

Wind and Solar Forecasting Trials: Do's and Don'ts, Part 1

Best practices

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UVIG 2017 Forecasting workshop

SECONDWIND
by Vaisala



3TIER
by Vaisala

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Outline

- ✓ **Background into Vaisala and Forecasting Trial Experience**
- ✓ **Basics of a Forecasting Trial:**
 - ✓ **What they do, why do to them**
- ✓ **Understanding end users' requirements and objectives**
- ✓ **Types of trials**
 - ✓ **Advantages/Disadvantages**
- ✓ **Most common Do's and Don'ts of Trials**

The content of this presentation supports IEA Wind ExCo strategic objectives:

“To reduce the cost of wind energy use, for both land-based and

onshore wind” and “increase the exchange of best practices.”

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3TIER by Vaisala Renewable Energy Forecasting History



- Founded in 1999
- Headquartered in Seattle, WA
- Acquired by Vaisala, the largest meteorology-focused company in the world, in Dec 2013. Shortly after the Vaisala acquisition of Second Wind
- 3TIER and Second Wind have a combined 50 years of experience in the wind industry
- We currently forecast for
 - 130,000 MW Wind Energy Forecasting
 - 7,400 MW Hydropower Forecasting

IEA Task 36, WP 2, Task 2.1: Table of Contents

Purpose of document

Definitions

Executive Summary of Procedures

Pre-trial and Benchmark Questions for End User

Resource Considerations

Checklist Questions for Efficient Execution

Best Practices and Recommendations

Live Trial with Real-time Datafeed

Live Trial without Datafeed

Retrospective Trial

Pitfalls and Reference Material

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Customers That May Request a Trial



OEM
System
Suppliers



Renewabl
e
Developer
s



Owners /
Operators



Energy
Utilities



Energy
Traders



Understanding users' requirements - examples

- Day ahead market bidding
- Balance-of-day forecasts (mitigate bad pre-schedules, balance reserve estimates, bilateral trades)
- Checking a box (e.g., required by Power Purchase Agreement (PPA))
- Scheduling maintenance crews (1-7 days ahead)
- Keeping the owner/operator honest with PPA deliverables (e.g., datafeed uptime, tracking outages)
- Keeping the lights on (reliability) (e.g., grid operators, BAs)



Types of Forecasting Trials:

Retrospective Trial :

Answers the question: *“How would the forecasts have performed at my key project(s) over my last year of operations?”*

Live Trial:

Answers the question: *“How does the forecast perform under realistic conditions that could be expected?”*



Retrospective Trial: Advantages/Disadvantages

■ Advantages:

- Less time upfront for both forecast provider and consumer.
- Forecast can be made over a longer period with same level of effort as a shorter test period.
- Results can be obtained quickly.
- No Realtime datafeed setup!

■ Disadvantages:

- Can only evaluate the Day Ahead forecast this way. The intra-day (Hour Ahead) forecast can be done, but there's potential for cheating.
- Forecast graphical tools are usually not available for forecast consumer to use in day-to-day processes.

Live Trial:

Advantages/Disadvantages

■ Advantages:

- Forecast user is allowed to evaluate both the intraday and day ahead forecast horizon performance
- Allows Forecaster to evaluate the ongoing forecast performance and make adjustments, where necessary.
- Better indicator of what to expect as far as operational flow

■ Disadvantages:

- Longer to see conclusion and results of the trial.
- Data setup – needs both historical data and real-time data exchange established. This is more effort upfront for both parties and can take a long time, especially the real-time data transfer.
- Oftentimes not long enough to really gauge performance

Common Trial Do's and Don'ts

Do

Clearly define all trial parameters ahead of trial start date.

Select a trial time period representative of all potential weather factors.

Supply all forecasters with the same information.

Supply training data from the same place which validation will be performed.

Ensure communication is kept throughout the trial.

Keep trial results anonymized.

Don't

Evaluate forecast providers on different data/farms.

Select a trial time period during just non-windy months or cloudy summer months.

Give certain forecasters extra information/data.

Supply substation meter data for validation against turbine power.

Wait until the end of the trial to mention something wasn't right.

Send out any results with forecast providers names visible.

Clear up-front communication is vital to ensure forecaster doesn't waste a lot of time and user gets the most accurate forecast under most realistic conditions

Elements of a well run trial

- Winning criteria communicated clearly up front
- Q&A period ahead of trial start date
- Detailed description of the metrics
- Clearly articulated start/end dates
- Covers a period of at least 3-6 months with varying levels of wind/solar capacity factor
- Result Sharing:
 - How and when results will be shared with forecasters
 - Interim metrics reporting- this allows the forecasters to make changes as needed for forecast improvement
 - Results of multi-participant trial anonymized
- Sufficient data provided to forecasters to reproduce results obtained by client.
- Clear and frequent communication!