An application of parametric modelling to New Zealand wind power

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Abstract: To model wind power within a conditional probability density framework and to estimate parameters through regression polynomial functions, finally to apply simulation data to a Dispatch Model for validation.

• INTRODUCTION

Wind energy is a source of renewable power generated from wind flowing. In New Zealand, it is one of the fastest growing sources of electricity. The utility of wind provides potential ability to meet future demand from the society. It presents challenges to the New Zealand Electricity Market (NZEM).

Methods to model wind power [1] includes persistence predicted wind, transforming wind to power at a turbine and forecasting the uncertainty in a wind farm.

• SIMULATION


Three wind scenarios are simulated in the Dispatch Model by applying synthetic power data as one of input variables.

– Scenario A: installed wind capacity 420MW
– Scenario B: installed wind capacity 1250MW
– Scenario C: installed wind capacity 2250MW

• DISCUSSION

The Dispatch Model models NZEM [5]. It uses linear programming techniques to optimise generation cost.

The New Zealand optimal Load dispatch model consists of 18 nodes and corresponded electricity network. Its structure has input decision variables, objective functions and constraints.

Validation of Mixture Beta simulation in the Dispatch Model requires:

– Input variables: actual grid loads, offers from generators and synthetic wind power offers
– Modification on the Dispatch Model for simulation runs
– Output analysis: time dependent prices and transmission line constraints
– Offer management thought different uncertainty levels of wind power

• REFERENCES