

The logo features the letters 'EL' in a bold, green, sans-serif font, followed by a large blue '4' with a horizontal bar extending to the right. The word 'CAST' is written in a smaller, blue, italicized sans-serif font to the right of the '4'.

EL4 *CAST*

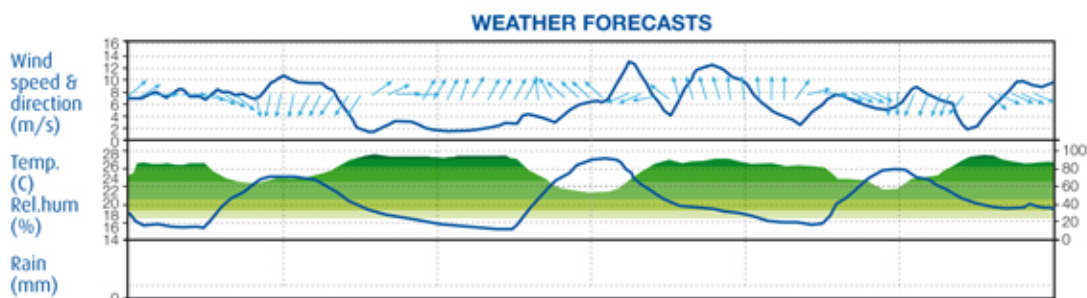
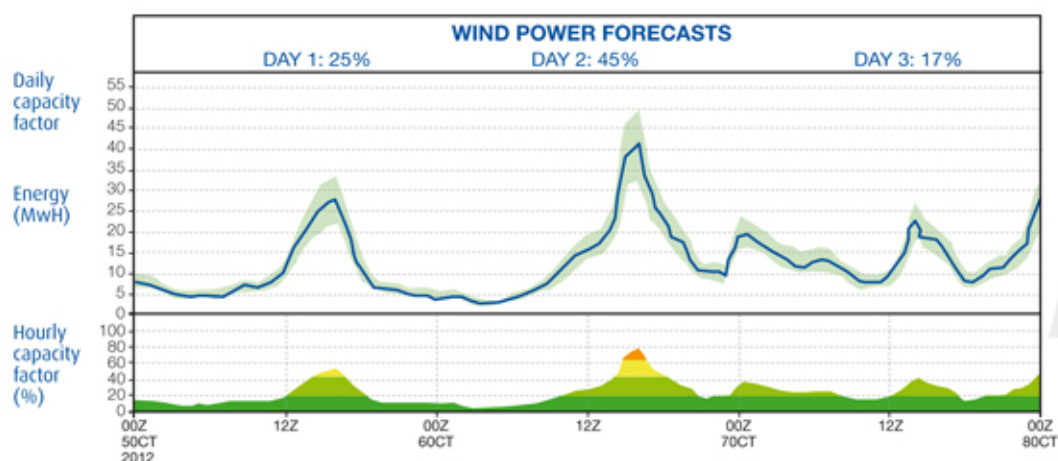


Trust in Our Wind

Accurate weather and power forecasts for wind farms

The Challenge

Integrating large quantities of renewable energy into the power grid has become a key issue for energy management. The uncertainty of wind farms production can bring extra costs due to imbalance charges. Modern technologies allow efficient weather and energy forecasts, improving the net efficiency and limiting charges for investors.



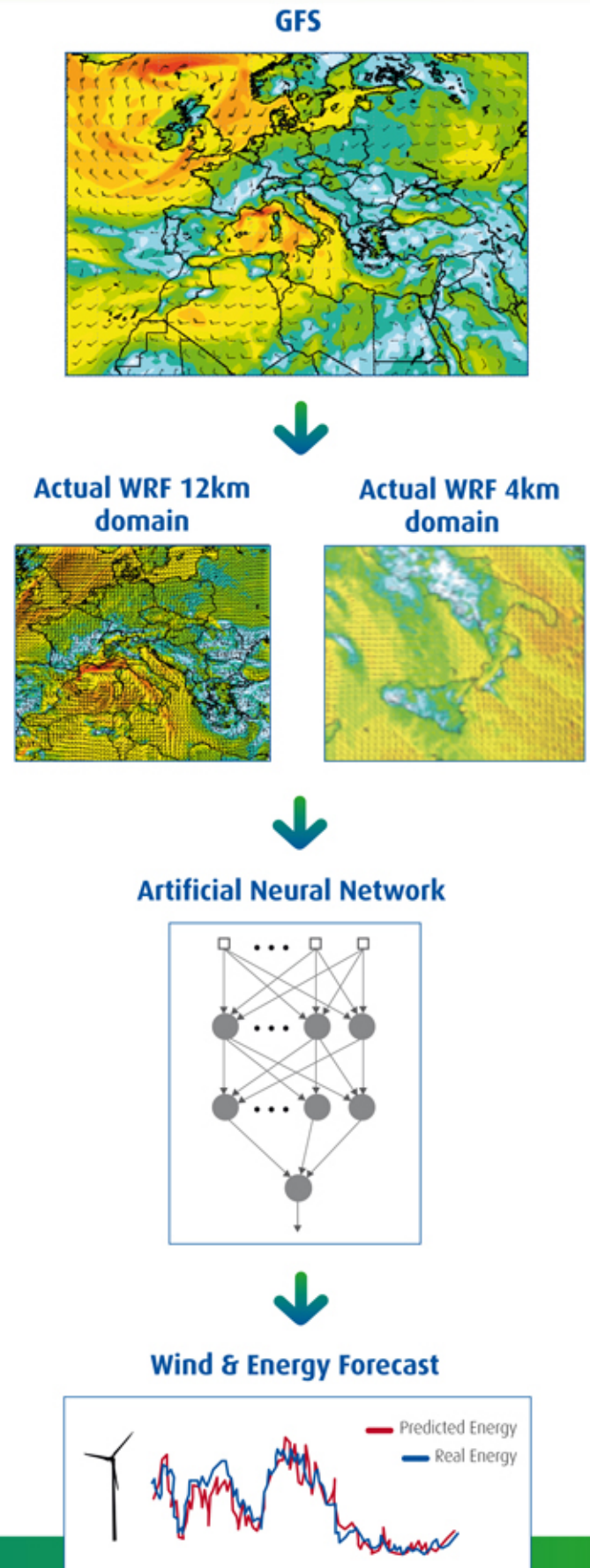
Technical Features

- WRF (Weather Research and Forecasting) numerical weather prediction model initialized with NCEP GFS (Global forecasting system) general circulation model
- Resolution of nested WRF models: 12 km and 4 km
- Feedforward Artificial Neural Network coupling meteorological forecasts with on-site wind and energy production
- Forecasting set-up and verification of accuracy with training and testing periods

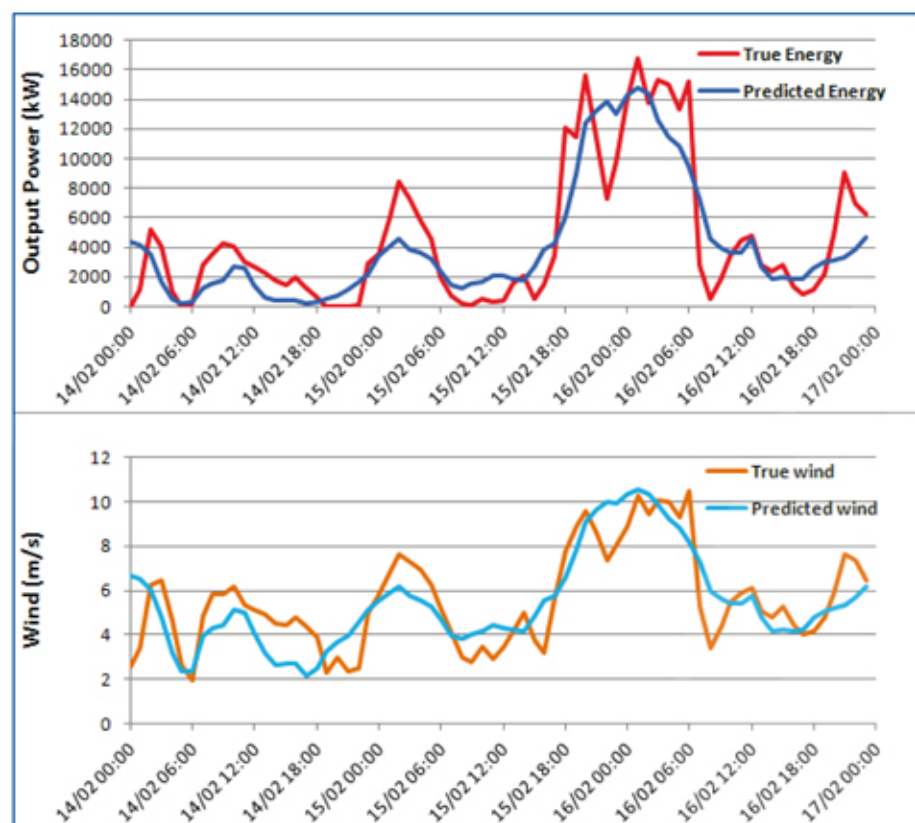


The Approach

E4Cast approach couples meteorological modeling with Energy production through Artificial Neural Networks Forecast System



Output Comparison



Calculated Accuracy Parameters

$$NMAE\% = 100 \times \frac{1}{N} \sum_{i=1}^N \frac{|E_m^i - E_p^i|}{C}$$

$$WMAE\% = 100 \times \frac{\sum_{i=1}^N |E_m^i - E_p^i|}{\sum_{i=1}^N E_m^i}$$

$$NRMSE\% = 100 \times \frac{1}{C} \sqrt{\frac{\sum_{i=1}^N |E_m^i - E_p^i|^2}{N}}$$

E_m^i : measured energy at hour i

E_p^i : predicted energy at hour i

N : Number of samples

C : Nominal Power

Summary of Forecasting Tests

SITE DATA				FORECAST DATA		FORECAST RESULT		
Site Name	CAPACITY	N.WTGs	MARKET ZONE	START	END	FORECAST HORIZON	NMAE	NRMSE
Site 1	34,0	17	SUD	31/07/11	31/07/12	d-2 00:00	14,5%	19,8%
Site 2	8,5	10	CSUD	31/07/11	31/07/12	d-2 00:00	6,3%	11,4%
Site 3	58,0	29	SUD	31/07/11	31/07/12	d-2 00:00	12,9%	19,1%
Site 4	36,0	36	SICI	31/07/11	31/07/12	d-2 00:00	11,0%	17,3%
Site 5	22,1	26	SICI	31/07/11	31/07/12	d-2 00:00	10,2%	15,5%
Site 6	23,0	27	SICI	31/07/11	31/07/12	d-2 00:00	9,6%	14,8%
Site 7	15,0	5	CSUD	31/07/11	31/07/12	d-2 00:00	9,1%	13,0%
Site 8	20,0	10	CSUD	31/07/11	31/07/12	d-2 00:00	5,7%	10,4%

E4 CAST





DELIVERY

- Daily Reports
- Web-Interface
- Mail Alert Service
- The update cycle is optimized for deadlines established for the Energy Market
- Forecasts come up to 7 days with increasing uncertainty

SALES

- 2-Months Free Trial
- Annual Subscription for single wind farm (starting from € 3.000)
- Discount for multiple wind farms





CONTACTS



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