



ABEEólica

Associação Brasileira
de Energia Eólica



WIND INDUSTRY ANNUAL REPORT – 2012

Word from ABEEólica

Wind power has experienced an exponential and powerful growth in Brazil. From 2009 to 2012, the auctions in which wind power participated, contracted about 7.1 GW in new projects. Such projects have raised and will raise further the volume of wind power facilities in the country, totaling 8.8 GW of accumulated capacity by 2017, about three times the current capacity of 2.5 GW. The new projects will attract more than 10 billion dollar investments from 2013 to 2017.

Due to the successful history of wind power in Brazil, ABEEólica - Brazilian Wind Power Association, an institution that brings together and represents the national wind industry, is pleased to present the Wind Industry Annual Report – 2012. This document gathers relevant figures and information on the local accumulated capacity in the period mentioned, generation, capacity factor, accumulated capacity and the various contributions of the source, such as, reduction of system charges and CO2 emission avoided, among others.

The year 2012 was very important for the consolidation of wind power in the Brazilian energy matrix. In this period, the highest levels of power generation by wind farms were recorded in the country.

The last twelve months also represented a milestone for the competitive phase of the source, with the delivery of wind farms contracted in the 2nd Reserve Energy Auction, in 2009. These wind farms have produced around 50% of their accumulated capacity in 2012, with emphasis on the second half of the year. Moreover, some enterprises reached above 50% capacity factor.

Last year the average generation for the month was 413.9 GWh and the largest monthly generation was 573.6 GWh. Another important figure relates to the accumulated capacity, which increased from 1,430.5 MW in 2011 to 2,507.8 MW in 2012.

ABEEólica will disclose the Wind Industry Annual Report annually, in February, based on the analysis of source generation official data. This way, it will be possible to observe the evolution of wind power in Brazil and its valuable and growing contribution to the National Energy Matrix.

Sincerely,

Elbia Melo



SUMMARY

Accumulated Capacity in Brazil - All Sources	Generation	Capacity Factor
4	5	5
Contribution of Wind Power to Hydroelectric Reservoirs	Contribution of Wind Power to Reduce System Charges	Contribution of Wind Power for Household Supply
6	8	8
Contribution of Wind Power to CO ₂ Emissions Avoided	Wind Power Accumulated Capacity	Closing Remarks
9	10	10

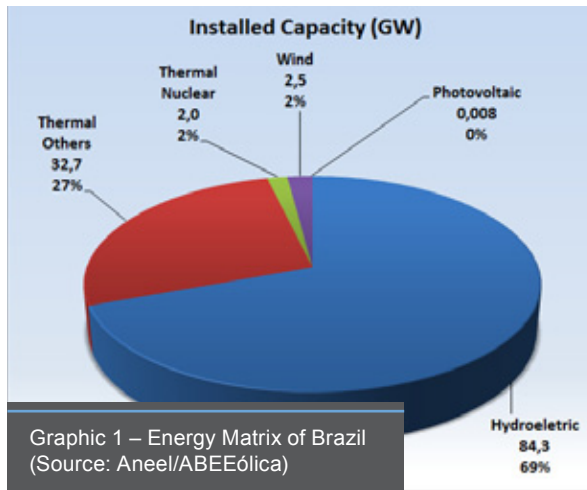
Accumulated Capacity in Brazil - All Sources

The year 2012 ended with 2,507.8 MW of accumulated wind power, distributed in 108 wind farms, reflecting approximately 73% power growth and additional 40 wind farms comparing with December 2011, when wind power had 68 wind farms and 1,450 MW. Chart 1 below illustrates the participation of the sources in the Brazilian energy matrix in December 2012.

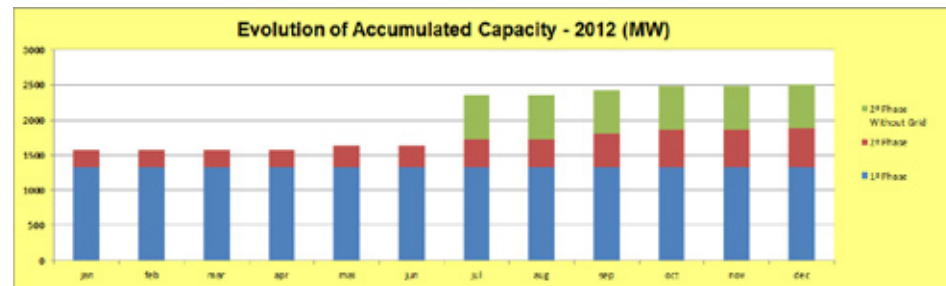
The 2.5 GW accumulated capacity is composed of 1.3 GW (52%) related to PROINFA and 1.2 GW (48%) related to auctions and free market. For better visualization and understanding of wind power evolution in Brazil, in this study, PROINFA will be considered phase 1 and the wind farms contracted after LER 2009 will be considered phase 2.

The main difference between Phase 1 and Phase 2 is related to the technological advances of wind turbines. The first PROINFA wind farms used 600 kW and 48 meter high wind turbines, while the new wind turbines are 1.6 MW and 3 MW and 100 meter high.

Chart 2 shows the accumulated capacity in 2012 and its composition, according to each deployment phase.



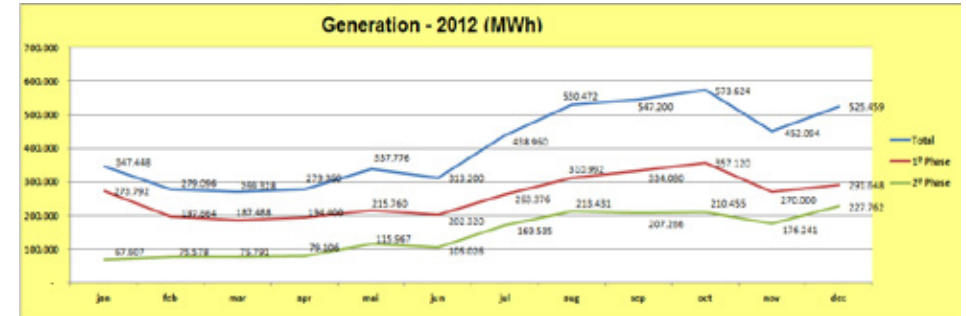
Graphic 1 – Energy Matrix of Brazil (Source: Aneel/ABEEólica)



Graphic 2 – Installed Capacity on Brazil in 2012

Generation

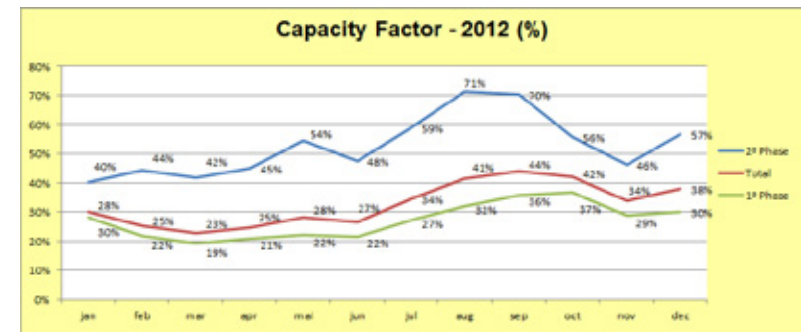
Chart 3 below shows wind power generation in 2012 in 3 trend lines - Phase 1, Phase 2 and Total. Wind farms generation in Phase 1 was greater than that in Phase 2 due to an increased accumulated capacity. Wind power generation in Brazil hit a record high in October, with 573.624 MWh.



Graphic 3 – Generation in 2012 (Source: CCEE/ABEEólica)

Capacity Factor

The wind power Capacity Factor (CF) is the ratio (percentage rate) of its effective output over a period of time to its full capacity in this same period. Chart 4 shows wind farms capacity factor in 2012.



Graphic 4 – Capacity Factor in 2012 (Source: ONS/CCEE/ABEEólica)



In Chart 4 it is possible to see the excellent performance of Phase 2 wind farms, due to technological advances and location of the wind farms. Table 1 shows the average capacity factors recorded in 2012.

Wind farms	Capacity Factor (%)
Phase 1	27%
Phase 2	54%
Total	33%

Table 1 – Averages of Capacity Factors in 2012

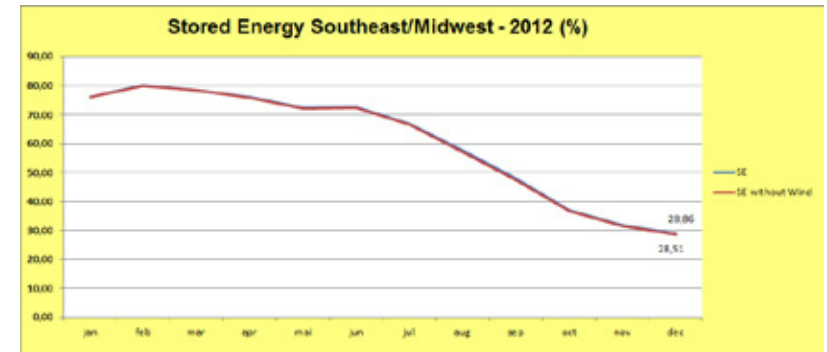
Contribution of Wind Power to Hydroelectric Reservoirs



Hydroelectric power accounts for 70% of the accumulated capacity in Brazil and power plants reservoirs are of great importance to assure electricity supply to the National Interconnected System - NIS, working as “batteries” during low hydrological rates.

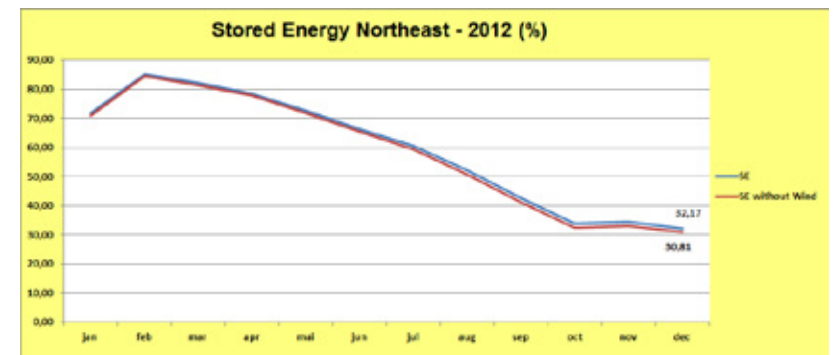
In this context, wind power plays a significant role in the grid providing electrical power with greater intensity in the second half of the year, causing, therefore, best storage rates in the reservoirs. Because wind power accumulated capacity represents 2% of Brazilian energy matrix, the impact on reservoirs in 2012 is still small.

In this study, simulations were made using hydroelectric reservoirs in the Southeast/Midwest and Northeast submarkets. Chart 5 compares Stored Energy (SE) curves of the Southeast/Midwest hydroelectric submarket in 2012, with wind power and without wind power. Due to the large storage capacity of the Southeast/Midwest submarkets, wind power accounted for 0.35% storage level growth in December 2012.



Graphic 5 – Storage Energy on Southeast/Midwest with wind power compared to the same without wind power in 2012 (Source: ONS/ABEEólica)

Chart 6 compares SE curves of the Northeast hydroelectric submarket assuming all wind power generated in 2012 were allocated in this subsystem. In this simulation, all wind power generated in 2012 would drive to 1.22% storage growth in the reservoirs of the Northeast submarket in December 2012.



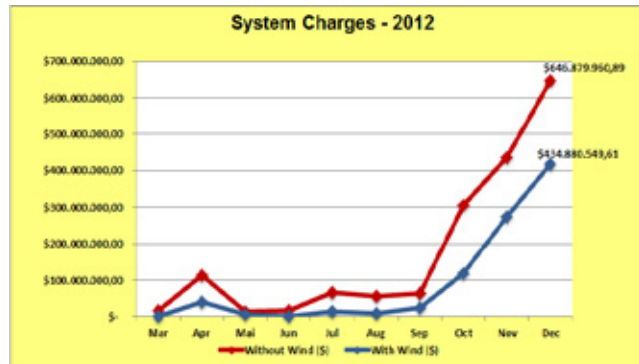
Graphic 6 – Storage Energy on Northeast with wind power compared to the same without wind power in 2012 (Source: ONS/ABEEólica)



Contribution of Wind Power to Reduce System Charges

In 2012, due to low storage levels in the reservoirs of hydroelectric power plants, the output of thermal power plants was necessary for energy security purpose, creating the ESS - SENERG (Charges for Energy Security Reason). Chart 7 compares the amount of charges in 2012 (blue line) with the amount that would be charged, at least, if not for the wind power in the Brazilian energy system (red line).

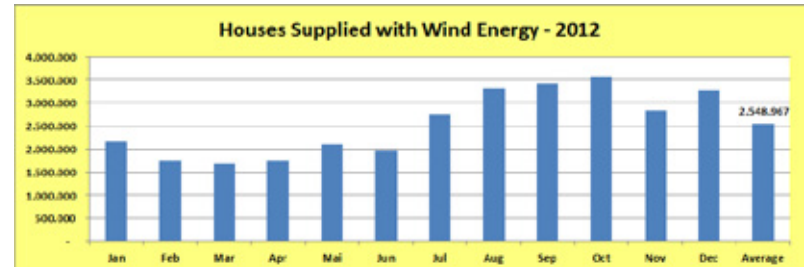
Only in December 2012, wind power avoided about R\$500 million in Charges for Energy Security Reason. If we consider the full year, wind power was responsible for saving about R\$1.6 billion. If there were no wind farms, total charges collected would be R\$3.4 billion, twice the amount actually charged to consumers.



Graphic 7 – System Charges by Security Energetics in 2012 (Source: CCEE/ABEEólica)

Contribution of Wind Power for Household Supply

The importance of wind power generated in 2012 can also be measured by the amount of Brazilian households served by this source. According to the monthly review published by the Energy Research Company - EPE, the average household consumption in Brazil is 160 kWh. Chart 8 shows the number of households supplied monthly with wind energy in 2012.

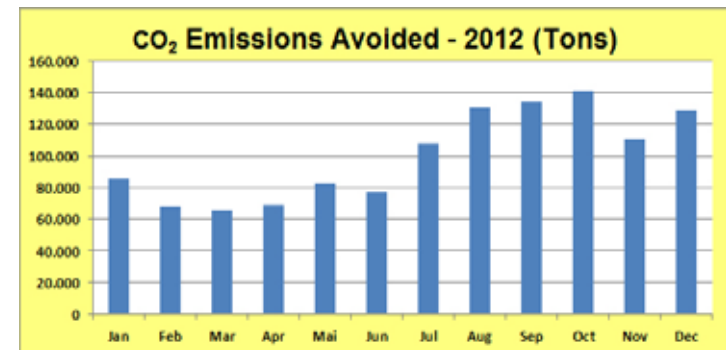


Graphic 8 – Houses Supplied by Wind Power in 2012 (Source: EPE/ABEEólica)

On average, about 2.5 million households were supplied per month and, considering an average of 3 people per household, this amounts to 7.5 million inhabitants. Therefore, the energy generated by wind power in 2012 was able to provide household electricity to a population equal to that of the city of Rio de Janeiro, which has 6.3 million inhabitants, according to the IBGE 2010 census.

Contribution of Wind Power to CO₂ Emission Avoided

By generating electricity from wind power, the Wind Farms replace other sources of electricity generation that emit CO₂. Chart 9 shows the amount of CO₂ emission avoided by wind power every month. Total emissions avoided in 2012 were 1.2 M tons CO₂.

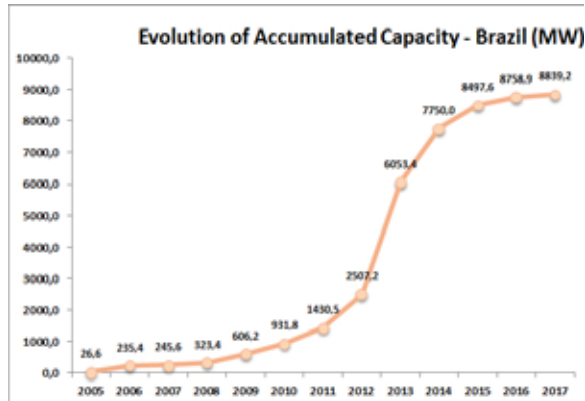


Graphic 9 – CO₂ Emission Avoided per month in 2012 (Source: ONS/MCTI/ECONERGY/ABEEólica)



Wind Power Accumulated Capacity

Chart 10 shows the evolution of wind power accumulated capacity and growth forecast considering the acquisitions already made in the regulated auctions and also in the free market.



Graphic 10 – Accumulated Installed Capacity in Brazil (Source: Aneel/ABEEólica)

Closing Remarks

Since 2005, wind power began to contribute in the Brazilian energy matrix and, each year, their participation becomes increasingly important. A high quality and safe electricity supply is fundamental for the development of the country.

With wind power generation, the reservoir storage index in 2012 has already improved and, in the coming years, this benefit will be even greater - a fact that will provide greater autonomy and security to electricity supply. Regarding the Northeast submarket reservoirs, were all wind generation allocated in this subsystem, the storage index in December 2012 would be 1.22% higher.

Through operation decisions, it is also possible to minimize the use of thermal power plants for energy security reason and reduce the amount of system charges. In 2012, the wind energy generated was responsible for avoiding the payment of R\$1.6 billion related to Charges for Energy Security Reason.

Wind power also shows its importance avoiding greenhouse gas emissions. Only in 2012, 1.2 M tons CO2 was avoided.

In addition to the contributions to the grid and the environment, deployed wind capacity in 2012 was responsible for generating R\$3.5 billion of investment and 15,000 jobs.

About ABEEólica

Reason for Being

Brazilian Wind Power Association - ABEEólica, nonprofit privately held corporation, founded in 2002, brings together wind power generation players in Brazil.

Mission

Establish wind power generation as source for national energy matrix, promoting competitiveness, consolidation and sustainability of the wind energy industry.

Vision

Be recognized as the association representing the supply chain industry in a legitimate, ethical and transparent way.

Values

Quality, ethics and compliance with legislation; Social and Environmental responsibility; Sustainability; Transparency; Cooperation with all supply chain players.

Organization

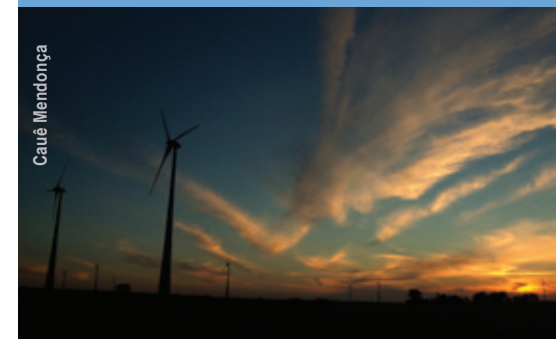
Based on the concept of professional management, ABEEólica governance format consists of a chief executive officer, Elbia Melo, a Board of Directors with 25 members and chaired by Otávio Silveira, and a Supervisory Board with counselors from associated companies.

Our structure

Chief Executive Officer – Elbia Melo
Financial Administrative Coordination – Clovis Mendes and Christiane Santos
Technical Coordination, Regulation and Infrastructure – Sandro Yamamoto, Emiliana Fonseca and Francine Pisni
Coordination of Institutional Relations and Press – Marcela Ruas and Felipe Vieira
Chairman of the Board – Otávio Silveira
Vice Chairman of the Board – Eduardo Leonetti Lopes, Laura Fonseca Porto, Lauro Fiuza Júnior, Paulo Celso Guerra Lage, Pedro Figueiredo Cavalcanti, Renato Amaral, Marcio Severi and Rosana Rodrigues dos Santos

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