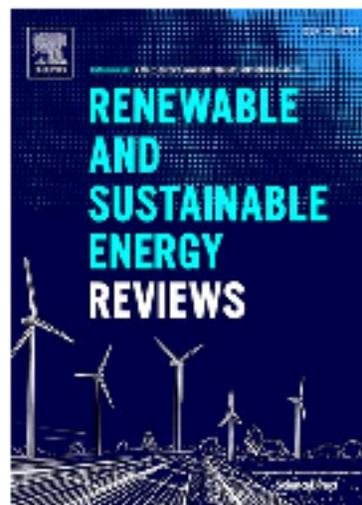


IEA Task 36/51 WP3 Uncertainty / Probabilistic Forecasting: from 2021 to 2022/23

One review paper is submitted and under review. Highlights include:

Jie Yan, Corinna Möhrlen, Tuhe Göçmen, Mark Kelly, Arne Wessel, Gregor Giebel

- **Uncertainty sources** are defined and described throughout the chain of forecast modelling.
- **Uncertainty mitigation** approaches for each type of uncertainty source **from planning, operation to market phase** are reviewed.
- An example of **uncertainty validation** is presented and discussed.



Improving wind power forecasting accuracy of the sea area by using a multi-scale ensemble learning model

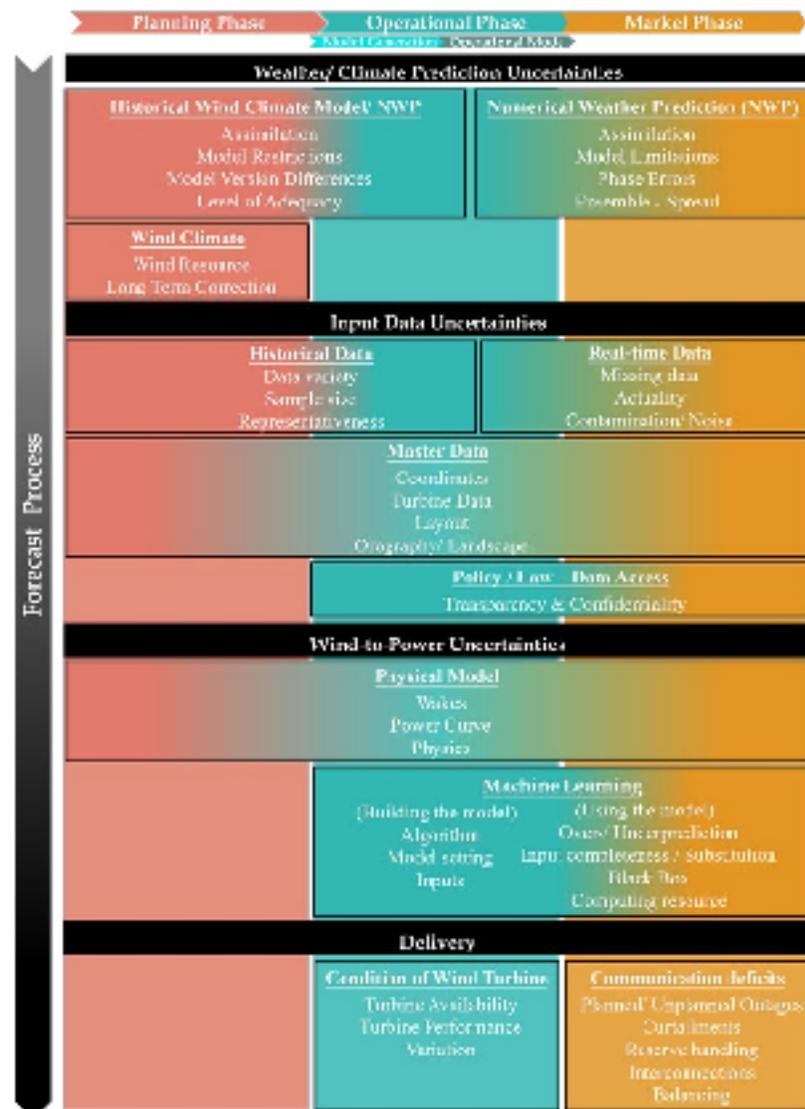
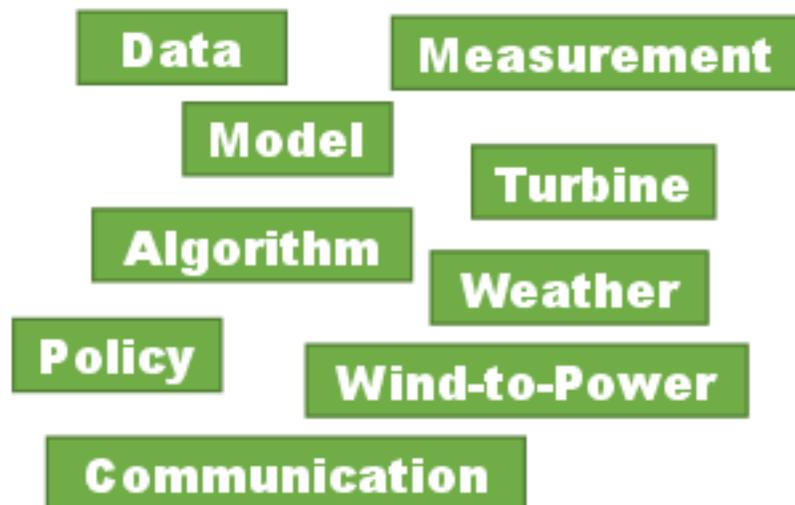
Yan, Jie; Möhrlen, Corinna; Göçmen, Tuhe; Kelly, Mark; Wessel, Arne; Giebel, Gregor

Renewable Energy, 2023, 160, pp. 1-15, doi:10.1016/j.renene.2023.104888

Abstract: This paper presents a multi-scale ensemble learning model for wind power forecasting. The model is designed to handle the multi-scale nature of wind power forecasting, from short-term to long-term. The model is trained on historical wind power data and is able to provide accurate forecasts for different time horizons. The model is evaluated using a set of test data and is shown to outperform other state-of-the-art models. The model is also able to provide uncertainty estimates for the forecasts. The model is implemented in Python and is available as an open-source project on GitHub.

1. Introduction

Wind power forecasting is a crucial component of the wind energy supply chain. Accurate forecasts are essential for the efficient operation of wind farms and for the integration of wind power into the power grid. However, wind power forecasting is a challenging task due to the highly variable and non-linear nature of wind. This paper presents a multi-scale ensemble learning model for wind power forecasting. The model is designed to handle the multi-scale nature of wind power forecasting, from short-term to long-term. The model is trained on historical wind power data and is able to provide accurate forecasts for different time horizons. The model is evaluated using a set of test data and is shown to outperform other state-of-the-art models. The model is also able to provide uncertainty estimates for the forecasts. The model is implemented in Python and is available as an open-source project on GitHub.



Aim and Motivation

What we did in 2021

“Dictionary” of Uncertainty

Book



Tool



Our aim in 2021-22

“Calculator” of Uncertainty

- **“dictionary”** to learn the sources of uncertainty and how these uncertainties propagate throughout the modelling chain.
- **“textbook”** to guide NWP providers, power forecasters and end users, etc. to implement more rational and targeted uncertainty mitigation strategies.

Standard Validation Guideline



? “Chain-based” Evaluation Tool

- **“standard test/examination paper”** to evaluate a forecast model/system, to know what kinds of uncertainty and how large of these uncertainties.
- **“exemplary (or general hopefully) public platform”** to illustrate the uncertainty chain and to compare different forecast models/systems – for the forecast developers, providers and end-users.

Potential collaboration and Results

To do list and expected results:

- Global standard dataset and validation example (e.g. on Github)
- Validation practice (report/paper...)
- Platform/Tool develop
- ...

Note: extended horizon from seasonal to minute/second-ahead

WP1: Seasonal forecast

WP2: Minute scale forecast

**Task 44:
Uncertainty source
Validate by use**

**Task 32:
Uncertainty source
Standardize the Dataset**

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