Can short term forecasts increase forecast accuracy over persistence forecasts?

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Outline

- Background
- Persistence
- Our most recent R&D work
- Additional Capabilities
- Implications & Recommendations

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Background

- Late in 2005 we embarked on a significant R&D project (halted improvements on operational systems)
- 2007 – Operational IT Infrastructure rebuild begins
- 2009 – New ePD Forecast System Operational
  - R&D continues
  - Operational IT Infrastructure rebuild continues
  - Presentation at NZWEA 2009

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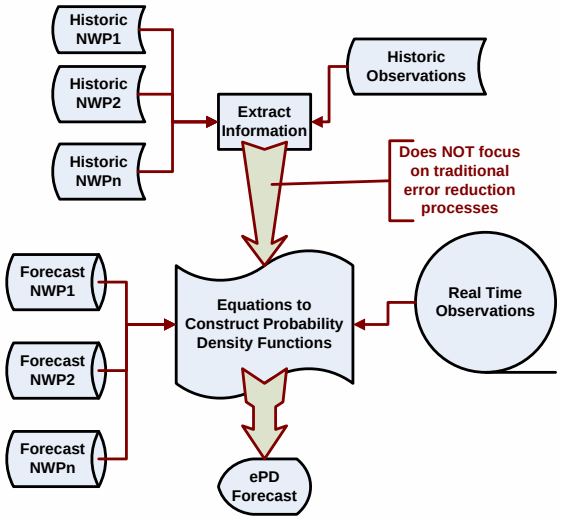
New ePD System

8/2/2010



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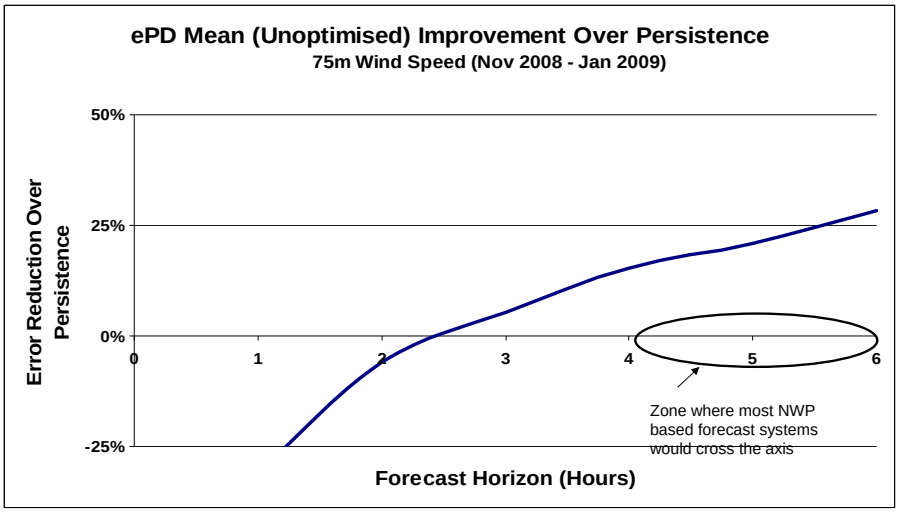
Background continued



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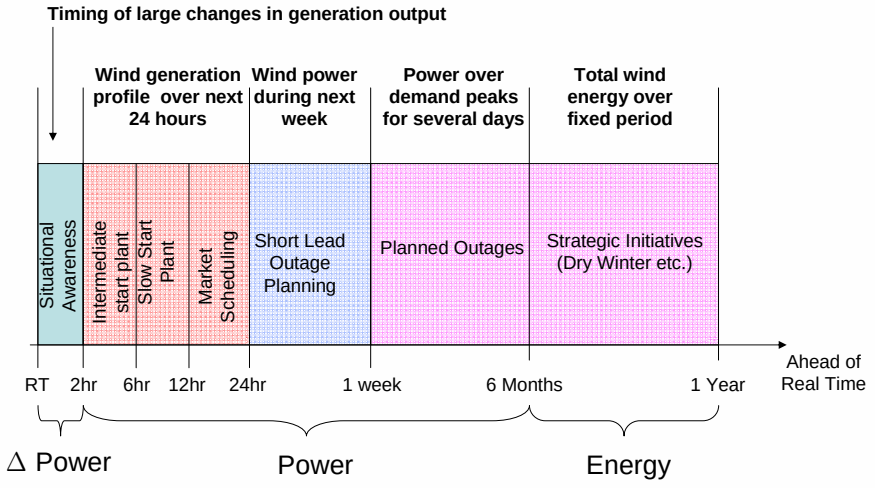
Forecasting Requirements – Source Transpower



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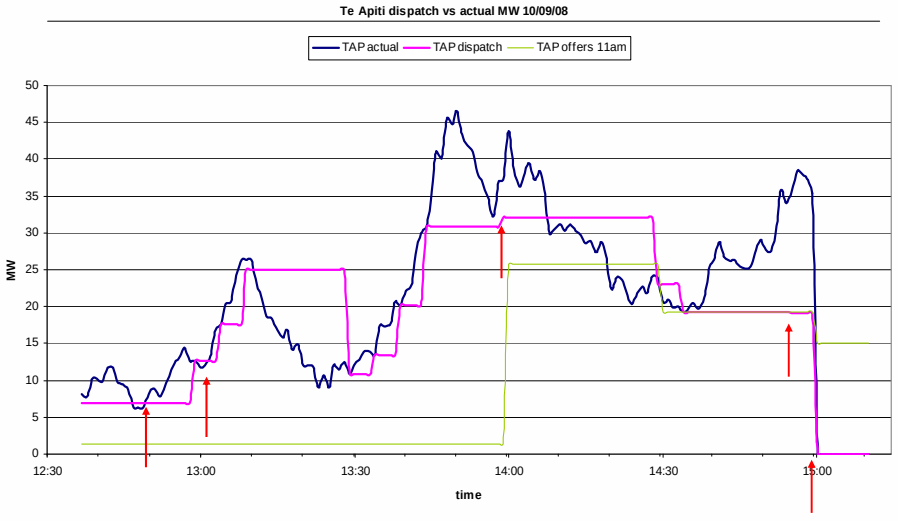

*Source Transpower

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Persistence

- Benchmark short-period forecast (<6 hour horizon) for wind speed.
- "As it is now, thus shall it be."
- Very difficult to improve on:
  - Alberta Electric System Operator – Wind Power Forecasting Pilot Project (2008)

  http://www.aeso.ca/gridoperations/13825.html
- Mandated for use for 2 hour horizon here in NZ.

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The R&D Project

- Unfunded, in conjunction with Meridian
- Meridian provided
  - observation data – 10 minute wind speed averages delivered to Metservice ½ hourly for three New Zealand sites.
  - Final forecast format advice and miscellaneous information
- MetService provided
  - One Scientist (Dr. M. Stephens)
  - the test hardware system
  - the technology (ePD System + operational NWP data)

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The Project Goals

- Target Variable: ½ hour mean wind speed.
- Target Forecast Horizon: ½ hourly forecasts to 6 hours
- Target Forecast Delivery: 20-25 minutes from receipt of latest observation, with an hourly update frequency
- Target Accuracy: Show skill (MAE) beyond persistence at a shorter horizon than 2 hours.

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The Work

1) Optimise data flow to reduce turn-around time
2) Modify the ePD forecast system to forecast ½ hour mean wind speeds.
3) Optimise the ePD forecast system for extracting information relevant for the 6 hour forecast horizon.
4) Establish test system.
5) Let the test system run (November 2009 – current)
6) Verify forecasts

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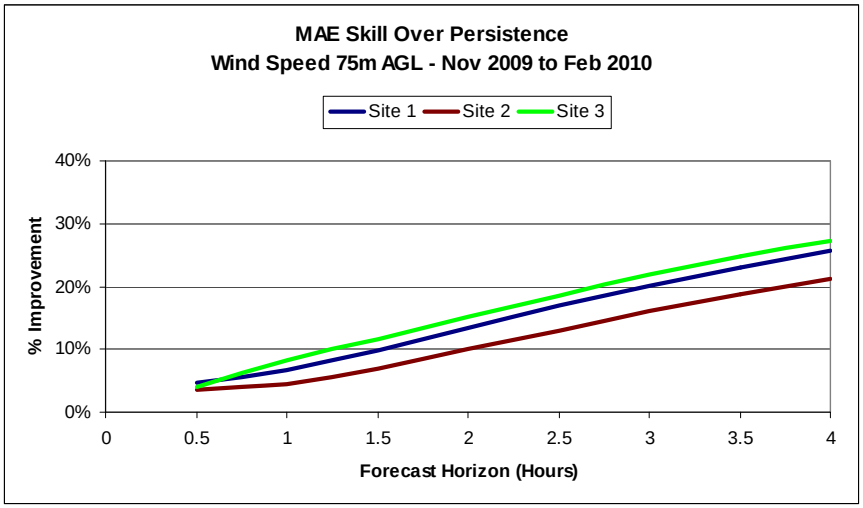
The Results - Accuracy



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Additional Capability

- Each ePD forecast is a complete probability distribution function (pdf/cdf)
- Probabilistic forecast data is situational dependent (not just based on historical data)
- Full range of probabilistic data available
  - Any and all Confidence Intervals
  - Any and all Probability of Exceedence (POE's)
  - Or even the complete pdf/cdf.
- ePD System can be configured to forecast wind farm/regional **power** output as well – just need relevant observation data

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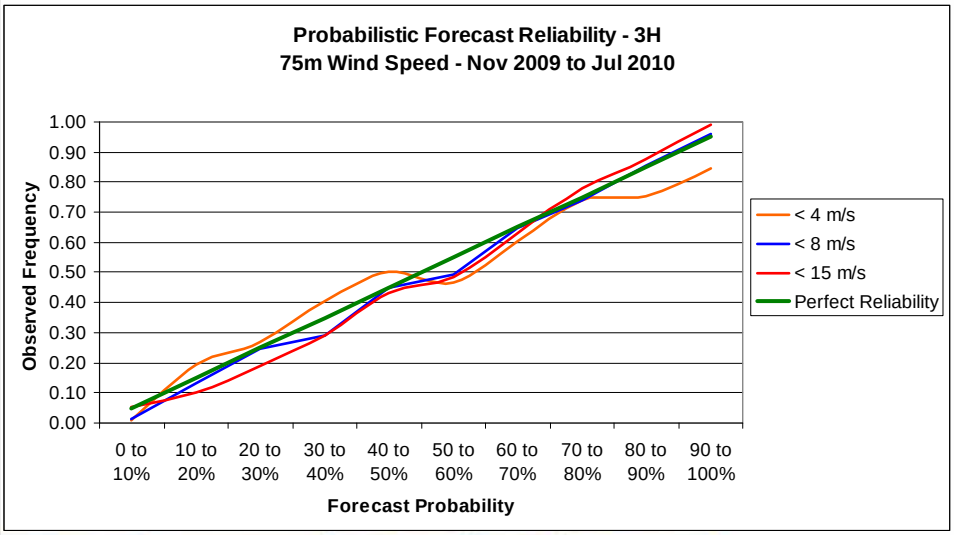
Quality of Probabilistic Forecasts



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Implications & Conclusions

- Persistence can be improved upon.
- The wind forecasting for NZ Wind farms can be improved significantly
- Can assist with System Operator's Security Checks and Standby Reserve Checks provided relevant observation data available.
- The mandate to use persistence as a forecast for power production could be reviewed.
- Grid connection requirements – observation data.

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