Making the most of limited predictability

This Google Doc serves as a living record of the discussion in our breakout group. Please add your thoughts either to the tables below or as comments. The Next Generation [...] organisers will tidy-up and share these notes after the workshop.

Thanks for participating!

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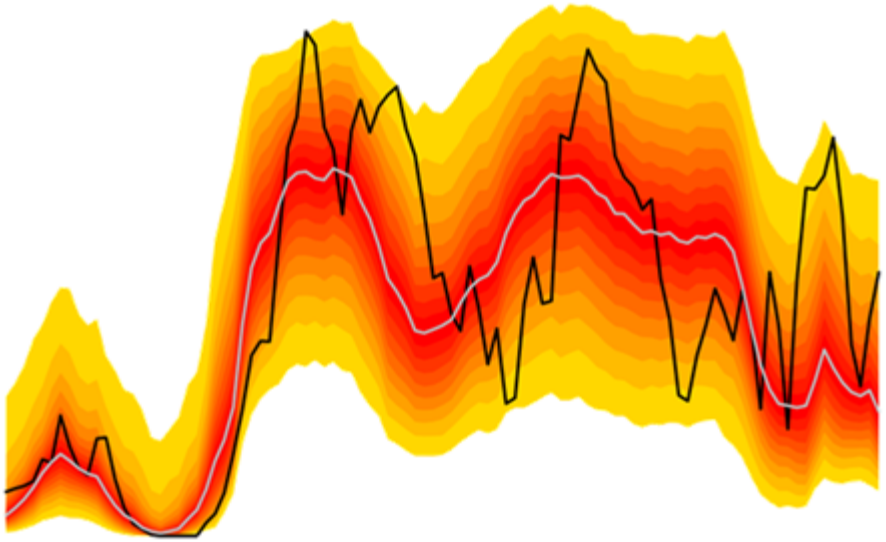
Starter for 10...

What's going with this wind power forecast?

How is the p50/deterministic forecast (white) different from the observation (black)?

Does the *fan plot* visualisation help?

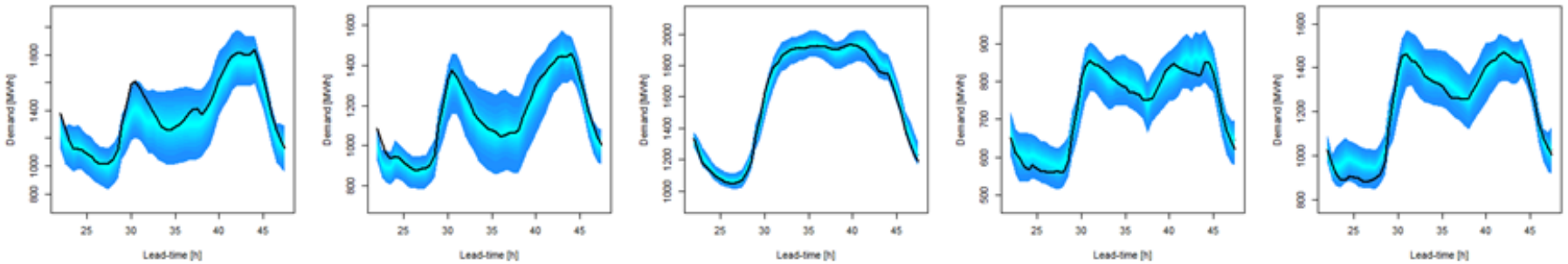
What sources of uncertainty and predictability could be at play here and in short-term wind/solar forecasting in general?



Another example:

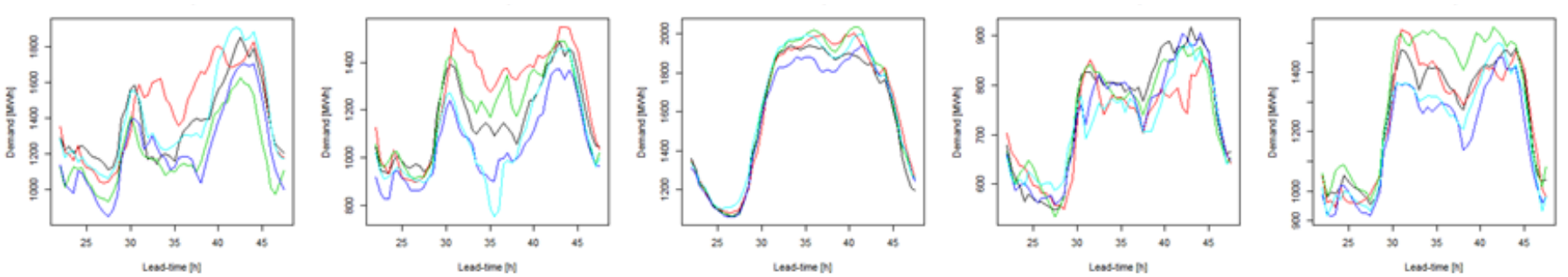
Consider net-demand (consumption less embedded generation). This example is from the electricity network in SE England (five neighbouring regions), but could be any energy system, or group of interconnected energy systems.

Different regions have different characteristics: composition of demand and generation, and other things? How does this impact predictability and uncertainty?



Neighbouring regions experience similar weather (and socio-economic effects?). Is this important? Should we care?

How might we begin to understand, predict, and communicate interdependence in forecast uncertainty?



Sources of Predictability and Uncertainty

Pred/Uncert source	Related to [wind/load…]	Time and length scale	Interacts with...	Nature of predictability/uncertainty Degree of understanding/appreciation
User mind set	All	Operational	Recent forecast performance	Forecaster or forecast user may respond differently, or make manual adjustments, based on recent experience, even if this isn't justified by the situation
High speed shut down	Wind	Minutes-Days		Sub-hourly time scales impact response, not captured in hourly wind speed, for example. Different wind farms have different control settings which are unknown/uncertain.
Underlying methodology	All	All		Forecasts produced by different methodologies have different qualities, e.g. quantile regression can be smooth, ensemble NWP weather uncertainty and extremes. No one-size-fits-all solution for all users in the energy sector.
Social response to weather	Load		Temperature, weather composite variable	New technology/use of technology with unknown/new weather response. (Electrification of heat/cooling, EVs). Can/should we monitor sales of AC units, solar panels...? Infer from smart meters?
Clouds	Solar		Temperature	Very difficult to predict, can have a large impact. High/low have different impacts. Cloud formation/break-up is very difficult (interacts with temperature).
Panel temperature	Solar	Very short-term	Irradiance, temperature	Cool panels ramp faster than warm ones in the same irradiance conditions, e.g. when clouds break.
Location + timing of low pressure system / fronts	All, wind	+/-10km, hours		Error in location can have a large impact on wind output. Indicated by high spread in ensemble members.

Large scale patterns	All	Medium-range		Potential for extremes (fires, icing, heat…) with large potential impact.
Fires/dust	Solar			Consequence of dry/heat can reduce solar production dramatically, even far away from fires.
Icing	Wind and Solar			Difficult to model, response depends on turbine characteristics (e.g. de-icing, unknown/uncertain if present).

How can uncertainty be disaggregated, interpreted, and communicated?

Source(s)	Related to [wind/load…]	Potential process of disaggregation	User interpretation/benefit