The Renewable Energy Market and Pacific Hydro Wind Farms in Brazil

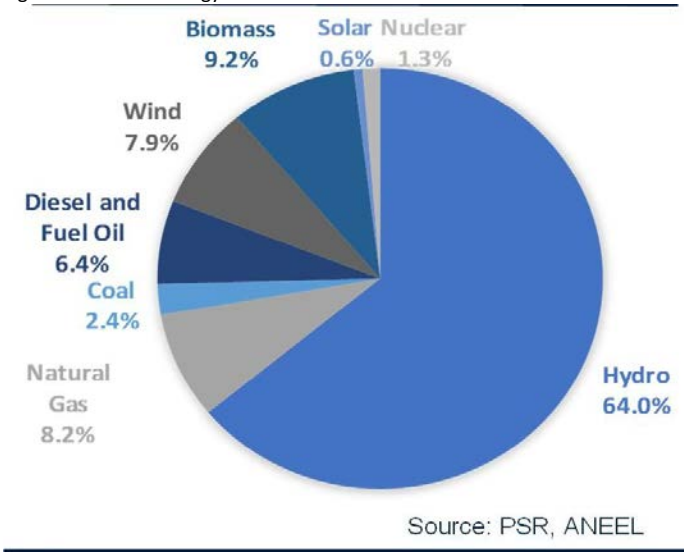
Project Summary

In 1995, the Brazilian Government created the Free Energy Market to stimulate private investment into the energy sector and to meet growing domestic demand for energy. This market allows renewable energy producers to directly negotiate with large energy consumers as opposed to through a government intermediary. Due to the incentives created by the Brazilian Free Energy Market, Pacific Hydro entered the Brazilian renewable energy market by investing in two wind farm projects in the North of Brazil. Together, the two projects provide 58.2MW of energy, and are particularly interesting in terms of financing as there was no multilateral development bank involvement in the projects. Instead, financing came from a domestic development bank (BNDES). In order to offload the produced energy, Pacific Hydro worked with the private sector energy trader Comerc Energia which facilitates deals between private producers and consumers of electricity. This market has promoted private investment and increased competition in the energy sector in Brazil, which has led to an increasing percent of Brazilian energy demand being met through renewable energy sources and lower energy prices for consumers.

The Brazilian Renewable Energy Market

Brazil has an abundance of renewable energy resources and is Latin-America's largest renewable energy market with an expected 35 GW to be contracted in the next decade.[1] Renewable energy sources such as water, wind, biofuels and solar account for nearly 83% of Brazil's energy mix (Figure 1). This makes Brazil one of the only large economies whose power matrix consists mostly of renewable energy.[2]

Figure 1: Brazilian Energy Mix in 2018



Source: ANEEL (February 2018)[3]

Hydropower is by far the dominant source of renewable energy in Brazil, however, recent episodes of severe drought have created strong incentives to diversify the country's renewable energy mix.[4] As a result, while growth in renewables is continuing to increase rapidly, hydropower's share of the renewable energy mix is gradually declining. Wind energy is increasing particularly quickly as Brazil has a high potential in this area (Figure 2).[5]

1 U.S. Department of Commerce International Trade Administration (2017). Brazil - Renewable Energy. Obtained on 17-04-2018 from https://www.export.gov/article?id=Brazil-Renewable-Energy

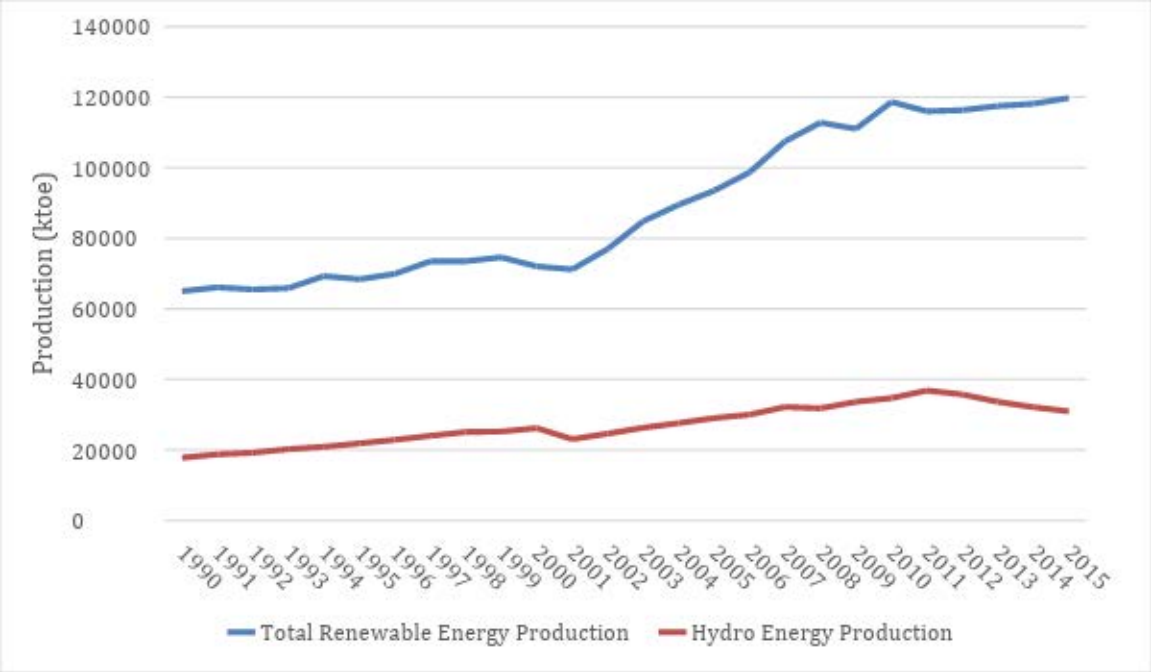
2 Leahy, J. (2017) Brazil's renewable energy potential attracts investors. The Financial Times, 20-09-2017. Obtained on 04-04-2018 from https://www.ft.com/content/a20b74bc-7eb4-11e7-ab01-a13271d1ee9c

3 ANEEL (2018). Generation Capacity of Brazil. Obtained on 17-04-2018 from: http://www2.aneel.gov.br/aplicacoes/capacidadebrasil/capacidadebrasil.cfm

4 Leahy, J. (2017) Brazil's renewable energy potential attracts investors. The Financial Times, 20-09-2017. Obtained on 04-04-2018 from https://www.ft.com/content/a20b74bc-7eb4-11e7-ab01-a13271d1ee9c

5 U.S. Department of Commerce International Trade Administration (2017). Brazil - Renewable Energy. Obtained on 17-04-2018 from https://www.export.gov/article?id=Brazil-Renewable-Energy

Figure 2: Renewable Energy Production in Brazil Over Time



Source: International Energy Agency[6]

To support the development of the renewable energy sector, the federal government created the Free Energy Market in Brazil through legislation passed in 1995. This legislation allows companies with contracted energy needs of 500kw or more to purchase energy directly from a market of renewable energy producers (including hydro plants, biomass burning thermal plants, and wind farms). This is in contrast to the captive energy market in Brazil for small-scale energy consumers in which consumers must pay a fixed rate that is decided by a federal regulatory agency.

The Free Energy Market in Brazil promotes competition between renewable energy providers which results in lower prices and improved service quality for large consumers. The market also provides a direct avenue for private renewable energy producers to enter the Brazilian market without being subject to fixed prices. Private producers are able to negotiate prices directly with large energy consumers in competition with other producers without necessitating negotiations with a government intermediary.[7]

More recently, additional programs have emerged to incentivize private participation in this market while seeking to decrease prices for consumers. In 2009, Brazil started a series of successful reverse auctions to govern and facilitate the deployment of renewable energy. In this system, private parties that are interested in developing renewable energy projects compete against proposed conventional energy projects in regular tenders. As a result, the price paid by Brazilian consumers for renewable energy should be lower as developers have incentives to offer the lowest price possible. In another move aimed at promoting private sector involvement, the Brazilian Development Bank BNDES provides subsidized loans to companies which use at least 65% local content in building renewable energy projects.[8]

This institutional environment has motivated robust private investment in the Brazilian renewable energy sector on the part of energy providers, as well as private renewable energy traders that help provide energy to large consumers.

In the public sector, new organizations and institutions have been established to promote and develop the Free Energy Market. One of these is the Chamber of Electric Energy Trading (CCEE) which was created in 2004 as a private non-profit organization providing services for the entire value chain of energy trading: from consumption measurement to the clearing of energy contracts. CCEE overseas regulated PPA energy auctions, is responsible for accounting and financial clearing of the Brazilian energy spot market and calculating the spot price benchmark used by local agents to price their MWh sales.

6 International Energy Agency (2018). Brazil: Balances for 2015. Statistics. Obtained from on 17-04-2018 from https://www.iea.org/statistics/statisticssearch/report/?year=2015&country=Brazil&product=Balances

7 Liga de Investimentos (2017). Energy Market Overview in Brazil. Obtained on 17-04-2018 from http://www.li.poli.ufrj.br/index.php/2017/03/02/energy-market-overview-in-brazil/

8 International Trade Administration (2016). Top Markets Report Renewable Energy Country Case Study: Brazil. Obtained on 17-04-2018 from https://www.trade.gov/topmarkets/pdf/Renewable_Energy_Brazil.pdf

The Millennium and Vales Dos Ventos Wind Farms

As a renewable energy provider, Pacific Hydro has been active in the Australian wind and hydro energy sectors since the early 1990's and currently operates over 450 MW of installed capacity in Australia. At the time of Pacific Hydro's investments in Brazil, the firm was entirely owned by IFM, a specialist investment management company which in turn is wholly owned by a consortium of Australian superannuation funds, i.e. pension funds (Pacific Hydro was subsequently sold to the Chinese firm SPIC in 2016).[9] Pacific Hydro saw an opportunity to diversify its renewable energy portfolio by investing in Brazil and utilizing the country's Renewable Energy Market to help offload energy.

Pacific Hydro's investment in the Municipality of Mataraca in Paraiba, Brazil is made-up of two sub-projects: The Millennium Wind Farm Project with an installed capacity of 10.2MW and the Vales dos Ventos (VDV) Wind Farm Project with and installed capacity of 48MW.[10]

Development of the projects began in 2004 when the company Vales dos Ventos Geradora Eolica S.A., a wholly-owned subsidiary of Australian company Pacific Hydro, was granted several authorizations by the regulatory agency ANEEL to build and operate wind power plants located in the state of Paraiba. Pacific Hydro signed a 25-year contract with ANEEL for the Vales dos Ventos wind farm and a 30-year contract for the Millennium wind farm. These contracts granted the company the right to sell electricity in the Brazilian wholesale market as an independent producer. Pacific Hydro also signed power purchase agreements (PPA) with the state-owned company Electrobas for 20 years through the Brazilian Federal Program PROINFA, which is an incentive program for alternative power generating companies aimed at increasing private sector participation in the Brazilian energy sector.[11]

Construction of the Millennium Wind Farm project started in 2005 and the wind farm has been operational since 2007. Construction of the Vales dos Ventos Wind Farm project started in 2007 and although financial closure was only achieved in June 2009, the wind farm began generating electricity in the same year.[12]

Pacific Hydro contracted with the private energy contractor Comerc Energia, which is one of the largest traders and pioneers of the free energy trading market in Brazil. The company helps free consumers (i.e. large-scale energy consumers) acquire access to renewable energy sources such as from the Millennium and Vale dos Ventos wind farms. The company currently manages the energy load of approximately 800 domestic and multinational clients in the Free Energy Market.

Project Financing

For both projects, Pacific Hydro provided 100% of the equity. The equity check for the Millennium project was USD 6.3 million and the check for the Vales dos Ventos project was USD 44 million. Both projects were financed through debt from the state-owned Banco Nordeste do Brasil ("BNB") which underwrote a USD 16.4 million loan for the Millennium project and a USD 81 million loan for the Vales dos Ventos project.[13] Note that Banco Nordeste do Brazil is a Brazilian state-owned regional development bank, and that there was no multilateral involvement in financing either of the projects.

Table 1: Equity and Financing of Millennium and Vales dos Ventos Wind Farms

	Millennium	**Vales dos Ventos**
Pacific Hydro Equity Investment	6.3 million USD	44 million USD
Banco Nordeste do Brasil Loan	16.4 million USD	81 million USD
Total	**22.7 million USD**	**125 million USD**

In total the cost for both projects was USD 147.7 million, sub-divided into USD 22.7 million for the Millennium project and USD 125 million for the Valle dos Ventos project.[14]

9 Stewart, F. & Yermo, J. (2012). Infrastructure Investment in New Markets: Challenges and Opportunities for Pension Funds. OECD Working Papers on Finance, Insurance and Private Pensions. Obtained on 17-04-2018 from: http://www.oecd-ilibrary.org/docserver/download/5k8xff424vln-en.pdf?expires=1513101201&id=id&accname=guest&checksum=5591B9779C9C6C641D6E57DBA83D63AE.

10 The World Bank (2017). PPI Stata Dataset. Obtained on 17-04-2018 from https://ppi.worldbank.org/data

11 Chao, J. Harris, C. Hong, Seong. Rudnik, N. Park, J. Djalal, D. Delay, J. (2016). Private Participation in Infrastructure: Annual Update." World Bank Group, Public-Private Partnerships, Singapore: June 2017.

12 Pacific Hydro (2017). Vale dos Ventos wind farm. Projects. Vale dos Ventos wind farm. Obtained on 17-04-2018 from: http://pacifichydro.com/english/projects/brazil/vale-dos-ventos-wind-farm/.

13 Chao, J. Harris, C. Hong, Seong. Rudnik, N. Park, J. Djalal, D. Delay, J. (2016). Private Participation in Infrastructure: Annual Update." World Bank Group, Public-Private Partnerships, Singapore: June 2017.

14 Chao, J. Harris, C. Hong, Seong. Rudnik, N. Park, J. Djalal, D. Delay, J. (2016). Private Participation in Infrastructure: Annual Update." World Bank Group, Public-Private Partnerships, Singapore: June 2017.

Outcomes and Key Takeaways

The creation of the Free Energy Market in Brazil has created an institutional framework that promotes private entry into the renewable energy sector. Allowing large-scale energy consumers to negotiate directly, or through energy traders such as Comerc, with energy producers has the potential to increase efficiency and reduce prices; while at the same time incentivizing the private sector to invest in energy infrastructure to meet the growing energy demand in Brazil through renewables.

Looking specifically at the Millenium and Vale dos Ventos wind farms, both projects have contributed to the local economy and minimized negative impacts on the local communities. For example, the 13 wind turbines for the Millennium project were manufactured locally by Wobben, an Enercon subsidiary in Brazil. For the Vales dos Ventos project, extensive consultation was undertaken at the site regarding issues such as damage to the natural scenery, local flora, fauna and cultural heritage.[15]

Furthermore, the projects are particularly interesting in that they did not receive any international development bank funding. Instead, Pacific Hydro received a loan from a Brazilian state-owned development bank. Thus, the project is an excellent case study of a substantial infrastructure investment in a developing country where financing came from a domestic partner. Lastly, it should be noted that based on the success of the Millennium and Vales dos Ventos projects, Pacific Hydro is currently planning substantial additional investments in the Brazilian renewable energy sector.

15 Pacific Hydro (2017). Vale dos Ventos wind farm. Projects. Vale dos Ventos wind farm. Obtained on 17-04-2018 from: http://pacifichydro.com/english/projects/brazil/vale-dos-ventos-wind-farm/.