

# Opening Up in the Wind Industry

[charlie.plumley@cubicoinvest.com](mailto:charlie.plumley@cubicoinvest.com)

# Who are we?

**Cubico**  
SUSTAINABLE INVESTMENTS



## Our Purpose

To be a leading investor in, and **long-term owner and operator** of, **global** renewable energy projects, leveraging our strong **local presence** with a unique combination of in-house business development, operations, financial, commercial and technical expertise

**3.3**

GW of capacity

**3.8**

TWh in 2018

**\$1.5b**

Investment value

**253**

Direct employees

**13**

Technical Team  
Members

**87**

Assets

**11**

Countries



**HQ**

London

**2**

Energy Analysts

# Contents



Where are we at?

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Who has the power?

---

How to make a difference

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Concrete examples

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Lets engage!

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# Where are we at?



OEMs



**Cubico**  
SUSTAINABLE INVESTMENTS



# Who has the power?

Operators

Owners

Consultants

Researchers

# How to make a difference?

- Talk openly, discuss ideas, be supportive
- Ask! For data, for access, for code
- Think about and focus on the benefits, not just the risks
- Be prepared to explain slowly and take baby steps
- Highlight when you use open data, source code, software
- Publish, present and make it reproducible



ERA5  
MERRA2  
NEWA

SCOTLAND

Fort William

Forfar

Dundee

St Andrews

Edinburgh

Glasgow

Kilmarnock

Ayr

Galashiels

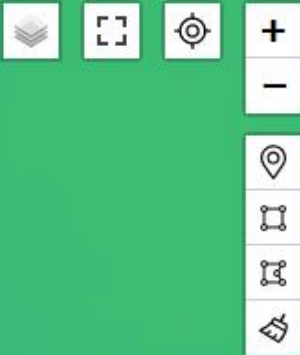
Dumfries

Carlisle

Newcastle  
upon Tyne

Coleraine

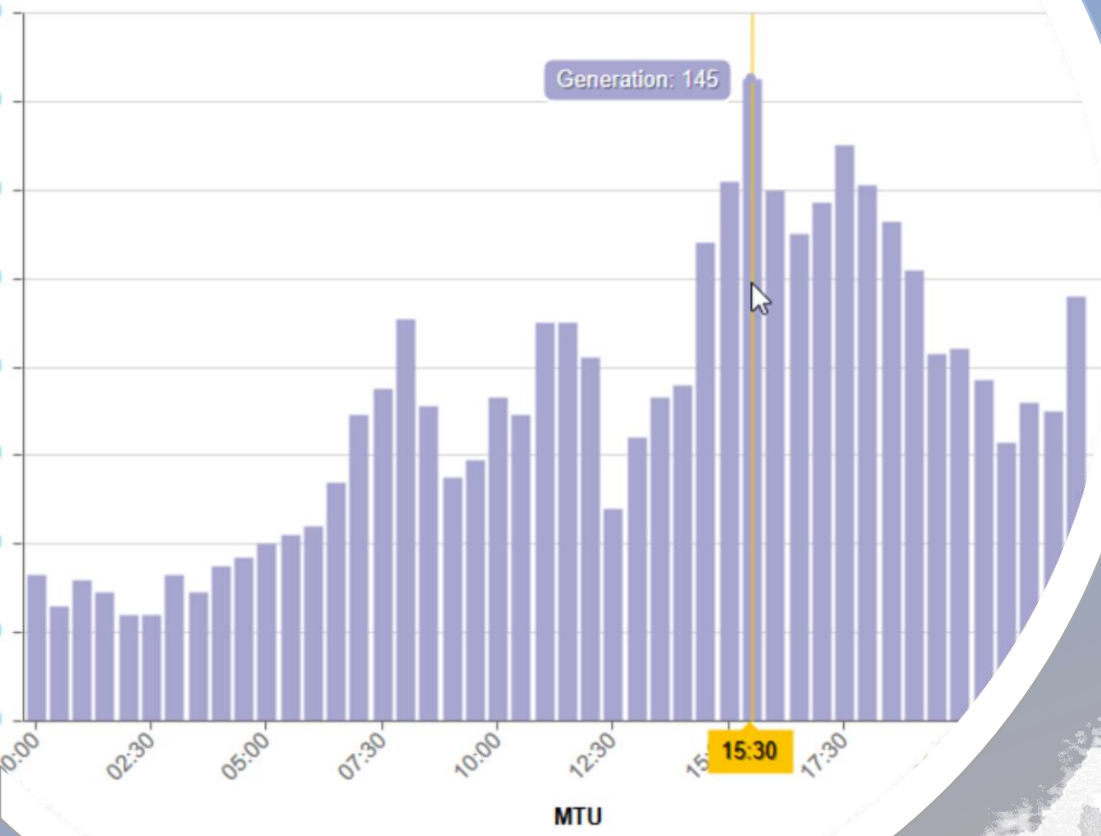
Londonderry/  
Derry



m/s  
15+



BZN GB			
	Generation Unit	Generation	Consum.
		[MW]	[MW]
Onshore	WHIHW-1	3 (VARY)	N/A
Onshore	WHILW-1	33 (VARY)	N/A



ENTSO-E





WindEurope Resource Assessment 2019 Last Checkpoint: 05/20/2019 (autosaved)

File Edit View Insert Cell Kernel Help Trusted Python 3

### Open-source Python library for wind data processing

WindEurope  
Resource Assessment 2019  
27-28 June, Brussels

#### Example usage of the brightwind Python library within a Jupyter Notebook.

##### 1. Import the library

```
In [1]: import brightwind as bw
```

##### 2. Load some data

The below will load a Campbell Scientific formatted csv data file into memory.

```
In [2]: file = r'C:\BW\brightwind-demo\data\campbell_scientific_demo_data.csv'
data = bw.load_campbell_scientific(file)
data
```

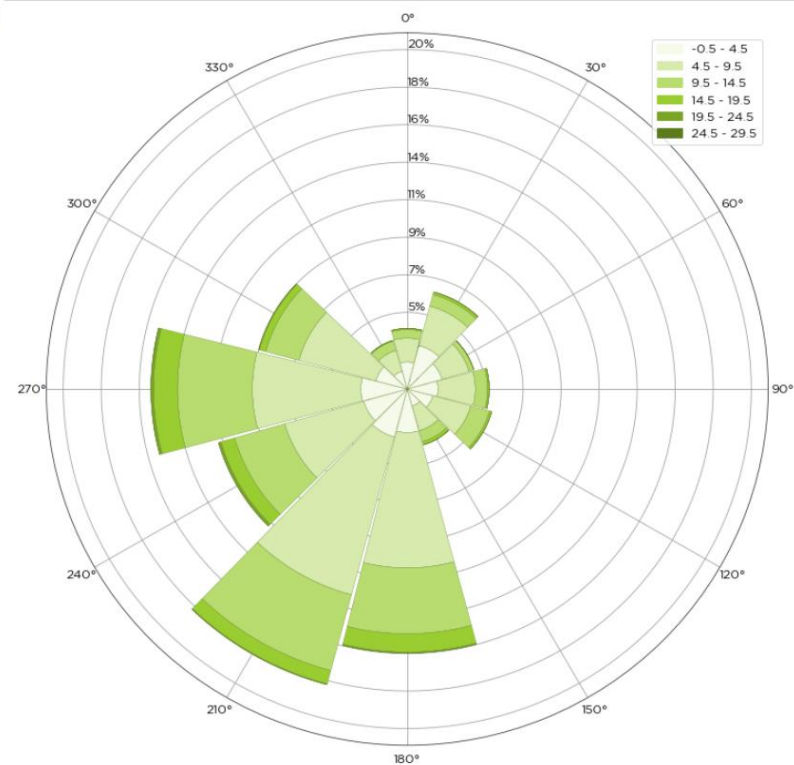
Out[2]:

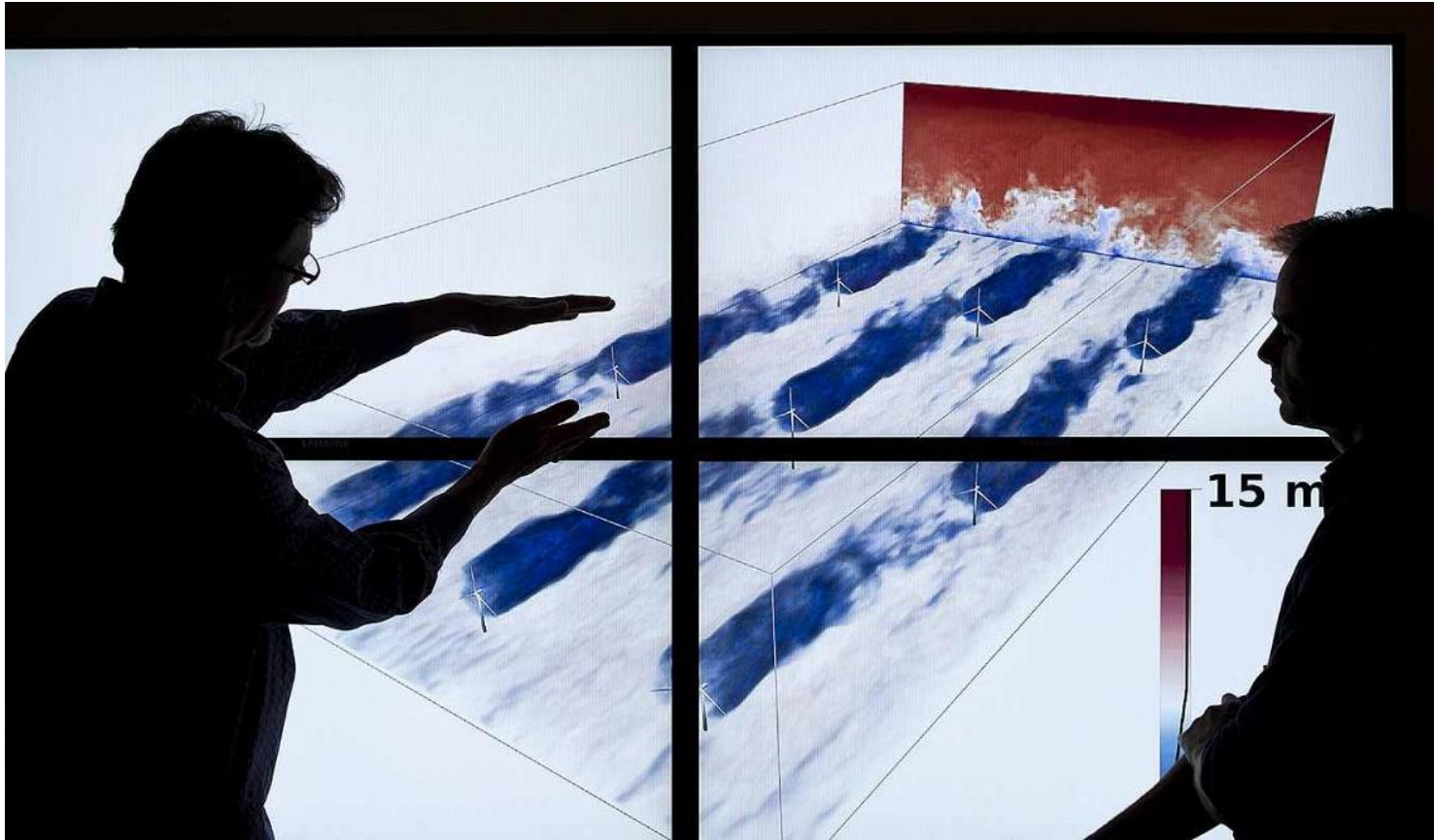
	RECORD	Site	LoggerID	Spd80mN	Spd80mS	Spd60mN	Spd60mS	Spd40mN	Spd40mS	Spd80mNStd	...	Dir78mSStd	Dir50mS	Dir50m
Timestamp														
2016-01-09 15:30:00	0	demo_mast	7000	8.370	7.911	8.160	7.849	7.857	7.626	1.240	...	6.100	110.10	
2016-01-09 15:40:00	1	demo_mast	7000	8.250	7.961	8.100	7.884	7.952	7.840	0.897	...	5.114	110.90	
2016-01-09 17:00:00	2	demo_mast	7000	7.652	7.545	7.671	7.551	7.531	7.457	0.756	...	4.172	113.10	
2016-01-09 17:10:00	3	demo_mast	7000	7.382	7.325	6.818	6.689	6.252	6.174	0.844	...	4.680	118.80	
2016-01-09 17:20:00	4	demo_mast	7000	7.977	7.791	8.110	7.915	8.140	7.974	0.556	...	3.123	115.90	
2016-01-09 17:30:00	5	demo_mast	7000	8.340	8.160	8.370	8.170	8.330	8.180	0.676	...	3.260	117.20	
2016-01-09 17:40:00	6	demo_mast	7000	8.130	7.929	8.090	7.895	7.972	7.788	0.557	...	3.677	115.90	

### 3. Plot a wind rose from the frequency table

```
In [3]: bw.freq_table(data.Spd80mN, data.Dir38mS)
```

```
Out[3]:
```

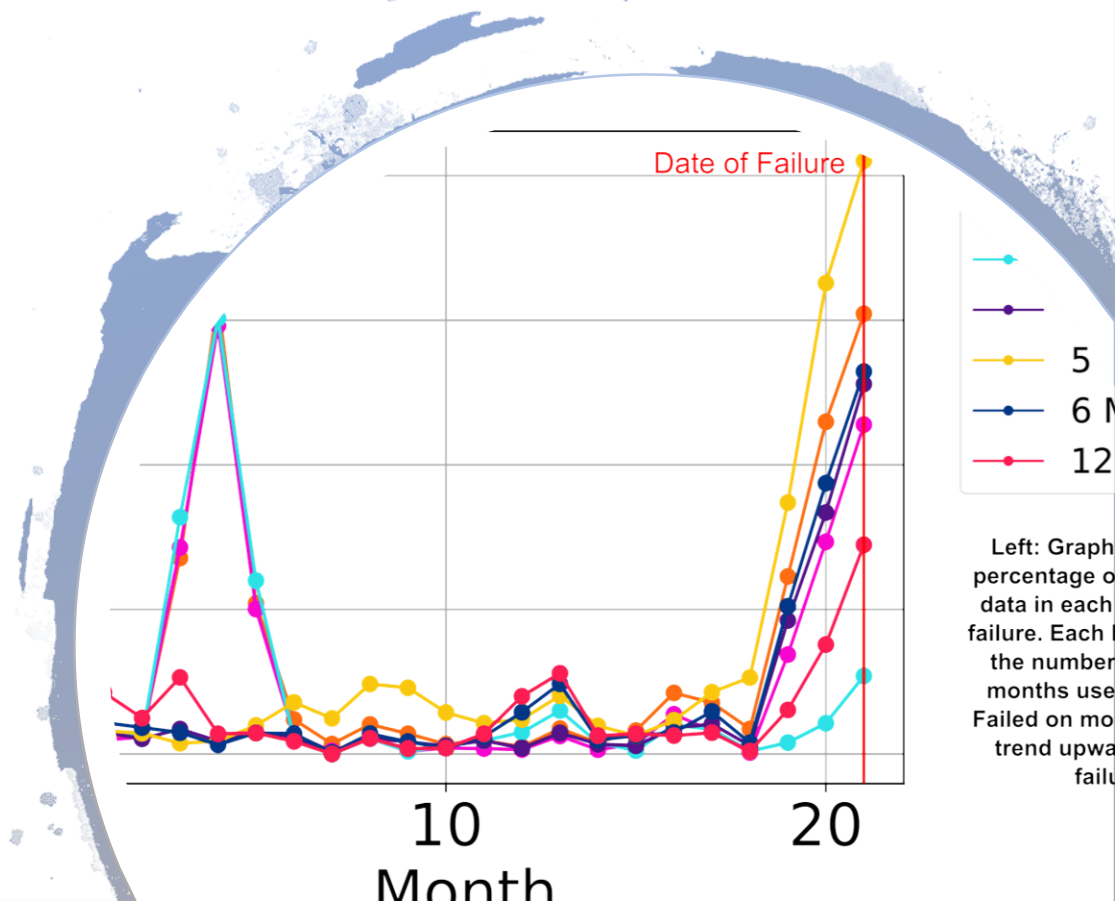
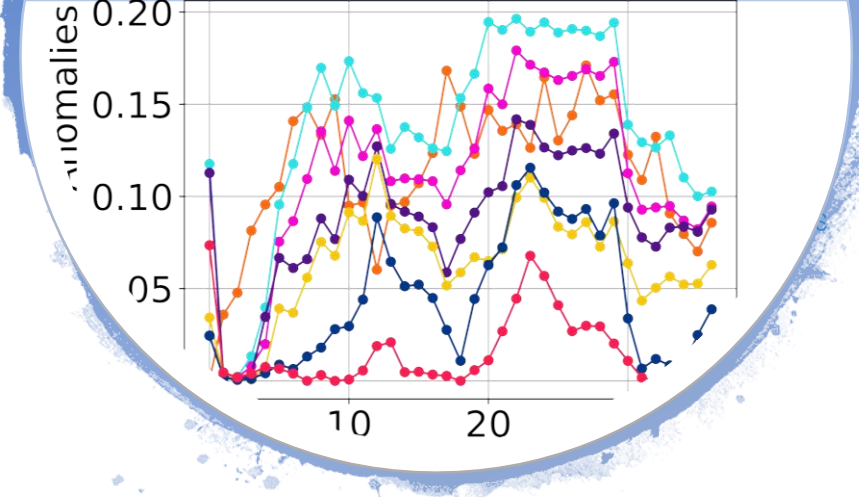




NREL

- OpenOA
- OpenFAST
- SOWFA
- WindSE
- TurbSim

# PhD collaboration







Wind & Marine Energy Systems  
**futureWind&Marine**

Lets engage!

- Come have a chat if
  - You're interested in what I'm talking about
  - You want to tell me why opening up can't be done
  - You want some data (onshore wind, solar)
  - You also want to share data, code, ideas
  - You know of some other cool open projects
  - You'd just like to talk 😊

