

1st International Conference on Energy and Meteorology
8th – 11th November 2011
Gold Coast - Australia

In Search of the Perfect Forecast

Pascal J. Mailier

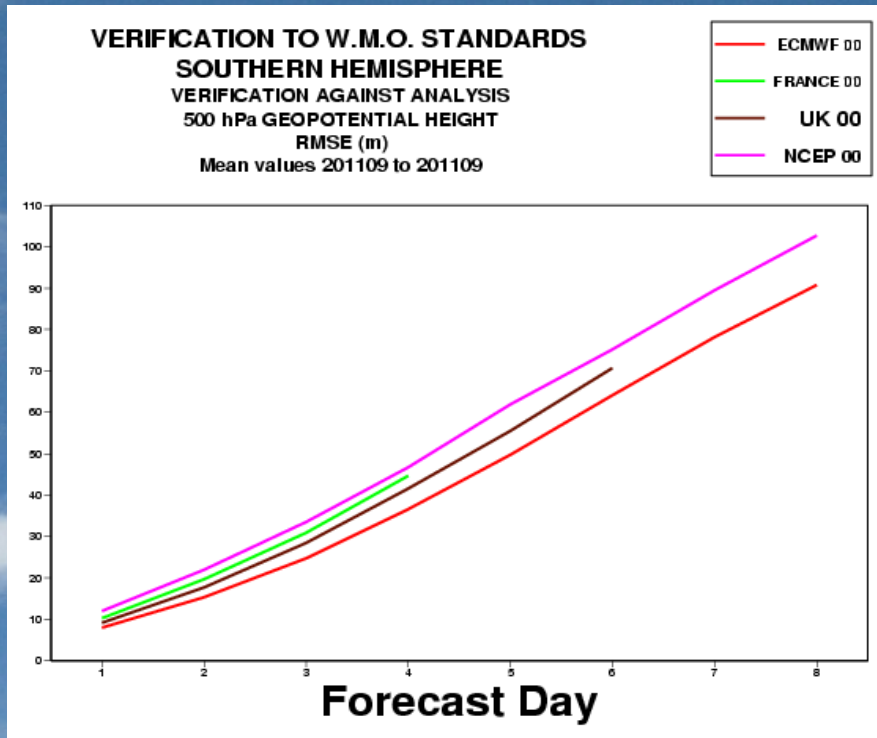
Royal Meteorological Institute of Belgium
Avenue circulaire 3, 1180 Brussels



What Does “Good” Mean?

- *Two* communities involved
 - **Scientists**: mainstream forecast quality assessment methods have been developed primarily to monitor/improve weather and climate forecast systems
 - The focus is on meteorological variables.
 - **Users** look at forecast goodness from an operational and commercial perspective
 - Non-meteorological attributes may be looked at, e.g. timeliness.
- As a result, assessments of goodness provided by meteorologists may not always be adequate for decision-makers.

The Scientist's Perspective



Forecast goodness is measured by comparing forecast and observed meteorological variables.

3

The User's Perspective

INDIVIDUAL PERFORMANCE CONTRACT FOR 2007				
NAME: Pascal Mailier		JOB: Senior Meteorologist	FUNCTION/DEPT: Portfolio Optimisation	LOCATION: Mi
OBJECTIVES				
		COMPETENT PERFORMANCE OBJECTIVE	HIGH PERFORMANCE OBJECTIVE	EXCEPTIONAL PERFORMANCE OBJECTIVE
Financial	1.1 Gross Profit from Proprietary Trading only after Direct Costs (e.g. Broker fees, Transportation, Network fees etc.)	£21	£31.5	
50%				
D - £11m				
£ 3,124,691 (15th Dec) (£4.1m FY)	1.2 Cost of Short Term Forecasting Error (Gas) Volume is calculation (in kWh) of 9am D-1 demand forecast loaded into Loadbal vs D+5 allocation run.	£30m-25m	£25m-£22m	£22m-£18m
£ - £8.3m to 22/11/07 - expected £9.6m	1.3 Cost of Short Term Forecasting Error (Electricity) Cost of inaccurate demand forecasting (NETA imbalance provision)	£15m-£12m	£12m-£10m	£10m-£8m
£ - 5.39% (benefit over forecaster: 1.48%, £780,654) (15th Dec)	1.4 Gas Short Term Forecast Error Mean Absolute Percentage Error of final total demand forecast generated to load into Loadbal vs D+5 allocation run.	8%-7.5%	7.5%-6%	6%-5% MAPE
£ - 1.94% overall to 22/11/07	1.5 Electricity Short Term Forecast Error Overall MAPE (final forecast v deemed) & Peak MAPE (Mar-October periods 31-43 and October-March periods 15-46)	2.75%-2.49%	2.49%-2.25%	2.25%-2%

Forecast goodness is measured by how much the cost of errors has been reduced.

4

Forecast 'Goodness'

- *Three* distinct types of goodness (Murphy, 1993)
 - **Consistency:** correspondence between the forecasters' judgements and their forecasts
 - A 'good' forecaster avoids 'hedging'.
 - Probabilistic forecasts are 'better' than deterministic forecasts.
 - **Quality:** correspondence between the forecasts and the matching observations
 - Bias as small as possible
 - Accuracy, reliability, association as high as possible
 - **Value:** incremental economic advantage and/or other benefits realised by decision makers through the use of the forecasts

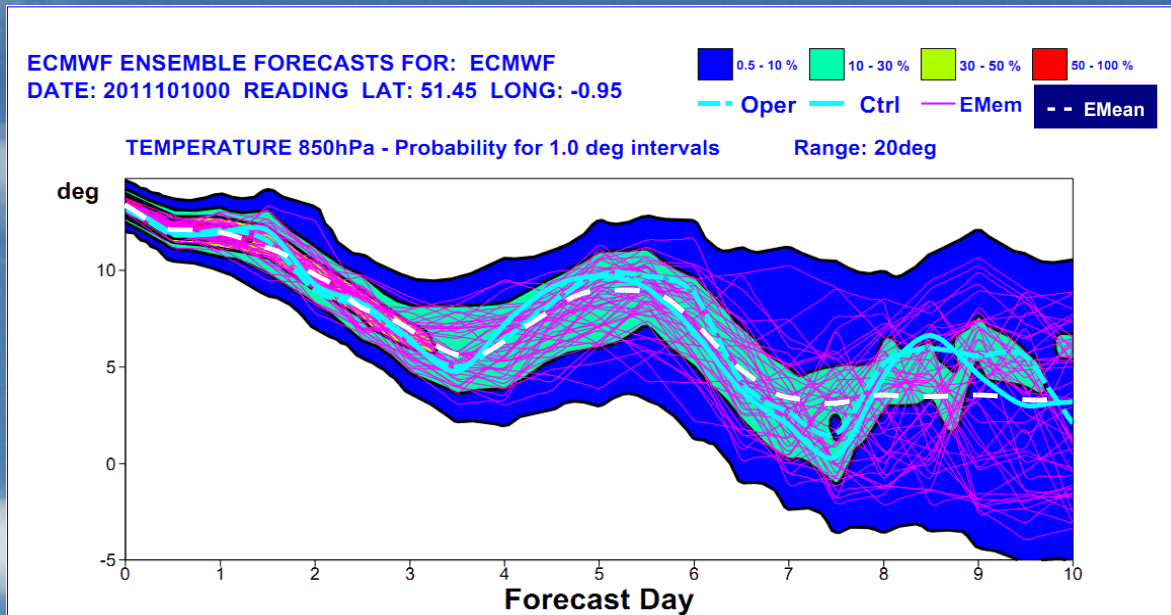
5

Accuracy vs. Value

- *Accurate* deterministic forecasts do not necessarily provide *value*.
 - The ensemble mean (EM) minimises the expected forecast error, but it is useless at detecting crucial signals for an end user in the energy sector (e.g. forecast gradient, extreme developments).
- Full ensemble forecast distributions are more valuable than single deterministic runs because they provide information on uncertainty and alternative scenarios.
 - The ensemble spread estimates the expected error.
 - The ensemble modes identify possible scenarios ('clusters').

6

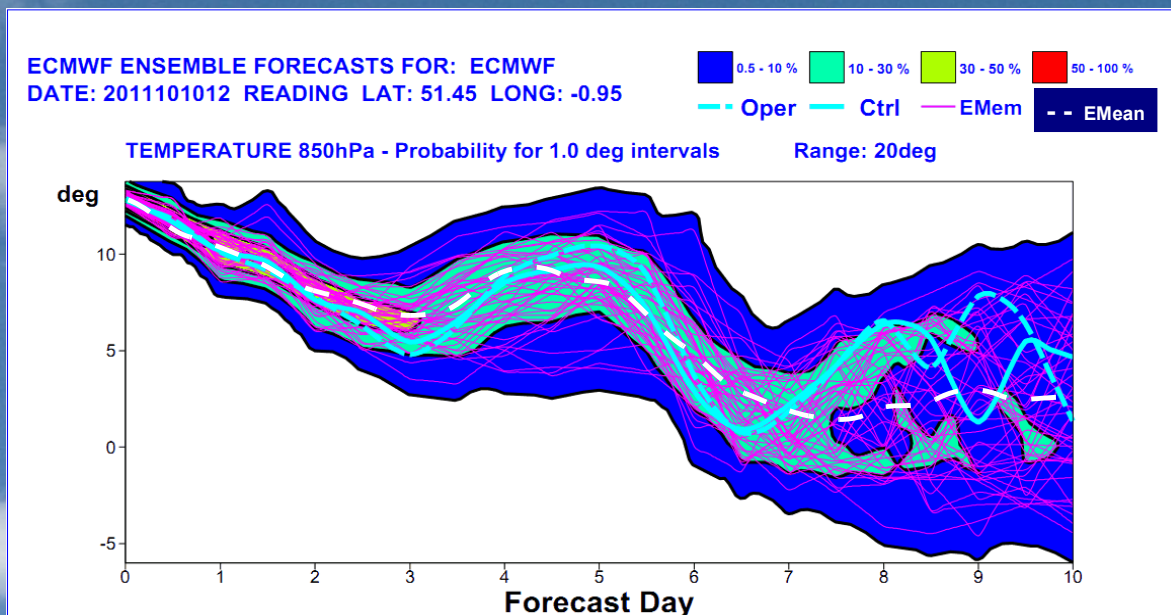
The Fallacy of Accuracy (I)



The EM 'consensus' forecast (dashed white) lingers within the main body of the ensemble distribution...

7

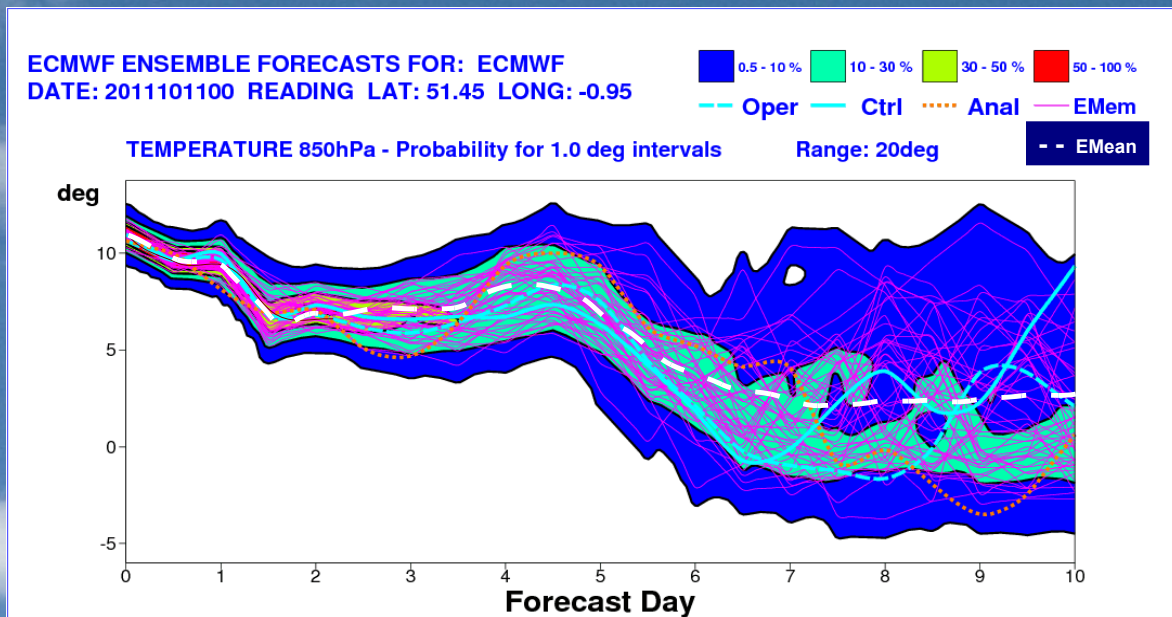
The Fallacy of Accuracy (II)



... and 'misses the plot' when the ensemble distribution predicts a significant risk of further cooling beyond D+7.

8

The Fallacy of Accuracy (III)



The ensemble distribution begins to favour the colder (winning) scenario while the EM remains more conservative.

9

Conclusion

- Accuracy and value do not always correspond and they can sometimes conflict.
- Uncertainty (probability) IS information! Removing it from the forecasts has a negative effect on value.
- A strong dialogue between the scientific community and forecast users in the energy sector is vital to guarantee that forecasts are always 'fit for purpose'.
- ICEM 2011 provides an ideal platform to promote this dialogue!

10

Reference

Murphy, A.H. 1993: "What is a good forecast? An essay on the nature of goodness in weather forecasting." *Weather and Forecasting*, **8**: 281-293.