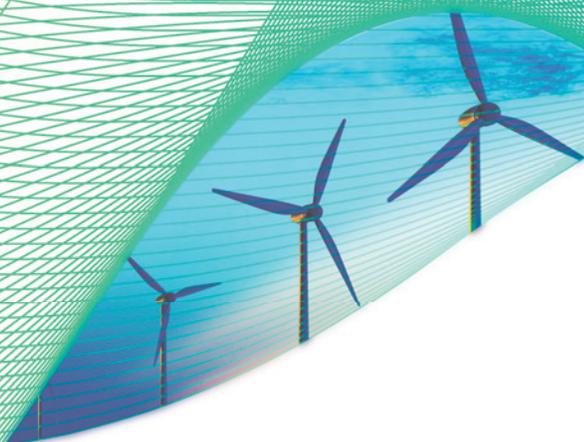




**ABEEólica**

Associação Brasileira  
de Energia Eólica



# 2017

ANNUAL WIND  
**ENERGY REPORT**

# 2017



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# MESSAGE FROM THE CEO



**Elbia Gannoum**  
ABEEólica CEO



This is the sixth ABEEólica Annual Wind Energy Report, which brings you data on a mature and dynamic industry experiencing robust growth. Over 2 GW of wind energy were added in 2017, in 79 new wind farms. This brought the total at the end of 2017 to 12.77 GW of installed capacity in 508 wind farms, or 8.1% of the nation's energy grid. Wind energy created over 30 thousand jobs in 2017, for an investment of US\$ 3.57 billion.

These key figures reflect a year of challenging work and consistent delivery of projects contracted in previous years.

2017 was also a year where the advantages of wind energy were widely felt. For example, wind energy was the salvation of the northeast, supplying over 60% of the energy needs in this part of the country, where hydro plant reservoirs are severely depleted. In all, the CCEE (Electric Energy Trading Chamber) believes that there was a 26.5% increase in the amount of wind energy between 2016 and 2017. For the first time ever, wind achieved a double-digit share of the energy generated in August (10%) and September (11%), at the height of the windy season.

We are also pleased to let our readers know that we worked with the ONS (National System Operator) to follow the implementation of the wind generation predicting model that will increase the accuracy of wind energy forecasts. At the launch event, the ONS explained that after this system was in place, there was rarely any need to reprogram generation due to violation of power reserves. This means we are handling the variability of wind energy in a technically correct manner, safely working within the margin of automatic generation control.

Global comparisons are also favorable. According to the GWEC (Global Wind Energy Council), Brazil has passed Canada, and is now ranked 8<sup>st</sup> worldwide in installed wind power capacity.



2017 was also a good year for transmission auctions, showing we are on the right path to finding a structural solution to enable the suitable flow of electricity. Regarding funding, in 2017 banks became more competitive and the possibilities for funding expanded. This improved scenario for wind energy is the result of several factors, including the BNDES decision to replace the TJLP (Long-Term Interest Rate) with the TLP (Long-Term Rate).

The main news however came at the very last minute - the A-4 and A-6 Auctions held on December 18 and 20. Wind energy was the star of these auctions, especially the A-6 auction, when 1.39 GW of wind energy were traded. If we add the result of the A-4 auction, a total of 1.45 GW of wind energy were contracted in 2017, an investment of more than US\$ 2.5 billion<sup>1</sup>. It is important to note that wind was the most competitive source of energy, traded at values below those offered by the large hydro plants. This is in line with global trends, as reported in the “2017 Renewable Power Generation Costs” published by IRENA, the International Renewable Energy Agency, which shows how the price of solar and wind energy is dropping around the world.

For all these reasons 2017 was a good year for wind energy, not only because of new facilities and increased generation, but mainly because the resumption of the auctions. Since the industry had faced two years without auction (from November 2015 to December 2017), there was a significant idle capacity in the industry. Thus, the contracts signed last December were essential to ensure the survival of the entire chain. It is important to remember that 80% of the chain is now supplied domestically, creating additional jobs and income for Brazil.

The government is talking about a more structured and earlier<sup>2</sup> auction plan, which is essential to banish the insecurity that industry players had been feeling. I would like to invite you to read our Annual Wind Power Report, with the most important data for 2017. We also publish monthly updates with industry numbers and news on the ABEEólica website and social network pages. Go online to keep track of what we are doing and what is going on in the industry.

**Enjoy your reading!**



<sup>1</sup> The conversion rate used was US\$1.00 = R\$ 3.20

<sup>2</sup> Decree 9<sup>st</sup>,143 of August 22, 2017 determined that, by March 30, the Ministry of Mines and Energy should publish an estimated calendar of Auctions for that year.



# INSTALLED CAPACITY IN BRAZIL – ALL SOURCES

79 new wind farms came on-stream in 2017, adding a total of 2,027.00 MW. Piauí and Bahia accounted for most of the new ventures - just over half the new ventures. We also call attention for the start of the first wind parks in the state of Maranhão.

## NEW INSTALLED CAPACITY ADDED IN 2017 (MW)

State	Power (MW)	Number of Wind Farms
PI	528.20	19
BA	517.10	20
RN	259.30	10
MA	220.80	8
CE	147.00	6
PE	131.10	5
RS	129.00	8
PB	94.50	3
<b>Grand Total</b>	<b>2,027.00</b>	<b>79</b>

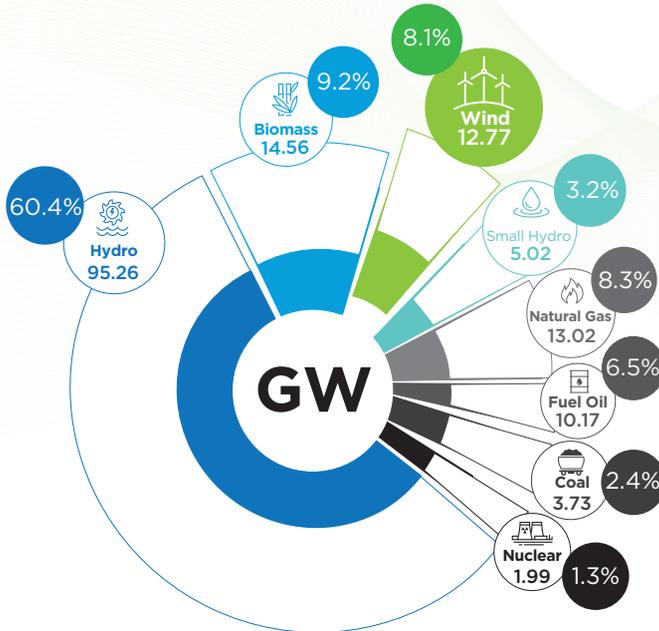
Source: ANEEL/ABEEólica

By the end of 2017 there were a total of 508 wind farms in the country, with an installed capacity of 12.77 GW, an 18.87% increase in wind power compared to December 2016, when the installed capacity was 10.74 GW.

Considering all sources of electric power, a total of 6.84 GW of new capacity were installed, primarily in hydro and wind power - 47.86% and 29.63% respectively. With an additional 2.03 GW, wind power now makes up 8.10% of the nation's power grid, as shown in Chart 1, showing the percent contribution from all sources of energy to the power grid in 2017. It is important to remember that at the end of 2016, wind power accounted for 7.12% of the energy generated.

# BRAZILIAN ELECTRICAL MATRIX (GW)

CHART 1



Source: ANEEL/ABEEólica

The 12.77 GW installed capacity includes 12.41 GW (97.23%) of wind farms in commercial operation, 0.26 GW (2%) in the testing phase, and 0.098 GW (0.77%) in plants able to operate<sup>3</sup>. Chart 2 shows how installed capacity grew over the year, including wind farms in operation<sup>4</sup> and those able to operate<sup>5</sup>.

## GROWTH OF INSTALLED CAPACITY IN 2017 (MW)

CHART 02



Source: ANEEL/ABEEólica

Total installed capacity in 2017: **2.03 GW**  
 Accumulated installed capacity in 2017: **12.77 GW**

<sup>3</sup> On 2013, ANEEL (the Brazilian Electric Energy Agency) published Normative Resolution 583, which defines the terms and procedures for obtaining and maintaining the operating status of power generation concern. Chapter I, Art. 2, paragraph I, defines the new operating condition suitable to able to operate, defined as an operating situation where the generating unit is able to produce energy to meet its trade commitments or for its own exclusive use, however, it is unable to provide power to the system due to delays or limitations of the transmission or distribution systems.

<sup>4</sup> Considers the installed capacity of generating units in commercial operations and in test as defined in regulation, at the plant busbar.

<sup>5</sup> Considers the date of recognition as the date of able to operate of the first unit of the wind park defined in regulation.

# GENERATION

In all, 42.25 TWh of wind energy were generated in 2017, 62.52% in the so-called windy season, which runs from July through December. This is a 27.45% increase compared to 2016. In 2017, 3,521.11 GWh were generated, in a monthly average, with a record in the month of September of 5,152.72 GWh. Chart 4 shows the average generating figures<sup>6</sup> for 2017.

## WIND POWER GENERATION 2017 (GWH)

CHART 03



Source: CCEE/ABEElólica

Total generated in 2017: **42.25 TWh**

In percentage terms, wind accounted for 7.44% of all the electricity generated and supplied to the National Interconnected System (SIN). In August, wind accounted for 10% of all the energy generated in the country. This is the first time this has been a double-digit number. By September this had increased to 11%.

<sup>6</sup> This chart shows wind energy generated by wind-farms in test and commercial operations at the plant busbar

Several records were broken in the months with the highest wind generation in 2017. Below are the records of demand supply for each sub-system<sup>7</sup> where wind is a source of power, and for the National Integrated System as a whole in 2017.

### NORTHEAST

On September 10<sup>th</sup>, 2017, 70.45% of all energy used in the northeast came from wind farms operating at a 71.21% capacity factor.

### NORTH

On October 1<sup>st</sup>, 4.16% of energy used in north came from wind farm at a 96.70% capacity factor.

### SOUTH

On October 8<sup>th</sup>, 2017, 16.59% of the energy used in the south came from wind farms operating at 67.58% capacity factor.

### NATIONAL INTEGRATED SYSTEM

On September 10<sup>th</sup>, 2017, 14.33% of all energy used in the National Integrated System came from wind farms operating at a 69.88% capacity factor.

Source: ONS

The chart below shows that the northeast subsystem's wind power capacity is close to the total generated, accounting for 84% in 2017, compared to only 14.4% in the south sub-system. This is because most of the wind farms in this country are in the northeast.

## WIND GENERATION<sup>8</sup> AND ITS SHARE OF THE POWER SUPPLY

CHART 04

Region	2016		2017		% growth
	Generation (TWh)	Share	Generation (TWh)	Share	
Southeast	0.07	0.2%	0.08	0.2%	13%
South	4.83	15.1%	5.84	14.4%	21%
Northeast	21.17	84.7%	33.99	84.0%	25%
North	--	--	0.55	1.4%	--%
<b>Total</b>	<b>32.07</b>	<b>100%</b>	<b>40.46</b>	<b>100%</b>	<b>26,2%</b>

Source: CCEE/ABEEólica

The five states with the greatest amount of energy from wind in 2017 were Rio Grande do Norte (13.24 TWh), Bahia (7.79 TWh), Ceará (5.87 TWh) and Piauí (4.59 TWh).

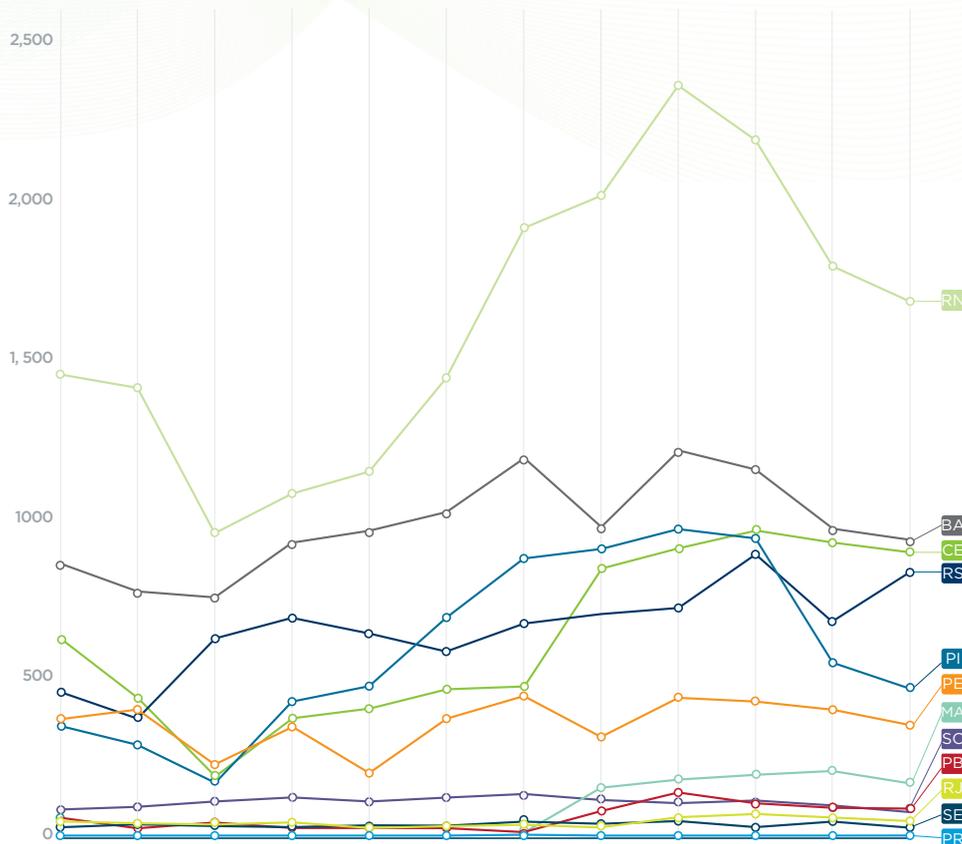
<sup>7</sup> The National Integrated System comprises four sub-systems: North, Northeast, South and Southeast/Middle-West. This is not the same as the geographic regions of the same name, since all the wind farms in the North sub-system are located in the state of Maranhão.

<sup>8</sup> Considers wind energy generated by wind-farms in commercial operation at the center of gravity.

The chart below shows the amount of wind power generated<sup>9</sup> in each Brazilian state.

## GENERATION BY STATE 2017 (GWH)

CHART 05



Source: CCEE/ABEólica

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
<b>RN</b>	1,064.1	804.0	634.3	754.1	794.4	1,050.0	1,380.6	1,490.6	1,604.0	1,427.2	1,160.7	1,079.2
<b>BA</b>	527.3	442.8	418.5	564.9	597.7	722.2	893.7	690.3	888.7	817.6	651.1	581.1
<b>RS</b>	359.3	249.7	448.6	478.1	449.0	409.3	483.8	525.3	530.0	598.8	486.0	566.9
<b>CE</b>	402.0	256.0	148.0	202.3	266.1	326.7	339.5	605.5	643.4	695.5	627.5	588.6
<b>PI</b>	203.1	150.4	129.8	271.9	350.6	438.7	503.0	539.7	664.3	608.9	373.2	358.0
<b>PE</b>	214.0	196.1	184.4	199.0	170.6	231.0	285.7	235.9	324.4	325.7	292.4	278.2
<b>MA</b>	-	-	-	-	-	-	7.6	72.4	112.6	117.5	126.5	115.7
<b>SC</b>	15.4	15.3	19.8	24.2	23.7	24.8	27.2	24.9	22.2	23.3	17.8	14.3
<b>PB</b>	13.3	9.7	7.7	9.9	7.1	11.6	15.4	15.4	23.0	48.8	45.0	43.8
<b>RJ</b>	10.9	4.9	5.3	3.8	4.4	3.0	3.4	6.8	11.8	10.1	7.0	6.1
<b>SE</b>	6.0	5.2	4.6	2.9	4.3	5.3	9.2	5.3	10.3	7.0	7.0	6.1
<b>PR</b>	0.2	0.2	0.3	0.4	0.4	0.4	0.4	0.4	0.3	0.3	0.2	0.2

<sup>9</sup> Considers wind energy generated by wind-farms in commercial operation at the center of gravity.

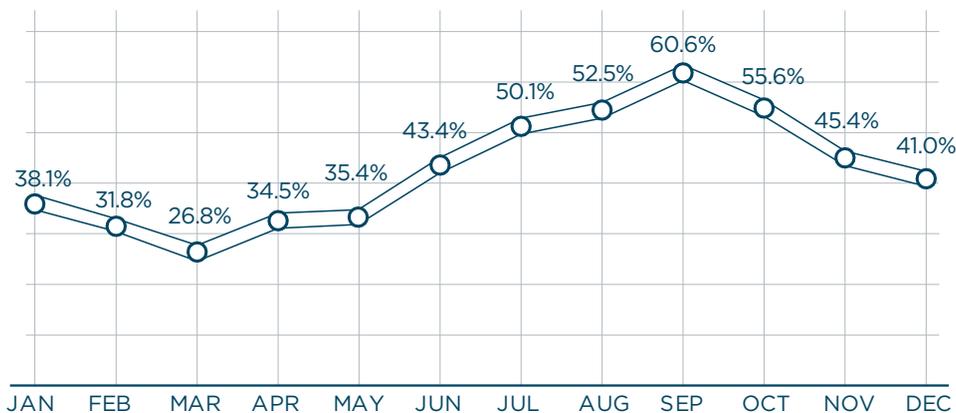
# CAPACITY FACTOR

The capacity factor<sup>10</sup> of a wind power source is calculated as the ratio of the plant's actual generation to its total capacity over a given period. The average capacity factor in 2017 was 42.9%, with a peak of 60.6% in the month of September. This is a very positive result, demonstrating that this energy source is consolidated in the country, even when we consider all the wind farms in Brazil, including those acquired from PROINFA<sup>11</sup>, with an average capacity factor of 25.2%, the industry is performing well above other countries. If we look only at wind farms using newer/better technology (e.g. excluding PROINFA farms), the average capacity factor in 2017 was 44.1%, peaking in September at 62.3%.

A 2016 survey of the Ministry of Mines and Energy shows that the average for wind farms around the world is 24.7%. In this document, the MME says: "Between 2000 and 2016 Brazil went from an average capacity factor of 20% to 41.6%. Worldwide these indicators are 22% and 24.7% respectively. Brazil went from a capacity factor below the world average in 2000 to one that is 68% higher<sup>12</sup>."

## CAPACITY FACTOR 2017

CHART 06



Fonte: ANEEL/CCEE/ABEEólica

Average capacity factor in 2017: **42.9%**

<sup>10</sup> Based on installed capacity and wind energy generated by wind farms in commercial operation, measured at the plant busbar.

<sup>11</sup> Incentive Program for Alternative Sources, introduced by Law 10762 of November 11, 2003 and governed by Executive Order 5025 of March 30, 2004, regarded internationally as the pilot program of renewable energy for electric power generation in Brazil. PROINFA plants follow a different contracting model from that adopted by current plants (auctions) and use outdated technology.

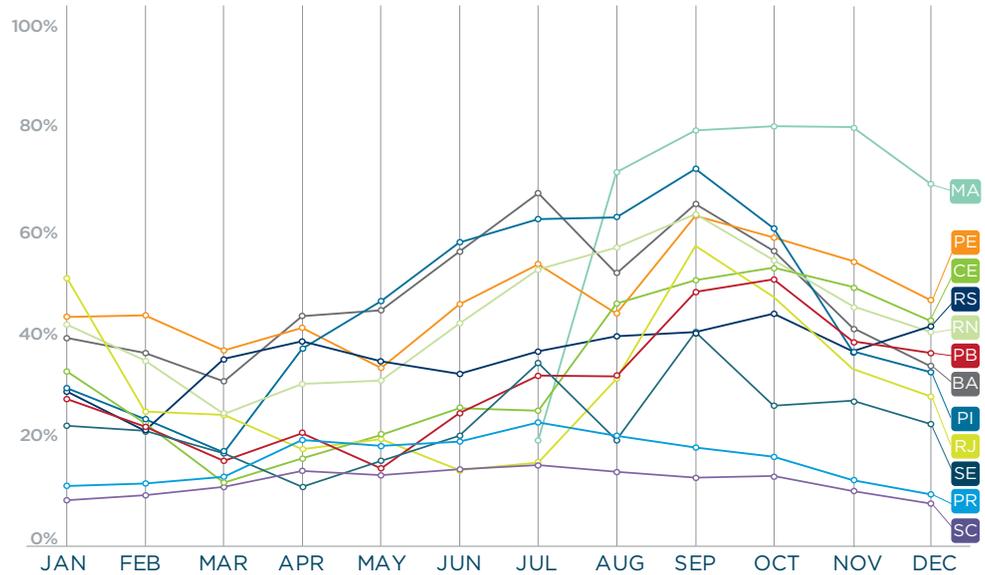
<sup>12</sup> Source: Department of Energy Planning and Development Bulletin entitled "Energia Eólica no Brasil e Mundo" (Wind Energy in Brazil and the World). This department is part of the Brazilian Ministry of Mines and Energy (MME).

During daily peaks, wind farm capacity factors exceeded 70%, as in the record generation measured in the north and northeast, and discussed in the previous chapter. During instantaneous peaks, capacity can be as high as 90%.

The five states with the largest average capacity factor in 2017 were Maranhão (68%), Bahia (48.5%), Pernambuco (48.3%), Piauí (46.1%) and Rio Grande do Norte (44.4%). In the case of Maranhão, where the first wind farms came on-stream in 2017, it is important to explain that the Capacity Factor has only been recorded since July, and thus covers only the period we call the “windy season”, which starts in July. The next bulletin will have a full year of data for this state to enable a fair comparison with wind farms located elsewhere in Brazil. Capacity factors calculated for each Brazilian state are shown in Chart 7 below.

## CAPACITY FACTORS BY STATE 2017

CHART 07



	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MA	--	--	--	--	--	--	20.7%	72.7%	80.9%	81.8%	81.6%	70.4%
BA	40.5%	37.7%	32.1%	44.8%	45.9%	57.3%	68.6%	53.0%	66.6%	57.5%	42.5%	34.9%
PE	44.5%	44.9%	38.1%	42.5%	34.6%	47.1%	54.8%	45.2%	64.3%	60.1%	55.6%	47.9%
PI	30.8%	24.7%	18.3%	38.5%	47.7%	59.1%	63.6%	63.9%	73.4%	61.8%	37.9%	33.9%
RN	43.2%	36.1%	25.8%	31.6%	32.3%	43.3%	53.9%	58.2%	64.7%	55.7%	46.8%	41.6%
RS	30.1%	22.6%	36.5%	39.8%	36.0%	33.5%	37.9%	40.8%	41.7%	45.3%	38.0%	42.9%
CE	34.0%	24.0%	12.4%	17.1%	21.7%	26.9%	26.4%	47.2%	51.8%	54.2%	50.5%	43.5%
RJ	52.3%	26.2%	25.5%	19.0%	20.9%	14.8%	16.3%	32.6%	58.4%	48.5%	34.6%	29.2%
PB	28.6%	23.2%	16.7%	22.0%	15.2%	25.8%	33.2%	33.1%	49.5%	51.9%	39.8%	37.6%
SE	23.4%	22.6%	18.1%	11.6%	16.6%	21.5%	35.7%	20.6%	41.6%	27.4%	28.3%	23.7%
PR	11.8%	12.2%	13.6%	20.7%	19.5%	20.3%	24.1%	21.5%	19.2%	17.5%	12.9%	10.2%
SC	9.0%	9.9%	11.6%	14.6%	13.9%	15.0%	15.9%	14.6%	13.4%	13.6%	10.8%	8.3%

Source: ANEEL/CCEE/ABEEólica

# WIND POWER CONTRIBUTION TO RESIDENTIAL SUPPLY

The importance of wind power generated in 2017 can also be measured based on the number of Brazilian households powered by this source, another index that demonstrates the importance of this source. According to the monthly review published by EPE (Empresa de Pesquisa Energética, or Energy Research Company), average residential consumption in Brazil in 2017 was 157 kWh per month.

Therefore, an average of 22.4 million households were supplied by wind power monthly, equivalent to some 67 million inhabitants<sup>13</sup>, almost 28.84% more than in the previous year, when wind power supplied 52 million people.

Enough energy was generated from wind in 2017 to power the homes of a population larger than the entire northeast region (over 57 million people)<sup>14</sup>.

The following chart shows the number of households powered by wind energy in 2017.

## HOUSEHOLDS SUPPLIED BY WIND POWER, MONTH BY MONTH

CHART 08



Source: CCEE/EPE/ABEEólica

Average monthly supply in 2017: - Homes: **22.4 million**  
Average monthly supply in 2017: - Inhabitants: **67.2 million**

<sup>13</sup> Considering an average of three people in each household.

<sup>14</sup> IBGE Data - Estimates of the Population Residing in Brazil and in the States, dated July 1 2017.

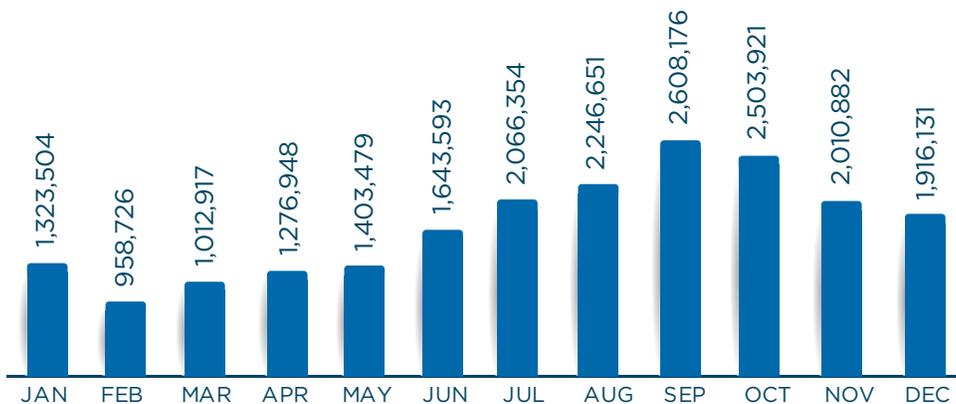
# WIND POWER CONTRIBUTION FOR REDUCING CO<sub>2</sub> EMISSIONS

In addition to very low implementation impact, wind power generation does not emit any CO<sub>2</sub>, and can replace other CO<sub>2</sub> emitting sources. The following chart shows CO<sub>2</sub> emissions avoided due to wind power month by month<sup>15</sup>.

Total avoided CO<sub>2</sub> emissions in 2017 added up to 20.97 million tons, equivalent to the annual emissions of 16 million automobiles<sup>16</sup>. For comparison purposes, the city of São Paulo has a fleet of over 6 million passenger cars, and the state of São Paulo a fleet of over 18 million<sup>17</sup>.

## AVOIDED CO<sub>2</sub> EMISSIONS IN EACH MONTH OF 2017 (TONS)

CHART 09



Source: CCEE/MCTIC/ABEEólica

Tons CO<sub>2</sub> avoided in 2017: **20.97 million**

<sup>15</sup> Based on the MCTIC (Brazilian Ministry of Science, Technology, Innovation and Communication) methodology and data used to calculate emissions avoided due to wind power (75% in power plant operation and 25% in power plant construction).

<sup>16</sup> Considers the indices in the 2016 State of São Paulo Vehicular Emissions Report issued by CETESB, the state of São Paulo Environmental Company.

<sup>17</sup> Fleet data provided by Detran-SP, updated to December 2017.



# SOCIOENVIRONMENTAL CONTRIBUTIONS OF WIND POWER

Wind power is renewable, non-polluting, has low environmental impact and helps Brazil fulfill its Climate Agreement Goals.



Wind farms do not emit CO<sub>2</sub>. In a single year wind energy avoided CO<sub>2</sub> emissions equivalent to some 16 million automobiles, or over twice the number of passenger cars in the city of São Paulo.



It offers one of the best cost-benefit ratios for energy. The best prices for energy offered at the December 2017 auctions came from wind farms.



Wind farms generate income and improve the quality of life of land-owners who lease their land for wind tower placement. There are now about 6,500 such towers in operation in Brazil. We believe some 4,000 families are receiving a total of over US\$ 3 million<sup>18</sup> a month to lease their land for towers. Leases are taxed so the government also benefits significantly.



This benefit enables land-owners to continue planting their crops or growing their animals



Job creation, payment of leases to land-owners, the possibility of farming and wind energy activities coexisting are just some of the means that help keep people in rural areas.



Training local labor.



<sup>18</sup> The conversion rate used was US\$1.00 = R\$ 3.20

In addition to these benefits, wind energy has a positive impact on the community due to social, cultural, healthcare and environmental projects undertaken for the development of the local population. These initiatives are extremely important for the surrounding community and reflect investor interest in the region. Below are a few examples of community projects undertaken by wind energy players:

Measures to promote water safety, providing access to safe water for humans and other activities, including isolated communities



Digital inclusion activities, training youth and adults, fostering employability and enterprise.



Stronger and expanded local production chains such as coconut, manioc, corn, beans, honey, milk and others to improve the population's income and promote sustainable development.



Health promotion projects including oral health and nutrition, for instance.



Activities to encourage sports and homework supervision.



Activities to encourage tourism, art, gastronomy and regional culture with festivals, courses, training and contests.



Encouraging local artisans.



Encouraging educational projects such as day-care centers and schools, with initiatives to increase the quality of life of students in public schools, with citizenship activities, educator training and better school environments. Foster discussions on sustainable development and renewable energy.



# RENEWABLE ENERGY CERTIFICATE PROGRAM

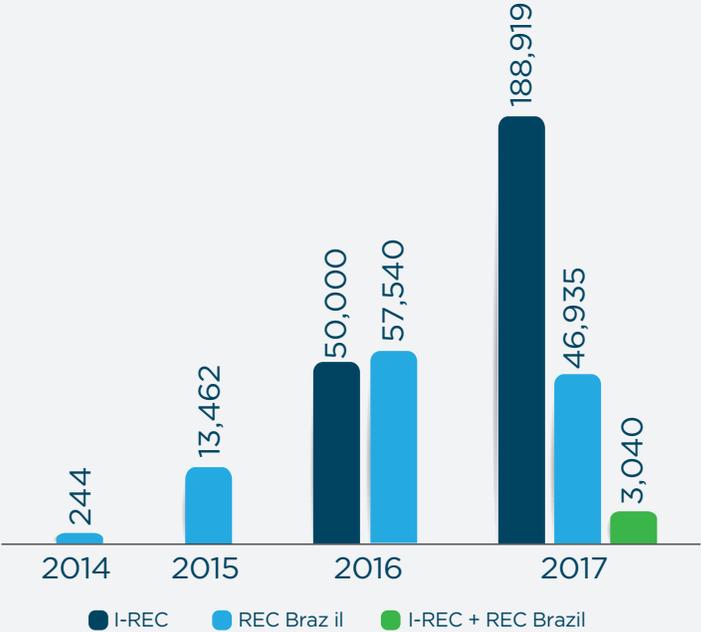
REC Brazil is a Renewable Energy Certification Program, a joint initiative of ABEEólica - Brazilian Wind Energy Association and Abragel - Brazilian Clean Energy Association, with the support of the CCEE and ABRACEEL - Brazilian Association of Energy Traders. The aim is to foster an industry made up of highly sustainable energy generated from renewable sources.

The Renewable Energy Certification Program in Brazil is managed by Instituto Totum and uses the International REC Standard (I-REC) platform to register and issue certificates. This ensures that RECs issued in Brazil follow the same standards of RECs issued elsewhere in the world. Furthermore, the Brazilian Renewable Energy Certification Program provides the REC Brazil Seal to generation ventures with distinctive sustainability. Both initiatives are coordinated by Instituto Totum, a third-party certifier that specializes in self-regulation and industry seals. Instituto Totum is the local issuer of RECs in Brazil. The first 200 certificates were issued in 2014. In 2017 there were over 230 thousand certification transactions.

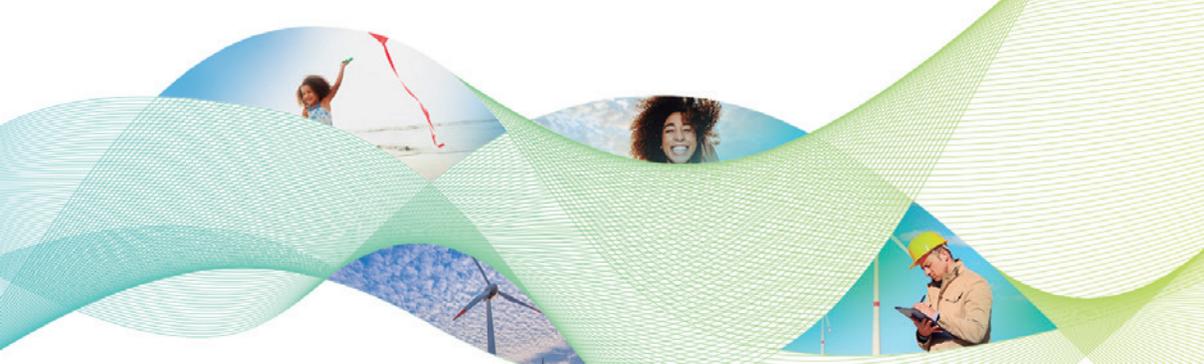
For further information go to [www.recbrazil.com.br](http://www.recbrazil.com.br).

## GROWTH OF RENEWABLE ENERGY CERTIFICATE TRANSACTIONS

CHART 10



Source: Instituto Totum

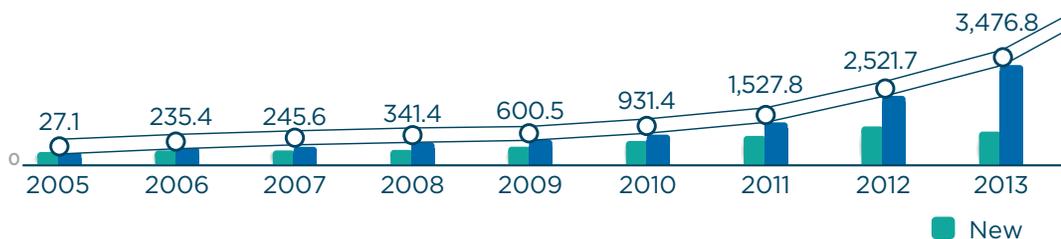


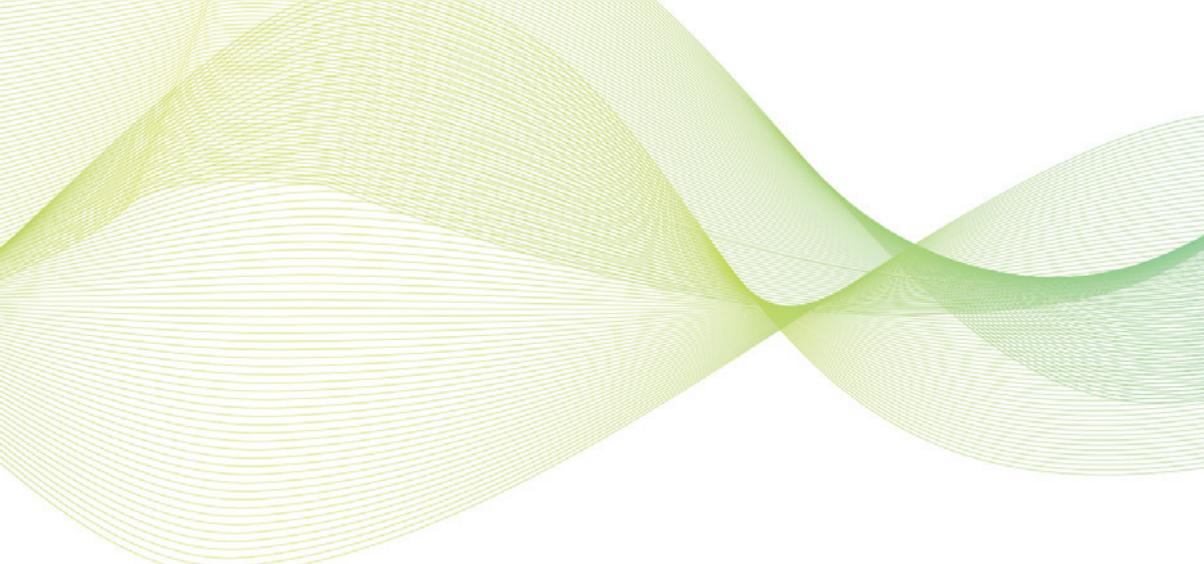
# EXPANSION OF THE WIND POWER INSTALLED CAPACITY

The following chart shows the increase in installed capacity and the growth of wind power as a function of previous contracts in regulated auctions and free market agreements.

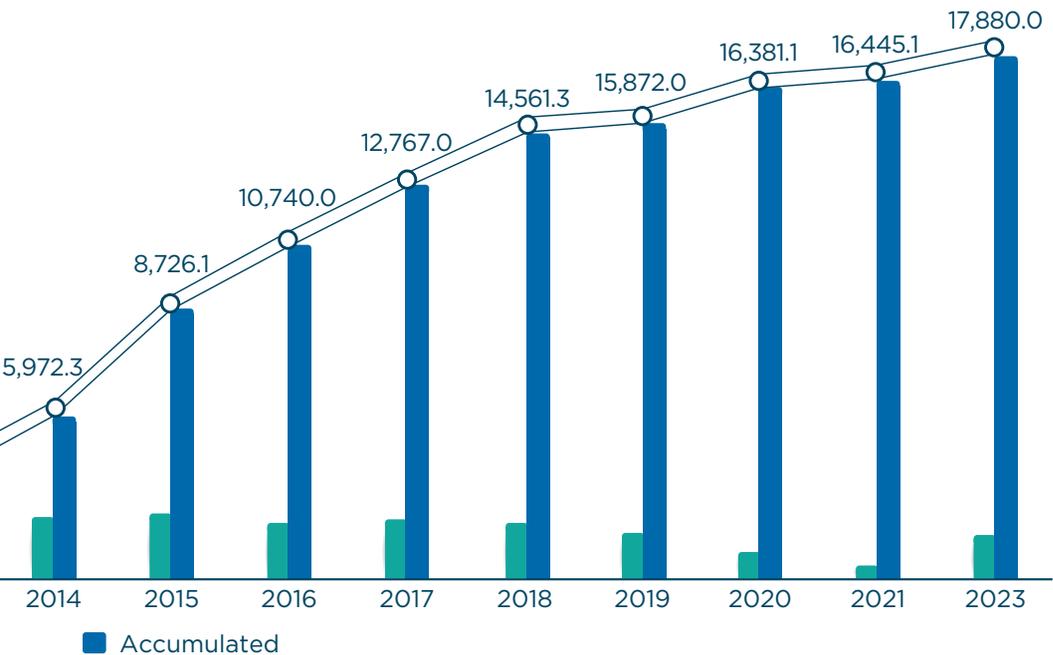
## GROWTH OF THE INSTALLED CAPACITY (MW)

CHART 11





Even with the December 2017 auctions, the small amount contracted in 2015, and none in 2016, impacted the wind energy supply chain, and we already see a drop in new energy installed in 2019, 2020 and 2021.



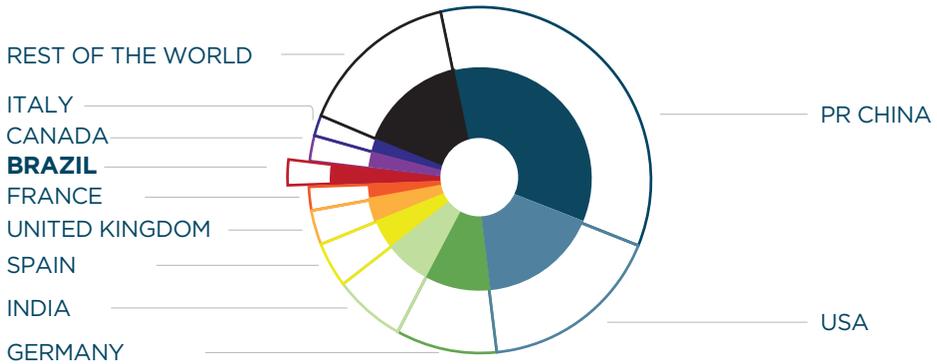
Source: ANEEL/ABEEólica

# GLOBAL FIGURES

In 2017, Brazil passed Canada in the GWEC (Global World Energy Council) ranking of Installed Wind Capacity and is now number 8 in the world. In 2012, Brazil was number 15.

## TOP 10 CUMULATIVE CAPACITY 2017

CHART 12



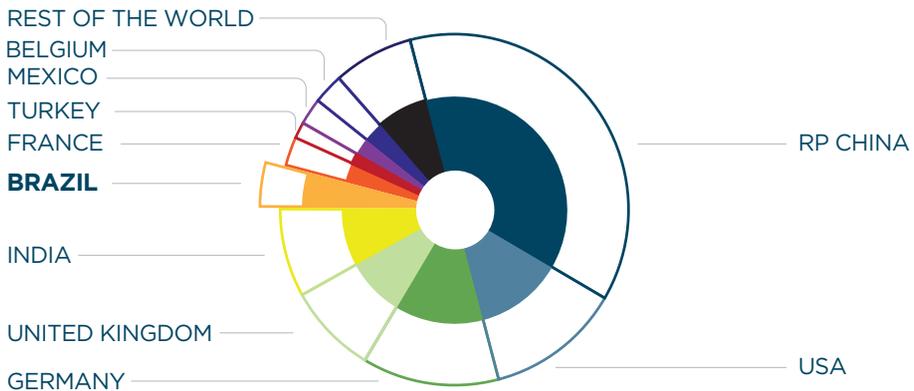
	COUNTRY	MW	%
1	RP CHINA	188,232	35
2	USA	89,077	17
3	GERMANY	56,132	10
4	INDIA	32,848	6
5	SPAIN	23,170	4
6	REINO UNIDO	18,872	3
7	FRANCE	13,759	3
8	<b>BRAZIL</b>	<b>12,763</b>	<b>2</b>
9	CANADA	12,239	2
10	ITALY	9,479	2
	REST OF THE WORLD	83,008	15
	<b>TOTAL TOP 10</b>	<b>456,572</b>	<b>85</b>
	<b>TOTAL</b>	<b>539,581</b>	<b>100</b>

Source: GWEC

In the new installed capacity list, Brazil ranks sixth, having installed 2 GW of new capacity in 2017. In this list, Brazil dropped one position, as the UK went from 9th place to the 4th, having installed 4.27 GW of wind energy capacity.

## TOP 10 NEW INSTALLED CAPACITY 2017

CHART 13



	COUNTRY	MW	%
1	RP CHINA	19,500	37
2	USA	7,017	13
3	GERMANY	6,581	13
4	UNITED KINGDOM	4,270	8
5	INDIA	4,148	8
6	<b>BRAZIL</b>	<b>2,022</b>	<b>4</b>
7	FRANCE	1,694	3
8	TURKEY	766	1
9	MEXICO	478	1
10	BELGIUM	467	1
	REST OF THE WORLD	5,630	11
	<b>TOTAL TOP 10</b>	<b>46,943</b>	<b>89</b>
	<b>TOTAL</b>	<b>52,573</b>	<b>100</b>

Source: GWEC

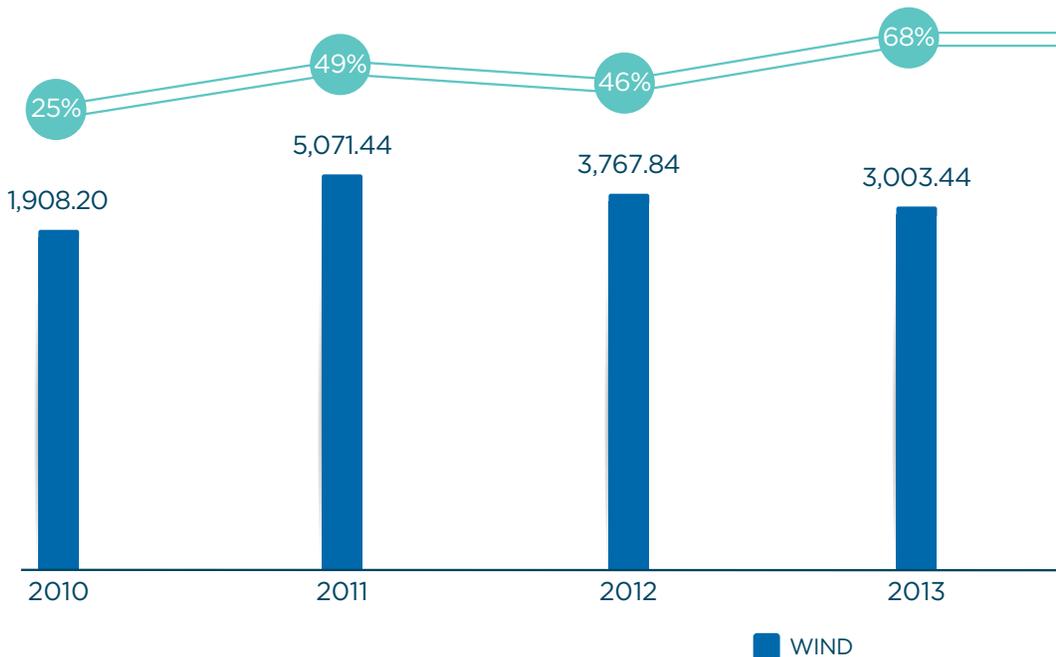


# INVESTMENTS IN WIND POWER

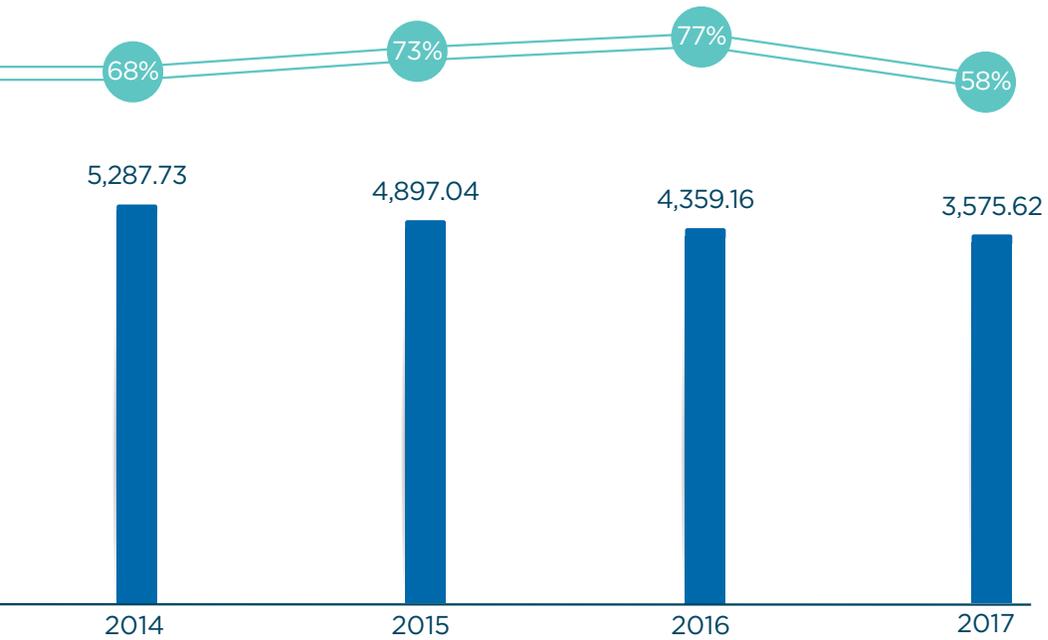
US\$ 3.57 billion were invested in wind power in 2017. This is 58% of the total invested in renewable sources (solar, wind, biofuels, biomass and waste, PCHs, etc.).

## INVESTMENTS IN US\$ MILLION

CHART 14



If we look at 2010 through 2017, the total was US\$ 32 billion. The following chart shows investments in renewable energy and the amount invested in wind energy since 2010, as calculated by BNEF (Bloomberg New Energy Finance)<sup>19</sup>.



Source: BNEF/ABEólica

● Representativeness in relation to the total invested by renewable energy

<sup>19</sup> The BNEF reviewed its previous data based on the premise that there may be "occasional variations in total invested by region, as deals not declared in previous quarters impact historical numbers".



# CLOSING REMARKS

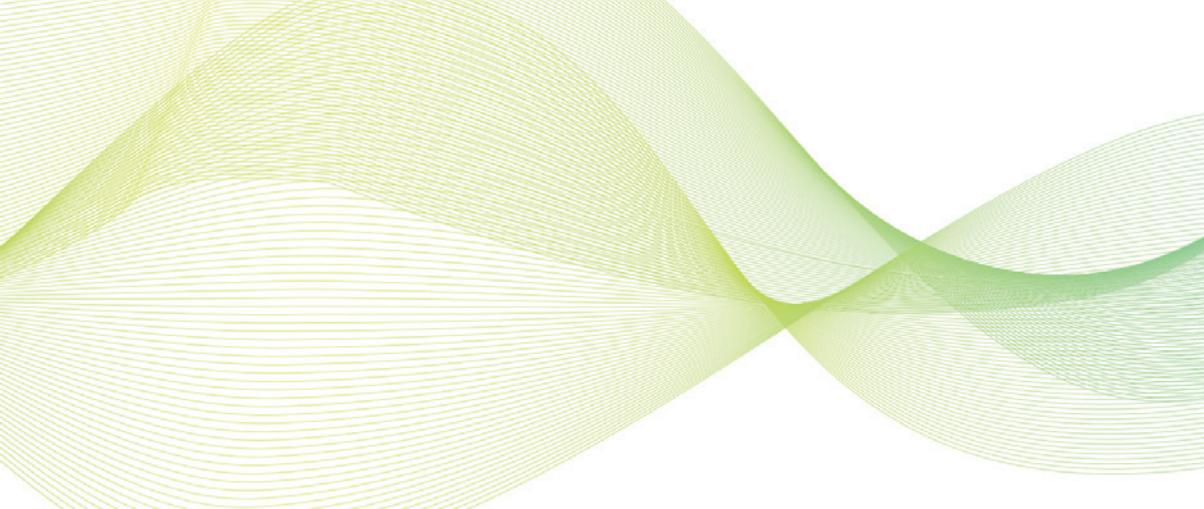
As shown in this document, 2017 was a year of challenging work, a bit of anxiety regarding the need for new auctions, and very positive results. The December auctions that resulted in 1.45 GW being contracted meant the year ended well, and players are more confident regarding the future of Brazil's wind energy industry.

The industry expects 2018 will be different, blending technical and industry-specific issues we must address directly, and broader themes that we must follow carefully, such as the elections. Regarding the political scenario, ABEEólica's opinion is that we must be up to date with the political scenario and elections, also keeping in mind to focus on our hard work and dedication to an industry that has been experiencing consistent growth, based on solid and technical arguments and the certainty that we are defending a sustainable and efficient source of energy that offers society real socio-economic benefits.

Regarding industry-specific themes for 2018, we would mention funding and increased supply of capital in the private sector, reforms in the electric sector, expanding the free market and changes in the price levels for wind energy.

It is also increasingly important to monitor and actively participate in discussions on the development and progress of innovative technologies such as batteries, electric cars and hybrid power plants. Our 2017 institutional video spoke of the disruptions we expect in the electric power industry because of these technologies. We believe these will demand even more attention from ABEEólica and its technical staff, as wind energy is an essential component of the current transformation wave, which has the protection of the environment as a backdrop.

Regarding international activities, I would remind you that 2018 started with good news as Brazil has started the process to join IRENA, the International Renewable Energy Institute. Created in 2009, IRENA has a serious, systematic and profound approach to the issue, and has quickly become a world authority on renewable energy. IRENA studies are often used by government bodies and agencies as they offer ample scenario descriptions and significant industry intelligence produced by extremely knowledgeable professionals. The decision to join IRENA was as accurate one that will doubtless bring us positive results. With over 500 wind parks in operation, productivity levels well above global averages, highly competitive auctions and sustainable growth that includes



concrete social benefits, we believe Brazil can make important contributions to IRENA discussions. We also have a lot to gain from the knowledge of other countries and will doubtless benefit from the accumulated body of knowledge in the institute.

Regarding demand, ABEEólica's target continues to be contracting at least 2 GW of wind energy a year, which we believe is essential to signal investors and give them confidence to invest in the entire chain. It is also essential to Brazil to achieve its commitments under the Paris Climate Agreement.

In 2018, we will have a great new capacity to be installed and we must finish the year with more than 14 GW of wind power installed capacity. This reflects auctions held in previous years, and we must continue to fight for new ones. As shown in the new capacity curve (see pages 22 and 23), the fact that there were no auctions for two years left a gap for the 2020 - 2021 period, when there will be very little growth. Furthermore, ABEEólica is engaged in continuous technical and transparent dialog with government bodies to ensure auctions that enable healthy and sustainable growth of wind energy in Brazil. This is a constant challenge that will always be the focus of our activities.

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## **Printing**

Gráfica Nova Visão

## ABOUT ABEEÓLICA

Established in 2002, ABEEólica, the Brazilian Wind Power Association is a non-profit organization that brings together and represents the wind power sector in Brazil. Since it was created, ABEEólica has effectively contributed to the development and recognition of wind energy as a competitive, clean, renewable, low-impact source of energy, and a strategic element of Brazilian electrical matrix.

## JOIN US

Learn of the advantages of being a member and read the association statutes on the ABEEólica website at “Join Us”, or send an e-mail to [comunicacao@abeeolica.org.br](mailto:comunicacao@abeeolica.org.br)

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