

# POWER CURVES – WHERE DO WE GO FROM HERE

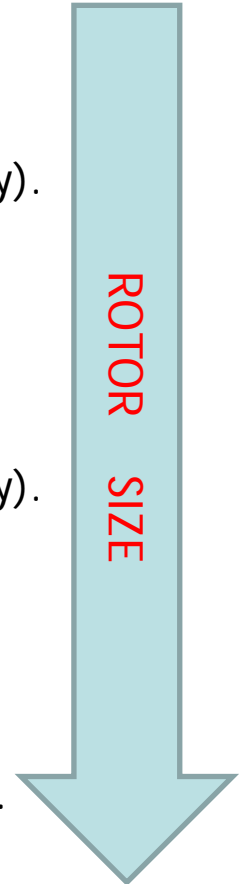
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GROUP TECHNICAL DIRECTOR

Tuesday 4<sup>th</sup> December 2012



## A Brief History Lesson:

- 1992
  1. Use sales Power Curve as input to energy yield.
  2. No adjustment for 'non-standard' inflow conditions (apart from density).
  3. No account taken of uncertainty.
  
- 2005
  1. Use sales Power Curve as input to energy yield.
  2. No adjustment for 'non-standard' inflow conditions (apart from density).
  3. Uncertainty included (varying levels depending upon the analyst).
  
- 2012
  1. Use sales Power Curve as input to energy yield.
  2. Adjustment for 'non-standard' inflow conditions using ad hoc methods.
  3. Uncertainty included (varying levels depending upon the analyst).
  4. **No consensus or established best practice!**



The Consequences are:

- Value being removed from projects.
- Over reliance on the sales power curve.
- Ad hoc empirical correction which have no physical foundations.
- Lack of credibility.
- All turbines being treated the same when clearly there are differences.
- No guidelines to ensure better siting.

## WORKING TOGETHER TO IMPROVE ENERGY YIELD PREDICTIONS

We already have the building blocks of a solution (Lidars, Models, Data etc.)...



Sir Henry Wellcome inspecting stonework for the new Wellcome Research Institution building on Euston Road, 1931.

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Today! Let's start to put these pieces together

## OUTLINE OF PRESENTATIONS - MORNING SESSION

- ❖ “What are the issues?” Daniel Stevens (SSE Renewables)
- ❖ “What are the mechanisms?” Michael Brower (AWS TruePower)
- ❖ “How to Improve Energy Predictions?” Andrew Tindal (GLGH)
- ❖ “Influence of Turbine Design Choices” Tomas Blodau (RE Power)
- ❖ “Modelling Impact of Non-Standard Conditions”, Axel Albers (Wind Guard)
- ❖ “Power Curves for Different Ambient Conditions” Henk-Jan Kooijman (GE)
- ❖ “Impact of ‘non-standard’ inflow” Ioannis, Antoniou (Siemens)

Moderated by Andrew Tindal (GLGH)

A general discussion around the following topics:

- How can the industry make progress on this issue?
- What site specific measurements can be used to improve yields?
- What extra information can be supplied by turbine manufacturers to improve yields?
- Relationship/Distinction between working group and Power Performance IEC Standard
- Next Steps?

You are more than welcome to:

Enjoy the Wellcome Collection Tour: 16:00 - 17:00

Attend the Evening Drinks Reception: 17:00 onwards



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power for good