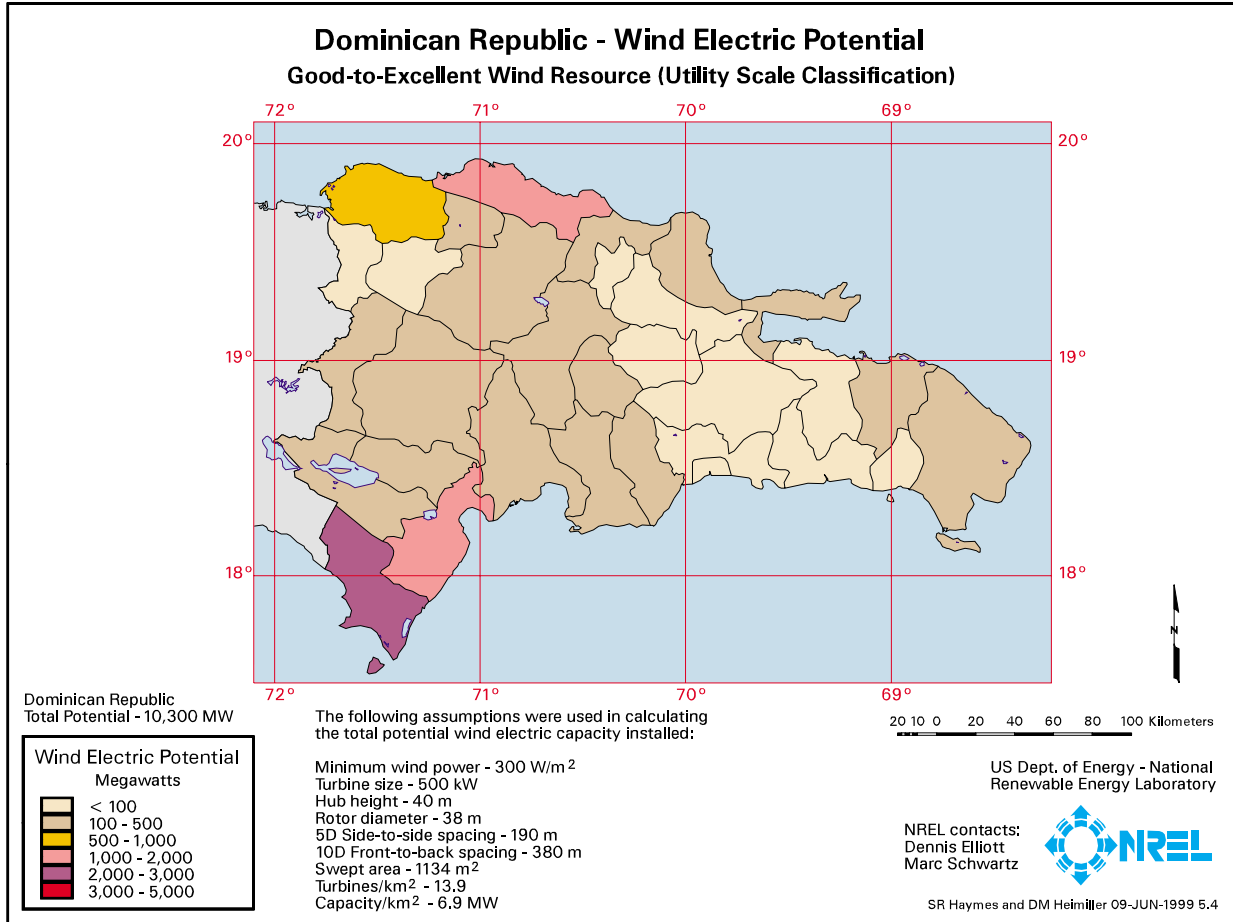


Figure 2: Location of wind farm Los Cocos and Quilvio Cabrera.

Source: Interview with César Santos.

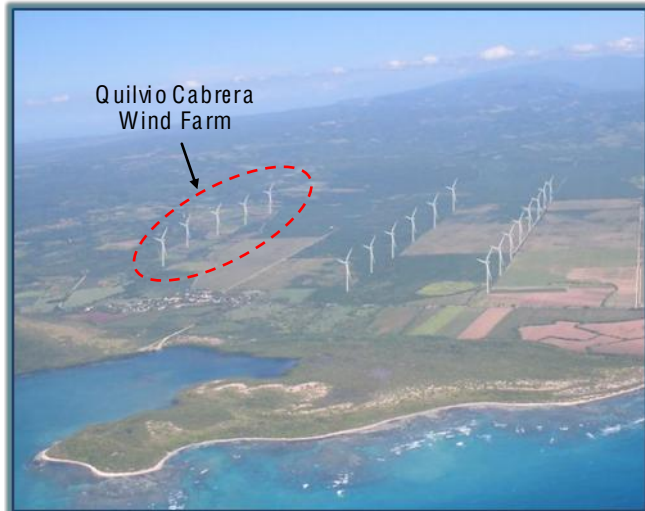
Figure 3: Rendering of Los Cocos project of wind farm.

Source: CDM Project Development Document Los Cocos Wind Farm Project.



Figure 4: Rendering of Quilvio Cabrera project of wind farm.

Source: CDM Project Development Document Quilvio Cabrera Wind Farm Project.



Bibliography

- Boyle, Godfrey. *Renewable Energy: Power for a Sustainable Future*. Oxford: Oxford University Press in association with the Open University, 2004. Print.
- Clean Development Mechanism (CDM-UNFCCC). “Project Design Documents Los Cocos Wind Farm Project.” United Nations Framework Convention on Climate Change. 11 November 2010. Web. 22 January 2011. <<http://cdm.unfccc.int/Projects/Validation/DB/MROMUKO2COBBAA08FNK2NJN8I1F4E5/view.html>>
- Clean Development Mechanism (CDM-UNFCCC). “Project Design Documents Quilvio Cabrera Wind Farm Project.” United Nations Framework Convention on Climate Change. 11 November 2010. Web. 22 January 2011. <<http://cdm.unfccc.int/Projects/Validation/DB/P5VQEK89NQ0TS40GY87DI16HZ3AIGU/view.html>>
- Dominican Today. “Dominican Republic can generate 10,000 MW from wind energy: study.” DominicanToday.com . 29 September 2010. Web. 28 January 2011. <<http://www.dominicantoday.com/dr/technology/2010/9/29/37126/Dominican-Republic-can-generate-10000-MW-from-wind-energy-study>>
- Elliot, Norbert, and John Opie. *The Symbolic Earth: Discourse and Our Creation of the Environment*. Eds. James G. Cantnll and Christine L. Oravec. Kentucky: University of Kentucky Press, 1996.
- German Technical Assistance Agency (GTZ). “Energy-policy Framework Conditions for Electricity Markets and Renewable Energies 16 Country Analyses.” Environment and Infrastructure Division. Eschborn, November 2009. Web. 29 January 2011. <<http://www.gtz.de>>
- Government of the Dominican Republic. *The General Electricity Act, Law 125-01*. Modified 6

August 2007. Web. 5 February 2011.

<<http://www.sie.gov.do/archivos/leyes/LeyGeneraldeElectricidadNo125-01.pdf>>

Government of the Dominican Republic. *Implementation Regulation on the General Electricity Act (Law 125-01)*. Web. 5 February 2011.

<<http://www.sie.gov.do/archivos/leyes/Reglamento%20para%20la%20Aplicacion%20de%20la%20Ley%20General%20de%20Electricidad.pdf>>

Government of the Dominican Republic. *Law on Incentives for the Development of Renewable Energy Sources and Special Regimes, No. 57-07*. 7 May 2007. Web. 5 February 2011.

<http://www.hacienda.gov.do/legislacion/ley_incentivos_tributarios%5CLey%2057-07%20sobre%20Energia%20Renovable.pdf>

Government of the Dominican Republic. *Implementation Regulation of Law on Incentives No. 57-07*. 30 May 2008. Web. 5 February 2011.

<<http://faolex.fao.org/docs/pdf/dom95065.pdf>>

Herrera, Mairobi. "Exposes threat to electrical sector." *Listin Diario*. 25 January 2011.

<<http://www.listindiario.com/la-republica/2011/1/25/174879/Expone-amenaza-a-sector-electrico>>

Inter-American Development Bank (IADB). "Prospects for the Oil-Importing Countries of the Caribbean" Ramon Espinasa, Oil and Gas Specialist - Energy Division - Infrastructure and Environment Department - IADB. September 2008. Web. 25 January 2011.

<<http://idbdocs.iadb.org/wsdocs/getdocument.aspx?docnum=1640644>>

Javier, José. "EGE-Haina builds first wind farm." *Diario Libre*. 20 March 2010. Web. 24

January 2011. <http://www.diariolibre.com/noticias_det.php?id=238659&l=1>

Jacobson, Mark Z., and Mark A. Delucchi. "A PATH TO SUSTAINABLE ENERGY BY 2030.

- (Cover story)." *Scientific American* 301.5 (2009): 58-65. Academic Search Premier. EBSCO. Web. 5 Feb. 2011.
- Lauber, Volkmar. *Switching to Renewable Power: a Framework for the 21st Century*. London: Earthscan, 2005. Print.
- Mathew, Sathyajith. *Wind Energy: Fundamentals, Resource Analysis and Economics*. Berlin: Springer, 2006. Print.
- National Energy Commission (NEC). "Diagnosis and definition of strategic lines of the electric sub-sector, final report." Dominican Republic. 29 January 2008. Web. 22 January 2011. <www.cne.gov.do/Download.asp?key=306>
- National Renewable Energy Laboratory (NREL). "Wind Energy Resource Atlas of the Dominican Republic." US Department of Energy, US Agency for International Development. October 2001. Web. 2 February 2011. <<http://www.nrel.gov/wind/pdfs/27602.pdf>>
- North Carolina Wind Energy Group. "Dispelling Common Myths about Wind Power." Appalachian State University. February 2003. Web. 18 February 2011. <<http://www.wind.appstate.edu/wind-power/wind-power-factsheets/common-myths-about-wind-power>>
- Redlinger, Robert Y., Per Dannemand Andersen, and Poul Erik Morthorst. *Wind Energy In the 21st Century: Economics, Policy, Technology, and the Changing Electricity Industry*. New York: Palgrave, 2002. Print.
- Rodriguez, José. Personal Email Interview. 21 January 2011.
- Santos, César. Personal Email Interview. 21 January 2011.
- Secretariat of State of the Environment and Natural Resources (SEMARENA). "Second National

Communication, Climate Control Project 2009.” Dominican Republic. 2009. Web. 26
January 2011. <<http://unfccc.int/resource/docs/natc/domrepnc2.pdf>>

Tiwari, G. N, and M. K Ghosal. *Renewable Energy Resources: Basic Principles and
Applications*. Harrow, U.K.: Alpha Science International, 2005. Print.