



Speedwell Wind Power Production Indices



Regional and National Indices

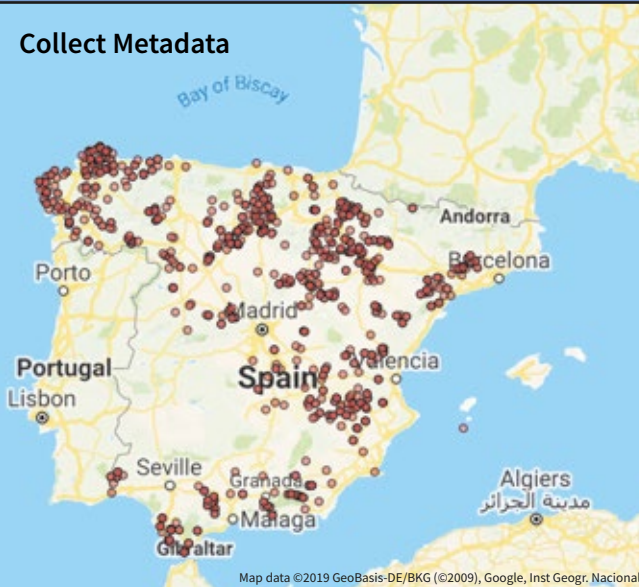
Speedwell offers a range of proprietary national and regional wind production indices. These benchmark regulated indices (EU Benchmark Regulation) are specifically designed to support weather risk transfer. In particular, the indices are designed to be used by conventional generators who wish to protect themselves against more wind energy than normal being delivered to the grid.

Each Wind Power Production Index represents an estimate of daily energy production (MWh) for a given national or regional area. For consistency as a hedging product, each index is frozen using a defined installed capacity at a specific date in order to maintain homogenous time series data, both for risk pricing as well as for settlement.

Creating Speedwell Wind Power Production Indices

1

Collect Metadata

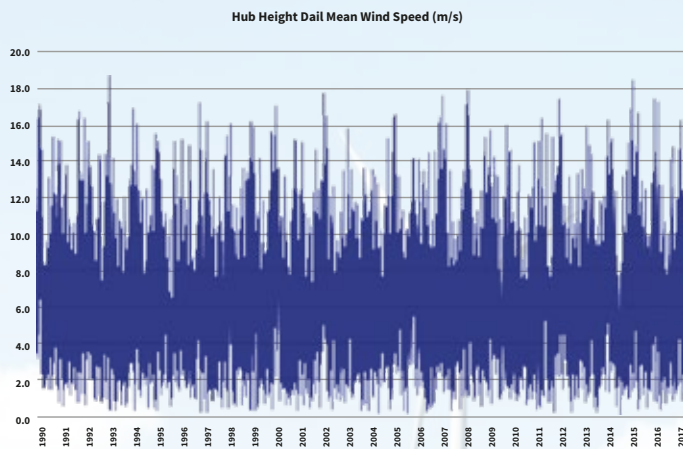


Distribution of wind farms over Spain 2017

Detailed metadata for the Index are obtained from operators, owners and manufacturers then validated. Essential information including accurate details of location, number of turbines, rating, hub height, power curve(s), commissioning date, percentage ownership and which power network(s) the site is connected to are collated.

2

Calculate Hub Height Wind Speeds

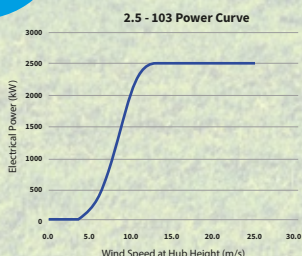


Using the native $0.625^\circ \times 0.5^\circ$ resolution MERRA-2 data, wind speed time series are calculated at the appropriate hub height(s)* using both horizontal and vertical interpolations to generate a time series of wind speed at each turbine location.

* Generic hub height may be applied where metadata is insufficient

3

Apply Power Curves

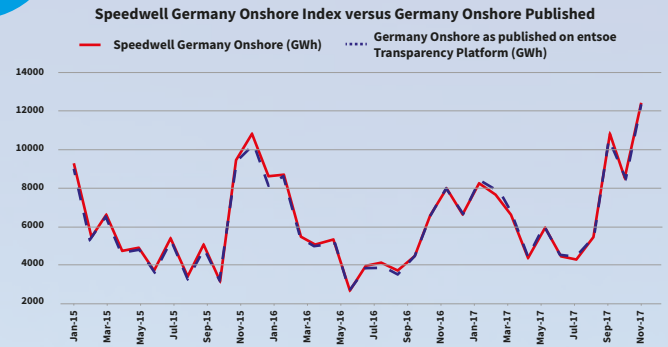


The respective power curve* for each turbine is applied to the wind speed series to derive theoretical energy output. The resultant energy outputs are then aggregated for the wind farm, region or asset collection.

* Generic power curves may be applied where metadata is insufficient

4

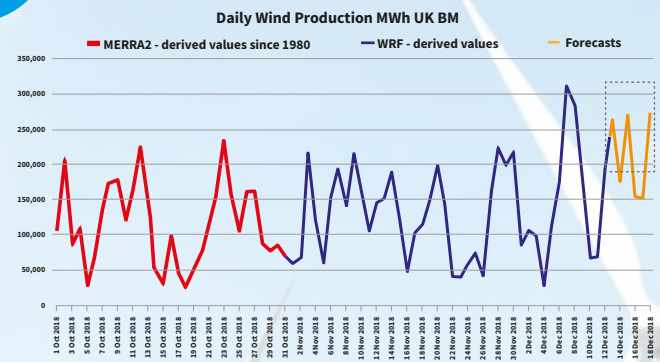
Validate Results



Each Index is analysed for consistency and compared against a benchmark series of actual generation data to confirm the configuration, calibration and calculations prior to publication.

5

Realtime Feeds

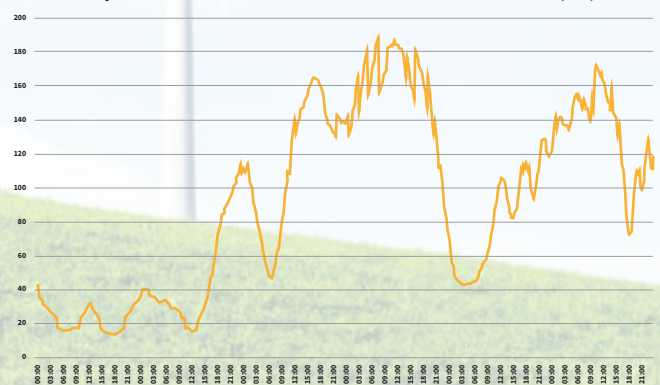


MERRA-2 data is available with ~1 month lag, an estimate of wind speeds using a Weather Research and Forecast Model (WRF) is used as the input series for the power curves. This is a next generation mesoscale forecast model and assimilation system that has advanced the prediction of mesoscale weather systems. This method provides seamless tracking of the Index allowing daily mark-to-model and, if required, immediate initial settlement of weather risk contracts.

6

Forecasts

5 Day Ahead Forecast in 15 Minute Intervals - Wind Power Production (MW)



The WRF model is capable of providing forecasts out to 5 days ahead at a temporal resolution of 15 minute intervals.

Wind Power Production Indices Catalogue (Winter 2020)

Region	Index name	Installed Capacity	Benchmark Comparison	Installed Capacity Freeze Date
Europe	Belgium Wind Power Index 2019	2.96 GW	ELIA	Jun 2018
	Denmark Wind Power Index 2019	6.12 GW	DEA	Jun 2018
	France Wind Power Index 2019	13.80 GW	RTE/ENEDIS	Nov 2018
	Germany Wind Power Index (Total) 2020 [†]	58.90 GW	Not published	Jan 2019
	Italy Wind Power Index 2018	9.50 GW	TERNA	Jun 2017
	Netherlands Wind Power Index (Total) 2018 [†]	4.39 GW	TenneT	Jun 2017
	Norway Wind Power Index 2019	1.77 GW	Statnett	Dec 2018
	Spain (Peninsular) Wind Power Index 2018	23.10 GW	REE	Dec 2017
	Sweden Wind Power Index 2019	7.58 GW	Nord Pool	Jun 2018
	Turkey Wind Power Index 2018	7.17 GW	EMRA	Jun 2017
	UK (Excl. N.I.) Wind Power Index (Total Installed) 2019 [†]	20.55 GW	Not published	Jun 2018
US	US Wind Power Index (ERCOT) 2019 [†]	23.67 GW	ERCOT	Dec 2018
Australia	Australia Wind Power Production (NEM) 2019	5.20 GW	AEMO	Dec 2018
	Australia Wind Power Production (NSW) 2019	1110 MW	AEMO	Dec 2018
	Australia Wind Power Production (QLD) 2019	12 MW	AEMO	Dec 2018
	Australia Wind Power Production (SA) 2019	2080 MW	AEMO	Dec 2018
	Australia Wind Power Production (TAS) 2019	310 MW	AEMO	Dec 2018
	Australia Wind Power Production (VIC) 2019	1671 MW	AEMO	Dec 2018
	Australia Wind Power Production (WEM) 2019	0.50 GW	AEMO	Dec 2018

[†] Sub-regional Indices also available on request

Custom Wind Power Production Indices

Using a similar methodology as that described on the previous page, Speedwell Weather is able to produce custom indices for wind hedging.

These custom indices are designed to model the power production of specific asset or a portfolio of assets. These indices are primarily used to hedge a lack of power production resulting from abnormally low wind speeds.

To learn more about these indices please see www.SpeedwellWeather.com or contact us at info@SpeedwellWeather.com

Speedwell Settlement Services

Speedwell Settlement Services provides independent, accurate, and reliable settlement data for index-based weather risk contracts.

As a regulated Benchmark Administrator Speedwell Settlement Services provides both Preliminary and Final Settlement Data for the Wind Power Production Indices. [EU Benchmark Regulation, Regulation (EU) 2016/1011]

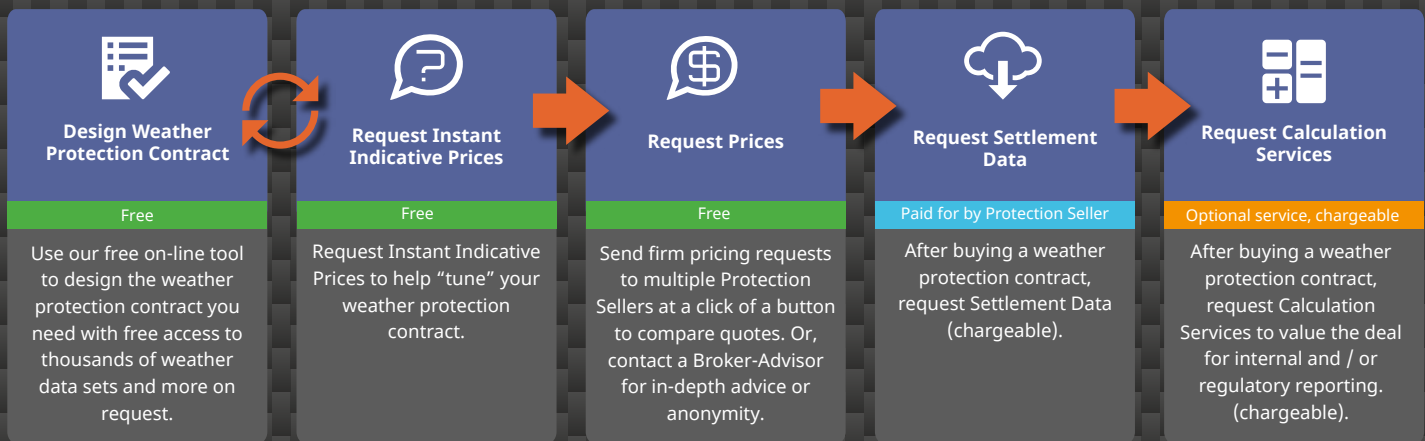
For more information please see www.SpeedwellSettlementServices.com or contact us at info@SpeedwellSettlementServices.com

weatherXchange

Speedwell Wind Power Production Indices are listed on the weatherXchange® Platform.

weatherXchange links Hedgers, Broker-Advisors and Protection Sellers thereby helping businesses with weather risk to more easily access weather risk protection. weatherXchange provides free access to thousands of worldwide quality weather data sets and a user-friendly tool to simplify the design of weather protection contracts. These can then be sent at a click of a button to multiple counterparties for pricing. The weatherXchange Platform also offers post transaction services necessary to settle a transaction and to monitor the performance of a hedge.

The weatherXchange Platform is provided by weatherXchange Limited which is part of the Speedwell Weather Group of companies.



weatherXchange makes no charge to those using the Platform to buy Weather Protection.

weatherXchange also takes no "soft-commission" neither from Broker-Advisors nor from Protection Sellers on the Platform.

What weatherXchange Provides

- Free access to high quality worldwide weather data for companies looking to structure weather protection
- Free tools and optional assistance to assist with the structuring process
- Access to Instant Indicative Pricing from multiple Protection Sellers
- Easy price comparison: tradable price can be requested from multiple Protection Sellers or other energy companies
- Facilitation of communication between Hedgers and Protection Sellers through technology
- Post-trade tools for P&L reporting / margining of a weather risk contract
- Post-trade tools for settling a weather risk contract
- As a "Trading Participant" an energy company Hedger may show an RFP to other energy companies as well as Protection Sellers

www.weatherXchange.com

weatherXchange, Mardall House 9-11, Vaughan Road, Harpenden, Hertfordshire, AL5 4HU, United Kingdom

Tel: +44 (0)1582 280 130