Ciclo de mesas redondas "A APREN e as Universidades" | Dia Mundial do Vento

A Energia Eólica: Presente e Futuro

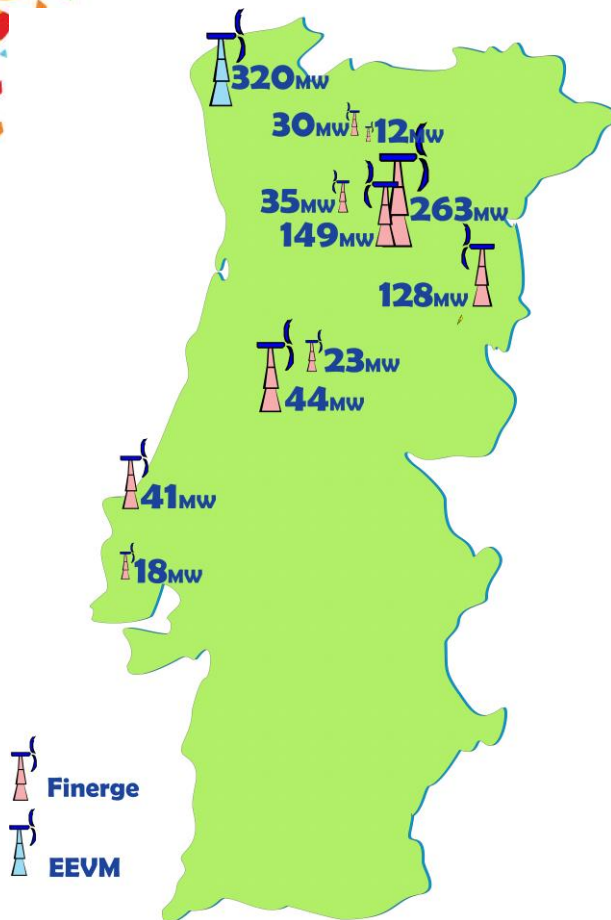Escola de Engenharia da Universidade do Minho, Auditório B1.10 | 15 de Junho de 2018

Celso Xavier

Desafios na operação das centrais eólicas da Finerge em Portugal

PORTFÓLIO NEW FINERGE
6.3 % Renewable Power
3.9% Electricity Consumption (2017)

Region/Zone	Wind Farm	Installed capacity [MW]	Net capacity [MW]
North	Aguieira	0.6	0.5
	Alto da Vaca	2.4	2.4
	Arcipreste	0.6	0.6
	Alfarrobeira	0.6	0.6
	Azinheira	14.0	14.0
	Lagoa D. João	34.0	34.0
	Alto do Marco	12.0	12.0
	Alto Douro	**253.2**	**253.2**
	Fonte da Mesa 2	10.0	10.0
	Gevancas	11.5	11.5
	Douro Sul	**149.1**	**149.1**
	EEVM	**319.6**	**159.1**
	Total	**807.6**	**646.9**
Center	Videira	6.0	6.0
	Alvaiázere + Arega	18.0	18.0
	Sicó	20.0	10.5
	Raia	**128.8**	**128.8**
	Picos Vale do Chão	22.6	22.6
	Total	**195.4**	**185.8**
West	Moinho Velho	1.8	1.8
	Capucha	10.0	10.0
	Almargem	6.0	3.3
	Lourinhã 1	20.7	20.7
	Lourinhã 2	20.7	20.7
	Total	**59.2**	**56.5**
	Total Portfolio	**1062.1**	**889.2**

Map labels: 320 MW, 30 MW, 12 MW, 35 MW, 263 MW, 149 MW, 128 MW, 23 MW, 44 MW, 41 MW, 18 MW

Legend:
- Finerge
- EEVM

Age of the Fleet
Traditional Portfolio: 113.8 MW – 10.5 years
Other/Clusters: 616.5 MW – 5.7 years

Vale do Minho: 159.1 MW - 9 years
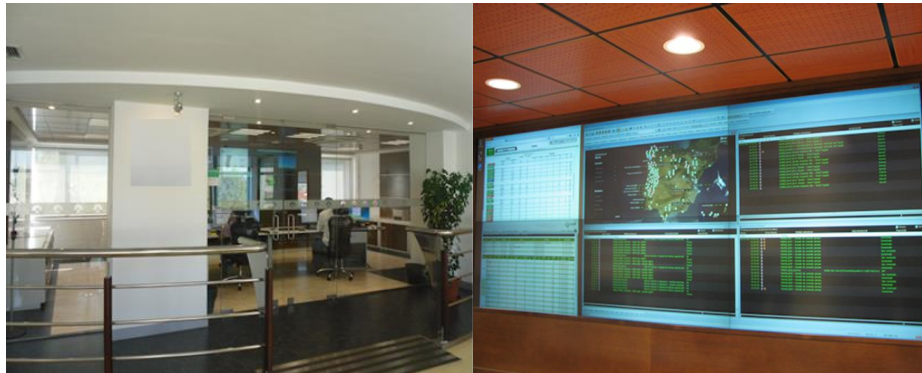
Finerge

Control Room New Finerge

10 years of experience
- 1º wind farm connected in 09/2007
- Operation 24/07 started in 2009
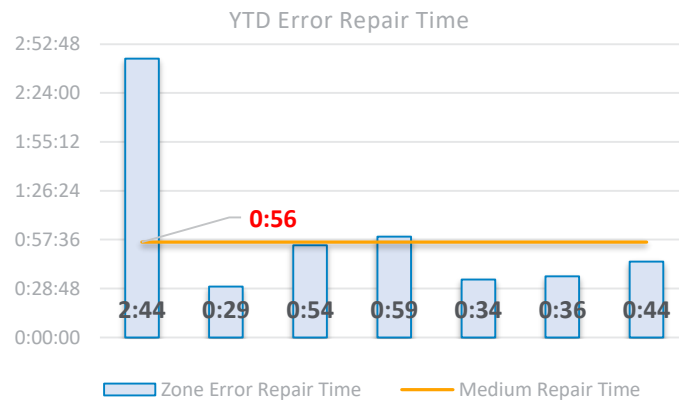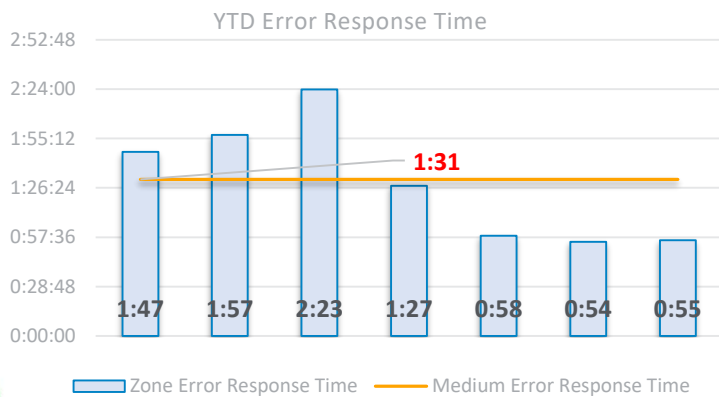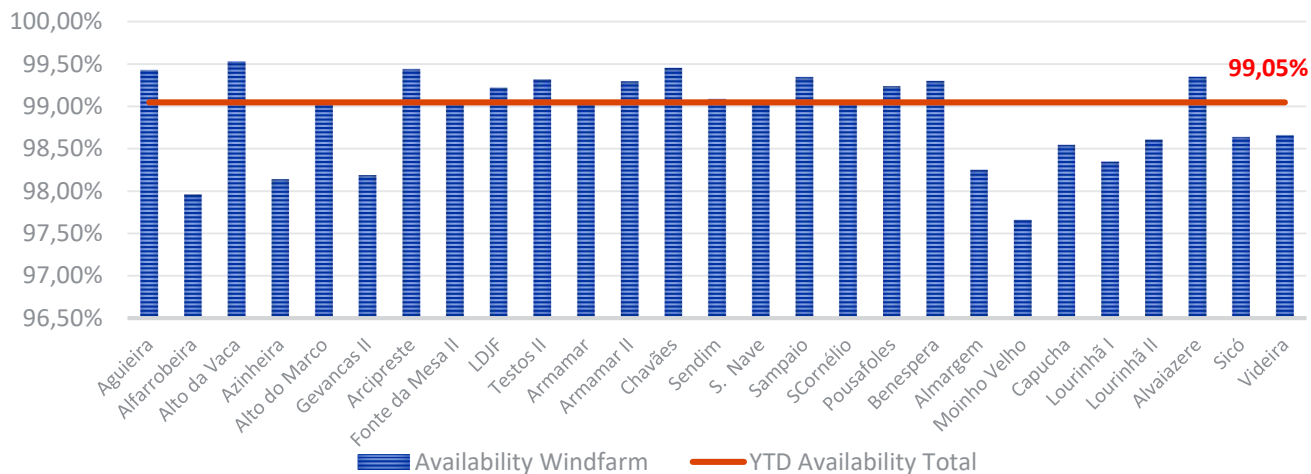- Provides C. Room Services to third-party

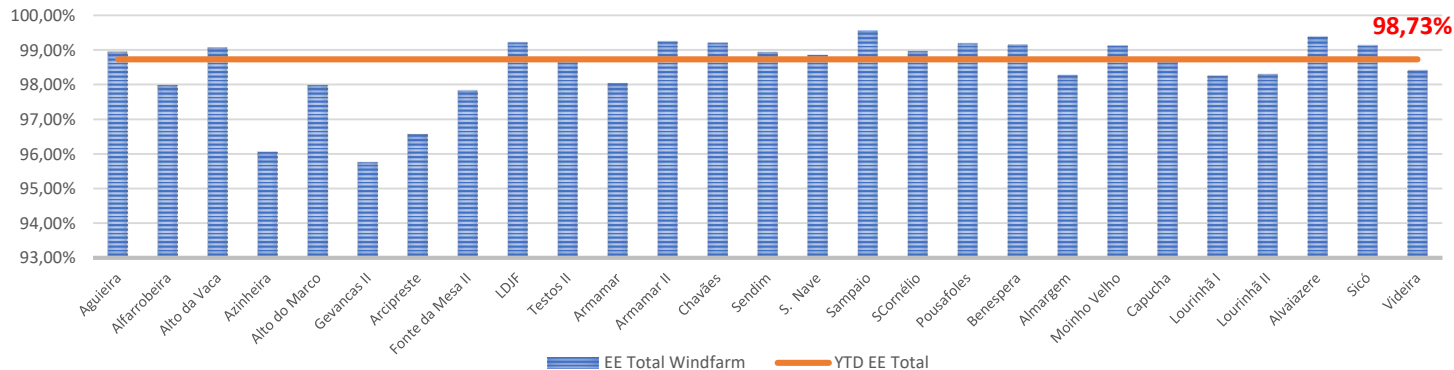<u>33 Win farms integrated - totalizing 754.8 MW</u>

<u>Main goals:</u>

- Real time monitoring of WECs and electrical equipment
- Remote reset of WECs and electrical equipment rearm
- Interlocution with DSO (EDP Distribuição) and TSO (REN)
- Sending data to the TSO (REN) and reception/dispatch of power limitation setpoints and other parameters
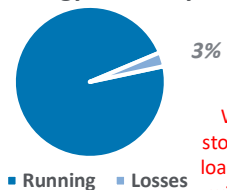- Contribution to the Safety of Equipment and **People**

Time Availability Analysis

Availability Windfarm (bar chart) with reference line at **99,05%** (YTD Availability Total)

X-axis labels: Aguieira, Alfarrobeira, Alto da Vaca, Azinheira, Alto do Marco, Gevancas II, Arcipreste, Fonte da Mesa II, LDJF, Testos II, Armamar, Armamar II, Chavães, Sendim, S. Nave, Sampaio, SCornélio, Pousafoles, Benespera, Almargem, Moinho Velho, Capucha, Lourinhã I, Lourinhã II, Alvaiazere, Sicó, Videira

Legend: Availability Windfarm — YTD Availability Total

YTD Error Response Time

Values: 1:47, 1:57, 2:23, 1:27, 0:58, 0:54, 0:55
Reference line: **1:31**

Legend: Zone Error Response Time — Medium Error Response Time

YTD Error Repair Time

Values: 2:44, 0:29, 0:54, 0:59, 0:34, 0:36, 0:44
Reference line: **0:56**

Legend: Zone Error Repair Time — Medium Repair Time

Finerge

Energy Efficiency

98,73%

Chart legend: EE Total Windfarm | YTD EE Total

Windfarms (x-axis): Aguieira, Alfarrobeira, Alto da Vaca, Azinheira, Alto do Marco, Gevancas II, Arcipreste, Fonte da Mesa II, LDJF, Testos II, Armamar, Armamar II, Chavães, Sendim, S. Nave, Sampaio, SCornélio, Pousafoles, Benespera, Almargem, Moinho Velho, Capucha, Lourinhã I, Lourinhã II, Alvaiazere, Sicó, Videira

Energy Efficiency

Running ■ **Losses**

3% **>** *1%*

Which means that the stoppages occurred with a load factor higher than the windfarms' average load factor.

Availability

Available ■ **Unavailable**

Energy Efficiency

Running ■ **Losses**

1% **<** *3%*
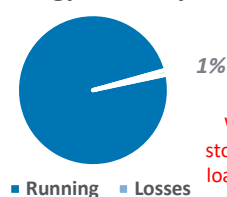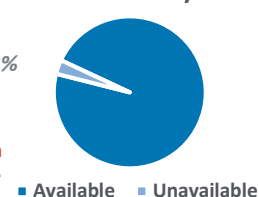
Which means that the stoppages occurred with a load factor lower than the windfarms' average load factor.

Availability

Available ■ **Unavailable**

Finerge

Main Components Control

Monitoring of Power Curve

The daily control of the Power Curve give us the possibility to optimize the "use of wind" and in that way improve the efficiency of the installation.
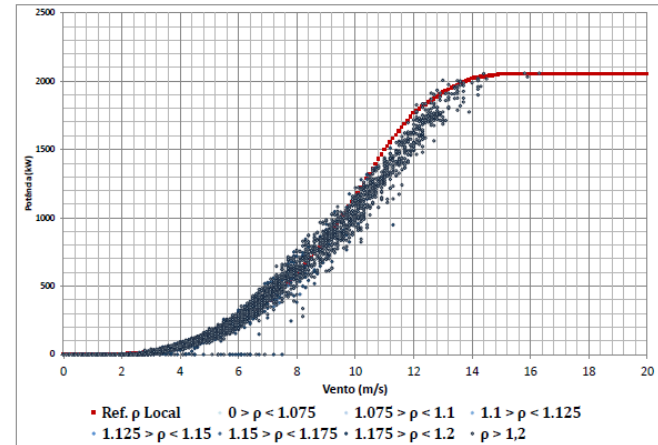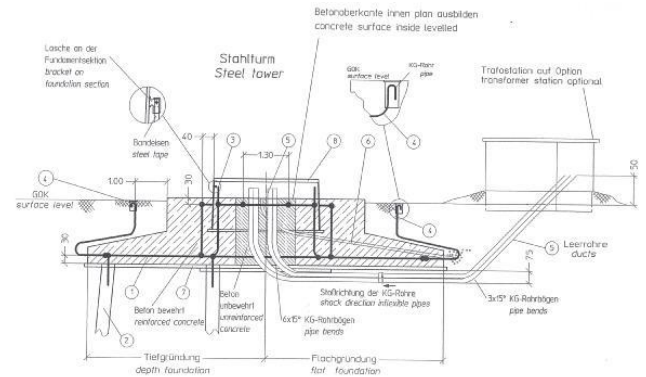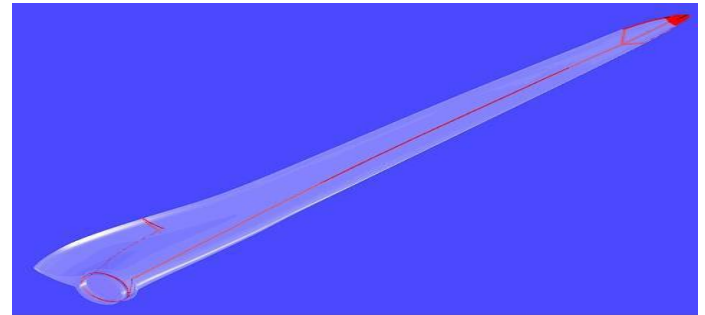

Monitoring of Temperature

Building reference curves with historical data and comparing those with new data monthly, so as to avoid several defects in the main components.

BEARING TEMPERATURE ANALYSIS

Legend: Temp Bearing Front REF, Temp Bearing Rear REF, Temp Bearing Front Period, Temp Bearing Rear Period, Tem Ext Periodo, Tem Ext REF
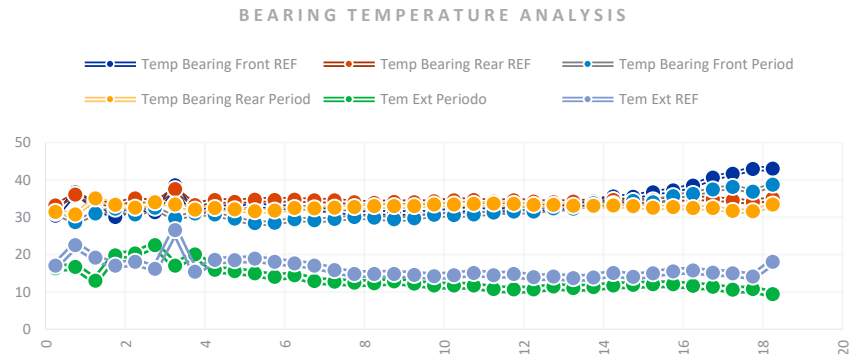
Lightning Protections and design

WEC external lightning protections

Annual Analyses of Power Use

Average Distribution

Considering the last 5 years, we had an equivalent production of 2,214 hours/year at full load.

From an annual point of view, we can considerer that we produce 77.2% of the energy in winter, spring and autumn (53% of the energy is produced between November and March).

Generically, in summer (the remaining 4 months) we only produce 22.8% of the energy.
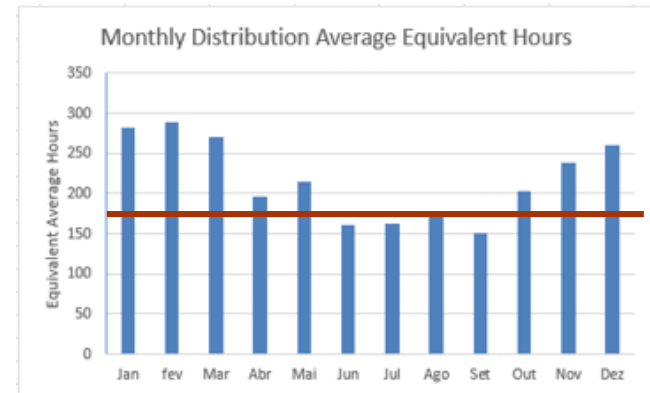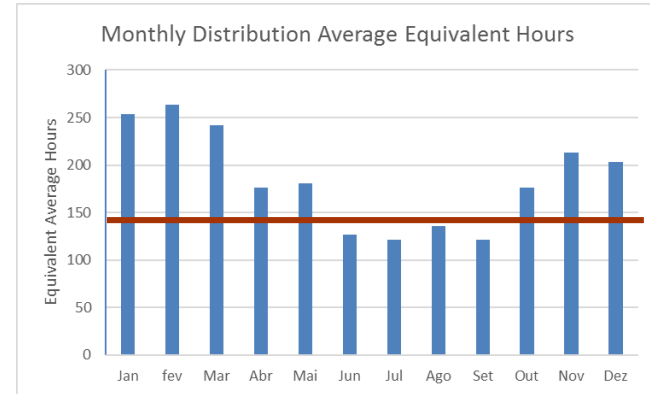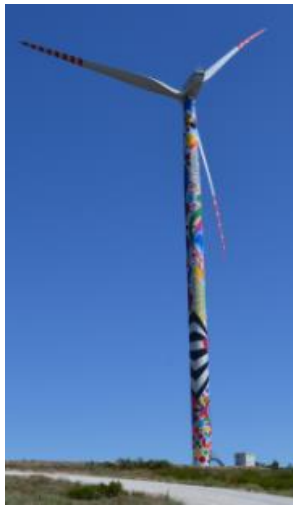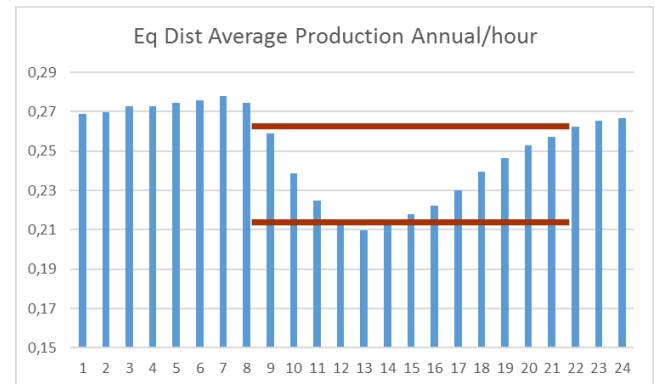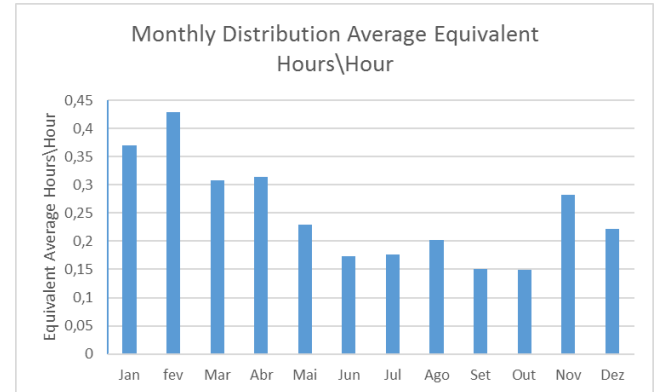

Distribution without Âncora, Alto Douro and Raia

Daily and Intraday Analysis

Average Distribution

During the day, from a monthly point of view, we can considerer that the distribution is similar.

From an intraday point of view, it seems clear that from 9 a.m. to 7 p.m. we have a reduction in the utilisation of the installed power.

Monthly Distribution Average Equivalent Hours\Hour

Eq Dist Average Production Annual/hour

Obrigado!

Finerge

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