



IREC INDEX  
Wind energy indexes  
**Annual report 2018**  
FRANCE  
GERMANY  
U. KINGDOM  
DENMARK  
BENELUX

## What is an energy index ?

An energy index is a tool that enables you to put your wind farm production into perspective with the actual wind resource available at the time. It corresponds to the ratio between the wind energy available over a given period (month, quarter or year) and over a long term period (reference period).

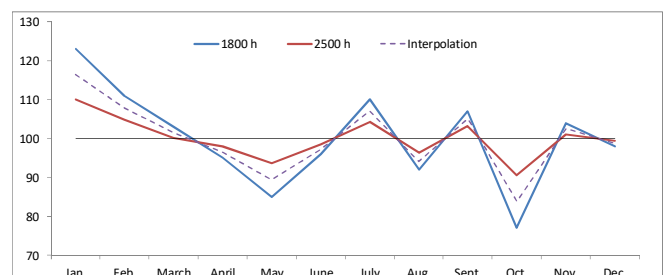
## How does it work ?

In 2010, my wind farm production achieved 1440 equivalent hours of operation (at 100% availability level) for a long term production capacity estimated around 1 800 h. The wind energy index, provided by Eoltech, indicates that, this year, the wind resource was 20 % less energetic than the average over the last 10 years. In consequence, the lack of wind explains 20 % of the production shortfall compared to the long term expected P50. In other words, the low production level of this year is explained by the lack of wind. No need to be alarmed.

Year	Net long term production capacity		
	1800 h	2500 h	3200 h
2007	108.5%	107.0%	105.5%
2008	117.5%	114.5%	111.5%
2009	97.5%	98.0%	98.5%
2010	80.0%	83.5%	86.5%
2011	104.5%	104.0%	103.0%
2012	97.5%	98.0%	98.5%
2013	101.5%	101.5%	101.0%
2014	96.5%	97.0%	97.5%
2015	111.5%	109.5%	107.5%
2016	85.0%	87.5%	90.0%

## Why different levels of production capacity ?

In a same region, from a site to another, the level of exposure of a wind farm may differ significantly due to topography, roughness, hub height, rotor diameter, etc. Such differences lead to consider several amplitude of production variation of wind farms within the same region. The different proposed levels offer the possibility to match your wind farm specificities as a first estimate. If not directly applicable, a quick interpolation may give you the level of equivalent hours to consider.



### About IREC Index

Eoltech's wind energy indexes enable you to quantify the responsibility of the wind resource in your asset performance over a given year. Our wind energy indexes are:

- ✓ **ROBUST:** At least 4 independent and consistent data sources combined per area,
- ✓ **EASY-TO-USE:** Direct correlation with your annual production data,
- ✓ **PROVEN:** Created in 2011 and validated over 100+ operating wind farms,
- ✓ **INDEPENDENT:** Developed by Eoltech, the leading independent French expert in wind energy

**North**

Year	Net long term production capacity		
	2000 h	2400 h	2800 h
2009	106.5%	106.0%	105.5%
2010	100.0%	100.0%	100.0%
2011	102.5%	102.5%	102.0%
2012	102.0%	101.5%	101.5%
2013	103.0%	102.5%	102.5%
2014	96.0%	96.5%	97.0%
2015	111.0%	110.0%	109.0%
2016	93.5%	94.0%	94.5%
2017	91.5%	92.0%	93.0%
2018	94.0%	94.5%	95.5%

**N. Lorraine**

Year	Net long term production capacity		
	2000 h	2400 h	2800 h
2009	104.5%	104.0%	104.0%
2010	99.5%	99.5%	99.5%
2011	97.5%	98.0%	98.0%
2012	107.5%	107.0%	106.0%
2013	102.5%	102.0%	102.0%
2014	92.0%	92.5%	93.5%
2015	104.5%	104.0%	103.5%
2016	92.5%	93.0%	94.0%
2017	102.0%	101.5%	101.5%
2018	97.5%	98.0%	98.0%

**Brittany**

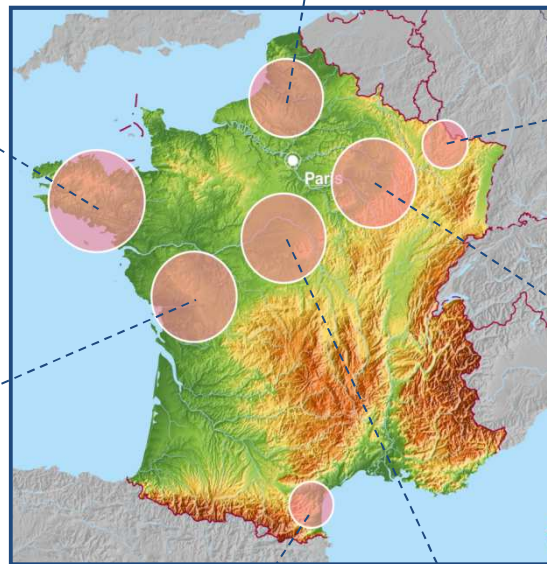
Year	Net long term production capacity		
	1800 h	2200 h	2600 h
2009	105.5%	105.0%	104.5%
2010	101.5%	101.5%	101.0%
2011	96.5%	96.5%	97.0%
2012	102.0%	101.5%	101.5%
2013	109.0%	108.0%	107.5%
2014	99.5%	99.5%	99.5%
2015	107.5%	107.0%	106.0%
2016	92.5%	93.0%	94.0%
2017	89.0%	90.0%	91.0%
2018	97.5%	98.0%	98.0%

**East**

Year	Net long term production capacity		
	2000 h	2400 h	2800 h
2009	101.5%	101.5%	101.5%
2010	101.5%	101.0%	101.0%
2011	93.5%	94.0%	94.5%
2012	109.5%	108.5%	107.5%
2013	101.0%	101.0%	101.0%
2014	96.5%	97.0%	97.5%
2015	105.0%	104.5%	104.0%
2016	94.0%	94.5%	95.0%
2017	98.0%	98.5%	98.5%
2018	99.5%	99.5%	99.5%

**West**

Year	Net long term production capacity		
	1800 h	2000 h	2400 h
2009	103.0%	103.0%	103.0%
2010	106.0%	105.5%	105.0%
2011	89.5%	90.0%	91.0%
2012	105.0%	104.5%	104.0%
2013	104.5%	104.5%	104.0%
2014	101.5%	101.5%	101.5%
2015	100.0%	100.0%	100.0%
2016	91.5%	92.0%	92.5%
2017	93.0%	93.5%	94.0%
2018	105.5%	105.5%	105.0%



**Aude PO**

Year	Net long term production capacity		
	2600 h	3000 h	3400 h
2009	100.5%	100.5%	100.5%
2010	106.0%	105.5%	105.0%
2011	95.0%	95.5%	96.0%
2012	106.0%	105.5%	105.0%
2013	109.0%	108.0%	107.5%
2014	97.5%	97.5%	98.0%
2015	97.0%	97.5%	97.5%
2016	95.0%	95.5%	96.0%
2017	101.5%	101.5%	101.0%
2018	92.5%	93.5%	94.0%

**Centre**

Year	Net long term production capacity		
	2000 h	2400 h	2800 h
2009	103.0%	102.5%	102.5%
2010	101.5%	101.0%	101.0%
2011	94.0%	94.5%	95.0%
2012	109.5%	108.5%	107.5%
2013	103.0%	103.0%	102.5%
2014	97.5%	97.5%	98.0%
2015	104.0%	103.5%	103.0%
2016	93.5%	94.5%	95.0%
2017	96.0%	96.5%	97.0%
2018	97.5%	98.0%	98.0%

**General remarks:**

- ✓ These indexes are applicable for wind farms with little or no specific curtailment strategy.
- ✓ The level of production is used as a proxy for exposure level, wind resource available on site and type of turbines,
- ✓ The values can be directly correlated with the net production of your asset.

**Mecklenburg – Vorpommern – N. Brandenburg**

Year	Net long term production capacity		
	1800 h	2500 h	3200 h
2009	97.0%	97.5%	98.0%
2010	100.0%	100.0%	100.0%
2011	110.5%	109.0%	107.0%
2012	106.5%	105.5%	104.5%
2013	93.5%	94.5%	95.5%
2014	91.0%	92.5%	94.0%
2015	112.0%	110.0%	108.0%
2016	90.0%	91.5%	93.5%
2017	110.0%	108.5%	107.0%
2018	89.0%	91.0%	93.0%

**Schleswig-Holstein**

Year	Net long term production capacity		
	1800 h	2500 h	3200 h
2009	85.0%	87.5%	90.0%
2010	93.5%	94.5%	95.5%
2011	116.0%	113.0%	110.5%
2012	106.5%	105.5%	104.5%
2013	98.0%	98.5%	99.0%
2014	100.5%	100.5%	100.5%
2015	113.0%	111.0%	109.0%
2016	88.0%	90.0%	92.0%
2017	107.5%	106.0%	105.0%
2018	92.0%	93.5%	94.5%

**S. Brandenburg**

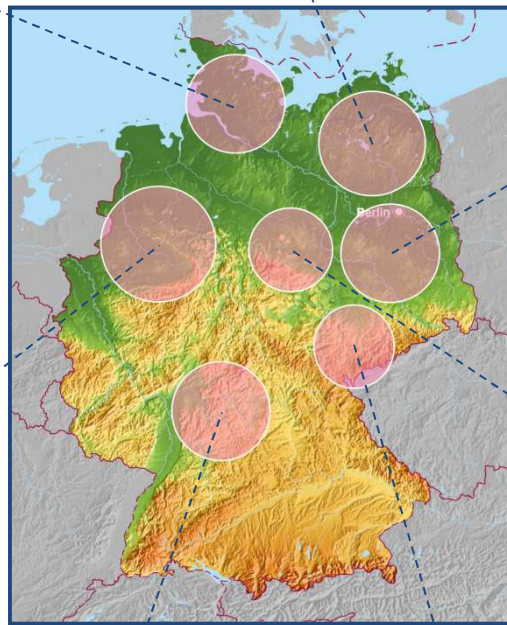
Year	Net long term production capacity		
	1800 h	2500 h	3200 h
2009	98.0%	98.5%	98.5%
2010	98.0%	98.5%	98.5%
2011	111.5%	109.5%	108.0%
2012	106.0%	105.0%	104.0%
2013	92.5%	94.0%	95.0%
2014	90.0%	91.5%	93.5%
2015	112.0%	110.0%	108.0%
2016	88.5%	90.5%	92.5%
2017	108.5%	107.0%	105.5%
2018	94.5%	95.5%	96.5%

**NRW - S. Niedersachsen**

Year	Net long term production capacity		
	1800 h	2500 h	3200 h
2009	90.0%	91.5%	93.0%
2010	92.0%	93.5%	95.0%
2011	114.5%	112.0%	109.5%
2012	106.5%	105.5%	104.0%
2013	102.5%	102.0%	101.5%
2014	93.0%	94.5%	95.5%
2015	112.5%	110.5%	108.0%
2016	91.0%	92.5%	94.0%
2017	103.0%	102.5%	102.0%
2018	95.5%	96.5%	97.0%

**Sachsen - Anhalt**

Year	Net long term production capacity		
	1800 h	2500 h	3200 h
2009	99.0%	99.0%	99.5%
2010	98.5%	98.5%	99.0%
2011	111.5%	109.5%	107.5%
2012	106.0%	105.0%	104.0%
2013	96.5%	97.0%	97.5%
2014	88.0%	90.0%	92.0%
2015	109.5%	108.0%	106.0%
2016	92.5%	94.0%	95.0%
2017	106.0%	105.0%	104.0%
2018	93.0%	94.0%	95.0%



**NW. Bayern-NO. Baden Württemberg-SO. Hessen**

Year	Net long term production capacity		
	1800 h	2500 h	3200 h
2009	86.0%	88.0%	90.5%
2010	100.5%	100.5%	100.5%
2011	109.0%	107.5%	106.0%
2012	107.0%	105.5%	104.5%
2013	104.0%	103.5%	103.0%
2014	84.5%	87.0%	89.5%
2015	105.0%	104.0%	103.0%
2016	93.0%	94.0%	95.5%
2017	108.0%	106.5%	105.0%
2018	103.5%	103.0%	102.5%

**W. Sachsen - O. Thüringen**

Year	Net long term production capacity		
	1800 h	2500 h	3200 h
2009	101.0%	101.0%	101.0%
2010	98.5%	99.0%	99.0%
2011	106.5%	105.0%	104.0%
2012	106.5%	105.5%	104.5%
2013	98.0%	98.0%	98.5%
2014	90.5%	92.0%	93.5%
2015	107.0%	105.5%	104.5%
2016	92.0%	93.5%	95.0%
2017	110.5%	108.5%	107.0%
2018	90.0%	91.5%	93.0%

**General remarks:**

- ✓ These indexes are applicable for wind farms with little or no specific curtailment strategy.
- ✓ The level of production is used as a proxy for exposure level, wind resource available on site and type of turbines,
- ✓ The values can be directly correlated with the net production of your asset.

**Northern Scotland**

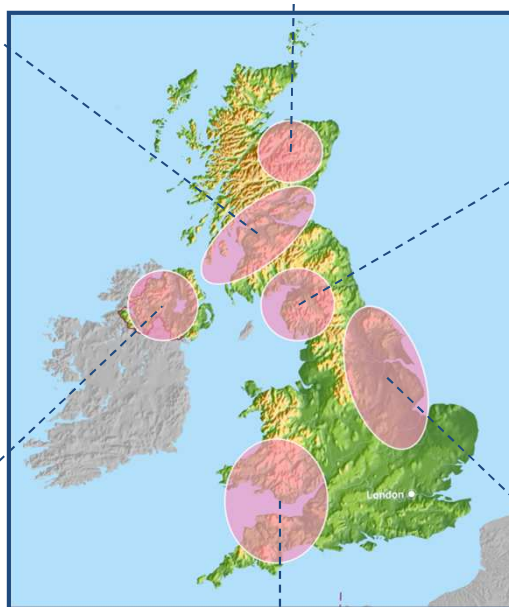
Year	Net long term production capacity		
	2100 h	2800 h	3500 h
2009	97.5%	98.0%	98.5%
2010	82.0%	85.0%	88.5%
2011	104.0%	103.5%	102.5%
2012	97.5%	98.0%	98.5%
2013	107.0%	106.0%	104.5%
2014	99.0%	99.0%	99.5%
2015	115.5%	113.0%	110.0%
2016	92.0%	93.5%	95.0%
2017	109.0%	107.5%	105.5%
2018	96.5%	97.5%	98.0%

**Southern Scotland**

Year	Net long term production capacity		
	2100 h	2800 h	3500 h
2009	104.0%	103.5%	102.5%
2010	76.5%	81.0%	85.0%
2011	105.0%	104.5%	103.5%
2012	95.5%	96.0%	97.0%
2013	107.0%	106.0%	104.5%
2014	102.0%	102.0%	101.5%
2015	114.5%	112.0%	109.5%
2016	91.5%	93.0%	94.5%
2017	101.0%	100.5%	100.5%
2018	102.5%	102.0%	101.5%

**Northwestern England**

Year	Net long term production capacity		
	2100 h	2800 h	3500 h
2009	106.0%	105.0%	104.0%
2010	78.5%	82.0%	86.0%
2011	107.0%	106.0%	104.5%
2012	96.0%	97.0%	97.5%
2013	103.0%	102.5%	102.0%
2014	103.0%	102.5%	102.0%
2015	114.0%	111.5%	109.0%
2016	91.5%	93.0%	94.5%
2017	102.0%	101.5%	101.5%
2018	99.0%	99.5%	99.5%



**Northern Ireland**

Year	Net long term production capacity		
	2100 h	2800 h	3500 h
2009	103.5%	103.0%	102.5%
2010	73.0%	78.0%	82.5%
2011	110.0%	108.5%	106.5%
2012	96.0%	96.5%	97.5%
2013	108.5%	107.0%	105.5%
2014	100.0%	100.0%	100.0%
2015	117.0%	114.0%	111.0%
2016	89.0%	91.0%	93.0%
2017	101.5%	101.5%	101.0%
2018	101.5%	101.0%	101.0%

**Eastern England**

Year	Net long term production capacity		
	1800 h	2500 h	3200 h
2009	100.5%	100.5%	100.5%
2010	80.5%	83.5%	87.0%
2011	107.5%	106.0%	105.0%
2012	95.0%	96.0%	96.5%
2013	107.5%	106.5%	105.0%
2014	102.5%	102.0%	101.5%
2015	114.5%	112.0%	110.0%
2016	92.5%	93.5%	95.0%
2017	102.0%	101.5%	101.0%
2018	98.0%	98.5%	98.5%

**Southwestern England**

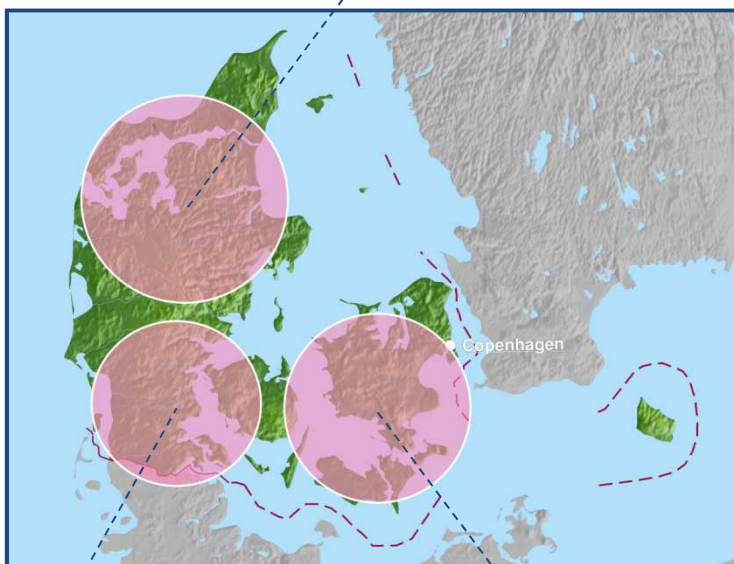
Year	Net long term production capacity		
	1800 h	2500 h	3200 h
2009	100.5%	100.5%	100.5%
2010	74.5%	79.0%	83.0%
2011	106.0%	105.0%	104.0%
2012	100.5%	100.5%	100.0%
2013	103.0%	102.5%	102.0%
2014	101.5%	101.5%	101.0%
2015	118.5%	115.5%	112.5%
2016	96.5%	97.0%	97.5%
2017	101.5%	101.0%	101.0%
2018	97.5%	98.0%	98.5%

**General remarks:**

- ✓ These indexes are applicable for wind farms with little or no specific curtailment strategy.
- ✓ The level of production is used as a proxy for exposure level, wind resource available on site and type of turbines,
- ✓ The values can be directly correlated with the net production of your asset.

**Midtjylland**

Year	Net long term production capacity		
	2100 h	2800 h	3500 h
2009	90.5%	92.5%	94.0%
2010	89.0%	91.0%	93.0%
2011	104.5%	104.0%	103.0%
2012	105.5%	104.5%	103.5%
2013	95.5%	96.0%	97.0%
2014	99.5%	100.0%	100.0%
2015	120.0%	116.0%	112.5%
2016	94.0%	95.0%	96.0%
2017	108.0%	106.5%	105.0%
2018	93.5%	94.5%	96.0%



**Syddanmark**

Year	Net long term production capacity		
	2100 h	2800 h	3500 h
2009	96.0%	96.5%	97.5%
2010	87.0%	89.5%	91.5%
2011	110.5%	108.5%	106.5%
2012	105.0%	104.0%	103.0%
2013	96.0%	96.5%	97.5%
2014	104.5%	104.0%	103.0%
2015	117.0%	114.0%	111.0%
2016	88.0%	90.0%	92.0%
2017	105.0%	104.0%	103.5%
2018	91.5%	93.0%	94.5%

**Sjælland**

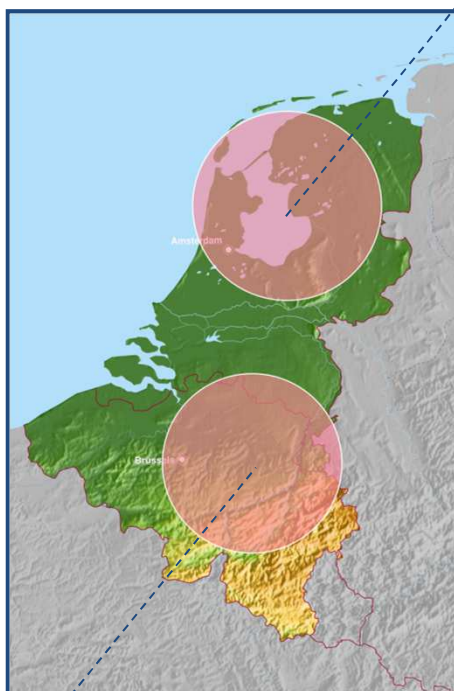
Year	Net long term production capacity		
	2100 h	2800 h	3500 h
2009	98.0%	98.5%	99.0%
2010	94.0%	95.0%	96.0%
2011	108.5%	107.0%	105.5%
2012	104.0%	103.0%	102.5%
2013	94.0%	95.0%	96.0%
2014	103.0%	102.5%	102.0%
2015	115.0%	112.5%	109.5%
2016	89.0%	91.0%	93.0%
2017	105.5%	104.5%	103.5%
2018	89.5%	91.5%	93.0%

**General remarks:**

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- ✓ The level of production is used as a proxy for exposure level, wind resource available on site and type of turbines,
- ✓ The values can be directly correlated with the net production of your asset.

**Netherlands**

Year	Net long term production capacity		
	1800 h	2500 h	3200 h
2009	101.5%	101.0%	101.0%
2010	83.5%	86.5%	89.0%
2011	109.0%	107.5%	106.0%
2012	101.5%	101.5%	101.0%
2013	106.0%	105.0%	104.0%
2014	100.5%	100.5%	100.0%
2015	116.0%	113.0%	110.5%
2016	89.0%	90.5%	92.5%
2017	99.5%	99.5%	99.5%
2018	94.5%	95.0%	96.0%



**Belgium**

Year	Net long term production capacity		
	1800 h	2500 h	3200 h
2009	101.0%	100.5%	100.5%
2010	90.0%	91.5%	93.5%
2011	105.0%	104.0%	103.5%
2012	101.0%	101.0%	100.5%
2013	103.0%	102.5%	102.0%
2014	97.5%	98.0%	98.5%
2015	112.0%	110.0%	108.0%
2016	95.5%	96.0%	97.0%
2017	100.5%	100.5%	100.5%
2018	95.0%	95.5%	96.5%

**General remarks:**

- ✓ These indexes are applicable for wind farms with little or no specific curtailment strategy.
- ✓ The level of production is used as a proxy for exposure level, wind resource available on site and type of turbines,
- ✓ The values can be directly correlated with the net production of your asset.