IEA Wind Task 36
“Wind Energy Forecasting” Workshop

Open Space Discussions

University of Strathclyde, Glasgow, 21\textsuperscript{st} January 2020
### Introduction

**IEA Task 36 Open Space Workshop on Wind Power Forecasting & System Integration Issues**

- **Whoever comes is the right people.**
- **The law of two feet.**
- **Open Space.**
- **Whenever it starts is the right time.**

### Organised by

- C. Möhrlen, WEPROG
- J. Zack, UL-AWS Truepower
- G. Giebel, DTU - Wind
- W. Shaw, PNNL
- H. Frank, DWD
- J. Browell, Uni. Strathclyde

<table>
<thead>
<tr>
<th>Time</th>
<th>Activity</th>
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<tbody>
<tr>
<td>13:30 - 13:40</td>
<td>Introductory presentation on IEA Wind Task 36 &amp; explanation of workshop format and objectives</td>
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<tr>
<td>13:40 – 14:25</td>
<td>Open Space discussions in 3 groups - participants rotate free among the groups</td>
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<tr>
<td>14:25 – 14:40</td>
<td>Group leaders provide summary of each group to the full group; full group discussion</td>
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## Open Space Workshop: How We Run It...

<table>
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<tr>
<th>Principle</th>
<th>Meaning</th>
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<tbody>
<tr>
<td>Whoever comes is the right people</td>
<td>CHANGE group whenever you think you have said what you wanted or you are no longer interested in the discussion</td>
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<tr>
<td><strong>Law of two feet</strong></td>
<td>You can contribute on any discussion, use this opportunity!</td>
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<tr>
<td><strong>When it’s over, it’s over</strong></td>
<td>We stop after 30 minutes...use the time to tell about your ideas!</td>
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<tr>
<td>Whenever it starts it starts</td>
<td>Whenever you come to a discussion it is OK to engage and participate</td>
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<tr>
<td>Whatever happens is the only thing that could have happened</td>
<td>No matter who and what is discussed regarding the topic, it’s good. Leave if you no longer like the discussion!</td>
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# Introduction to the Open Space Topics

<table>
<thead>
<tr>
<th>Topic #</th>
<th>Title</th>
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| 1 | **Meteorological Measurements and Instrumentation**  
  - Standardization for Integration into Grid Codes of system operators  
  - Measurement Networks in conjunction with the Met Society (WMO, national met centers) or Line Monitoring |
| 2 | **Recommended Practices**  
  - Questions to the RP documents  
  - First experience exchange with the documents or parts thereof |
| 3 | **Application of Probabilistic Forecasts in the Power Industry**  
  - which applications are known that use probabilistic forecasts  
  - for which applications would probabilistic forecasts be useful  
  - to which other applications than renewable forecasting should the underlying probabilistic meteorological forecasts be applicable |
Summary of the OpenSpcae Discussions

**Topic #1:** Application of Probabilistic Forecasts in the Power Industry

**Topic #2:** Recommended Practice Guideline

**Topic #3:** Application of Probabilistic Forecasts in the Power Industry
Summary of Topic #1 Discussion
Meteorological Measurements and Instrumentation

Current barriers:
• Data Quality
• Data provision needs to be legally binding and enforceable
• Grid code often not sufficient
  → UK < 50MW, should be 1MW
  → DE: no rules, need of requirement
• No maintenance incentive post construction
• Missing Declaration of availability is a source of forecast error
• Wind farms will have to report potential power - could be basis for requirements for measurements
• Turbine flow distribution need to be addressed
• Are hub height wind speeds what we want/need?
Mitigation:

- Data (format) standardisation for operational consideration, meta data
- Financial incentives may help
- Incentives for wind farm operators:
  → Data useful for maintenance planning forecast
  → Health of turbine needs measure (e.g. gearbox temperature etc.)
- With Machine Learning techniques errors in measurements may not matter
Summary of Topic #2 Discussion
Recommended Practices for Forecast Solution Selection

More practical examples
→ Example of a probability density function
→ more examples of cost functions for different type of users

Additional promotional material
→ Generate short videos of key sections
→ Generation of an Audio book
→ Reach out to users individually (by email)
→ Generate handouts
  → key points
  → questions in iteration with providers

Communication
Summarise key points instead of document descriptions

Contact/Link up to procurement platforms:
→ Achilles IT platform for acquisitions of services for companies
Summary of Topic #3 Discussion
Application of Probabilistic Forecasts in the Power Industry

Applications as Risk Measure:
- Trading
  → Internal Processes
  - Risk management
  - Expert Judgement
    “human in the loop”
  - Interconnector Flow
- Policy/internal risk management
- Capital of Risk
- Severe Event Prediction

Asset Management
- Maintenance
- Safety

System Operation:
- Interconnector flow
- Reserve Scheduling
- Dynamic Line Rating
- Constraint Management
- Ancillary Services Provision
Summary of Topic #3 Discussion
Application of Probabilistic Forecasts in the Power Industry

Long/Medium Range Applications:
→ Construction planning:
  - weeks in advance
  - vessel

→ Transmission Outage planning:
  → weeks in advance
  → Control run challenges
    - Staff
    - Bank Holidays

Flexible Market Products:
• Predicting when outcome is influenced by weather (forecast)
• Flexibility
• Inertia
• Curtailment
• Price spread

Interdependency Forecasting:
• RES ↔ Prices: Optimisation
• Long-term: Capacity credits, PPAs

Not-Casting:
• Bounded ranges of possible futures
• Polyhedra
• Robust Optimisation

Microgrid Operation
Generator Testing
Black Start

Challenges/Barriers

Missing Business Cases
• Difficult to construct
• Time Requirements
• Specialist knowledge/Training required
• Many solutions in academic literature but not in practice
• Link to value is missing
• Implementation challenges
ADDITIONAL INFORMATION & CONTACT

Follow us:

Project webpage
http://www.ieawindforecasting.dk/

Task-page:
http://www.ieawindforecasting.dk/topics/workpackage-3/task-3-1
http://www.ieawindforecasting.dk/topics/workpackage-3/task-3-5

Recommended Practice Guideline:
https://www.ieawindforecasting.dk/Publications/RecommendedPractice

Publications:
http://www.ieawindforecasting.dk/publications.html

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