SOCIO-ECONOMIC BENEFITS OF METEOROLOGICAL AND HYDROLOGICAL SERVICES

INVENTORY OF DECISION SUPPORT TOOLS

INVENTORY FRAMEWORK

ITEM	DESCRIPTION
Sector	Energy
Sub-sector	Wind power production
Tool Name	Wind farm manager simulator
Tool Description	The players are asked to trade power from a wind-farm on the energy market. They are presented first with traditional deterministic forecasts and then with ensemble forecasts, complete with tools for assessing financial risk, and found that they could earn considerably more money from the farm by following the ensemble forecasts.
Weather, Climate or Water inputs	3-day site specific deterministic and ensemble weather forecast
Specific weather, climate, water data required	10-m wind speed deterministic and ensemble data.
Spatial resolution	Site specific
Temporal resolution	The default version of the game uses T+72 forecast but any lead time could be used instead
Delivery methodology	It uses historical data
Frequency of data requirement	A set of default data is provided. It can be updated if wanted
Other	Data used in the game are genuine deterministic and ensemble 3-day forecasts, and real observations, from a week in May 2004. Wind Power forecasts are based on genuine performance data for a Vestas 1.6MW wind turbine and electricity prices are believed to be typical of the trading market in 2004.
Detailed Tool Description	**Playing instructions:** The game is set up as an MS Excel Spreadsheet. The game will open with an introductory page. (If it opens anywhere else, please click the Introduction tab at the bottom to start.) (Note: When you open the game it will come up with a standard warning about Excel macros and ask whether you wish to Disable or Enable macros. We do not use macros so you can disable without problem.) Proceed through the Deterministic and Ensemble pages by clicking the tabs at the bottom, and following instructions to enter your power estimates for each day, based on the forecast information provided. Guidance from

	the ensemble forecasts is presented in several ways: * Mean, maximum and minimum power forecasts given by the ensemble (presented both as a table and as a box and wiskers graph). * Probabilities of different power outputs (see middle graph). * Recommended values to minimise risk according to the probabilities given by the ensemble. * A "Risk Estimator Tool" on the right-hand side of the screen. Here you may enter the power estimate you are thinking of selling and see a graph of the risks of making a profit or loss. The size of each blue blob indicates the probability of that profit or loss. You will find that reducing your bid reduces the risk of losing money, but also reduces your potential profits, so you must decide how much risk you are prepared to take to maximise your gains. A low-risk strategy would be to minimise the blobs below the zero profit/loss line, but can you do better? Can you beat the game's recommended minimum risk strategy? Finally, proceed to the Results page to see how you got on! Having played once, you can go back and try different strategies simply by deleting your previous entries and trying again. Have fun!
Spatial resolution	Spatial resolution of output products
Temporal resolution	Temporal resolution of output products
Delivery methodology	Delivery methodology of product
Frequency of provision	Frequency of provision of product
Other	Other relevant information as required
Benefits of tool application	This tool is particularly useful to show the benefits of probabilistic information for decision making. It brings together concepts such as transforming meteorological variables into user variables (e.g. power production) and the use of cost/loss models.
Possible future advances	Unfortunately, we do not have enough time or resources to update the game. However, it could be adapted to take real time data and to make the market description more realistic.
Comments	
URL	
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