<u>Replies to RC2</u>

Dear reviewer,

Thank you for taking the time to review the manuscript and for the useful feedback. Below you can find my replies to your comments (your comments are in bold and italic, the remaining text are my replies).

The paper proposes a fault diagnosis and prediction method based on SCADA data from wind turbines. From the results, it is evident that training models with a sufficient amount of data can enable the prediction of certain faults, demonstrating practical significance. The authors are advised to consider the following issues:

1. ***The proposed model's performance is analyzed in terms of reconstruction errors under masked sensor errors and nominal conditions, as well as its ability to distinguish between healthy and unhealthy data. To better demonstrate the superiority of the model, it is recommended to include comparisons with other models, particularly in the prediction aspect.***

   It is indeed correct that no extensive comparison of different methodologies is done in the manuscript. The main purpose of this manuscript is to show that a masked autoencoder is a method that is suitable for failure prediction on drivetrains under the condition of sensor errors. It resolves the sensor error problem in a reliable and transparent way without requiring the training of many different models (on certain subsets of signals which hopefully then exclude the signal with the measurement errors), or user specified feature engineering (sensor fusion), while at the same time still being able to distinguish healthy from faulty data well. The fact that this methodology can do that has already a significant added value.

   In the manuscript a comparison is made between the situations where the mask is applied to the signal hit by the sensor error, and when it is not applied. The latter situation corresponds more or less to the vanilla autoencoder. By comparing the results in these two situations the added value of the mask is shown.

   An extensive comparative study of different methodologies that do the same is future work, since comparing the methodologies is indeed interesting. However, to clarify the predictive performance of the masked autoencoder NBM, we've added section 4.2 "Prediction accuracy of model" (lines 409-427 in the revised manuscript) to the manuscript that discusses the prediction accuracy of the model on healthy data. The results show that in general the median absolute reconstruction error is smaller than 1°C, with the exception of WF4 (for which an explanation has been given in the manuscript). This indicates that the masked autoencoder is still an accurate modeler of the normal behavior. In future work these results will be compared to results from other methodologies.

2. ***The authors' work primarily relies on SCADA data for analysis, and the fault information is mainly based on faults that can be reported in wind farms. Therefore, the authors should further emphasize the practical significance of the proposed method in key sections.***

The reason behind the focus on SCADA data was indeed not explained properly. The text of the manuscript has been updated. Lines 34-36 in the revised manuscript explain that there is an economic incentive to do condition monitoring with only SCADA data.

The failure information is not based on failures that are already reported by other condition monitoring systems. The failure information is a historical dataset and is received from the industrial partner. It indicates that a certain turbine at a certain point in time has failed. The information also indicates which component has failed. So the used validation failures were not predicted by a system in advance. The masked autoencoder is very often able to predict these failures well in advance, something that the industrial partner could not do before. We acknowledge however that this might not have been made clear sufficiently in the manuscript. For this reason a section "Component failures" (lines 335-347 in the revised manuscript) has been added to the manuscript.

I hope this sufficiently addresses your comments.

Sincerely,