

# Wind Integration Project (WIP)

For NZ Wind Energy Conference and  
Exhibition 2009

20-22 April 2009

# Introduction

1. Background to the WIP
2. The challenge: wind uncertainty and scheduling
3. Size of wind forecast errors
4. Incentives for wind forecasting
5. Forecasting improvements: options for possible improvements
6. Information for participants
7. Areas of focus for possible changes
8. Next steps

# 1. Background

## The Wind Generation Investigation Project (WGIP)

- Conducted by EC/SO/Stakeholders
- Aimed for a balanced treatment of wind generation
- Identified a range of issues, e.g.:
  - Pressure on frequency keeping needs
  - Low voltage ride through
  - Pre-dispatch (forecasting / scheduling) and dispatch
- Assessed and consulted on mitigation options during 2007
- Commenced projects to address the key issues identified

# 1. Background (cont...)

*Projects commenced to address identified issues*

Issue	Project
FK issue	<ul style="list-style-type: none"><li>• Optimise selection of frequency keeper</li><li>• Investigate possibility of using HVDC to share FK resource between islands</li><li>• Investigate automatic governor control (AGC) to enable multiple frequency keepers in each island</li></ul>
Ride through	<ul style="list-style-type: none"><li>• Develop standards</li></ul>
Pre-dispatch and dispatch	<ul style="list-style-type: none"><li>• Wind Integration Project</li></ul>

# 1. Background (cont...)

The WIP will

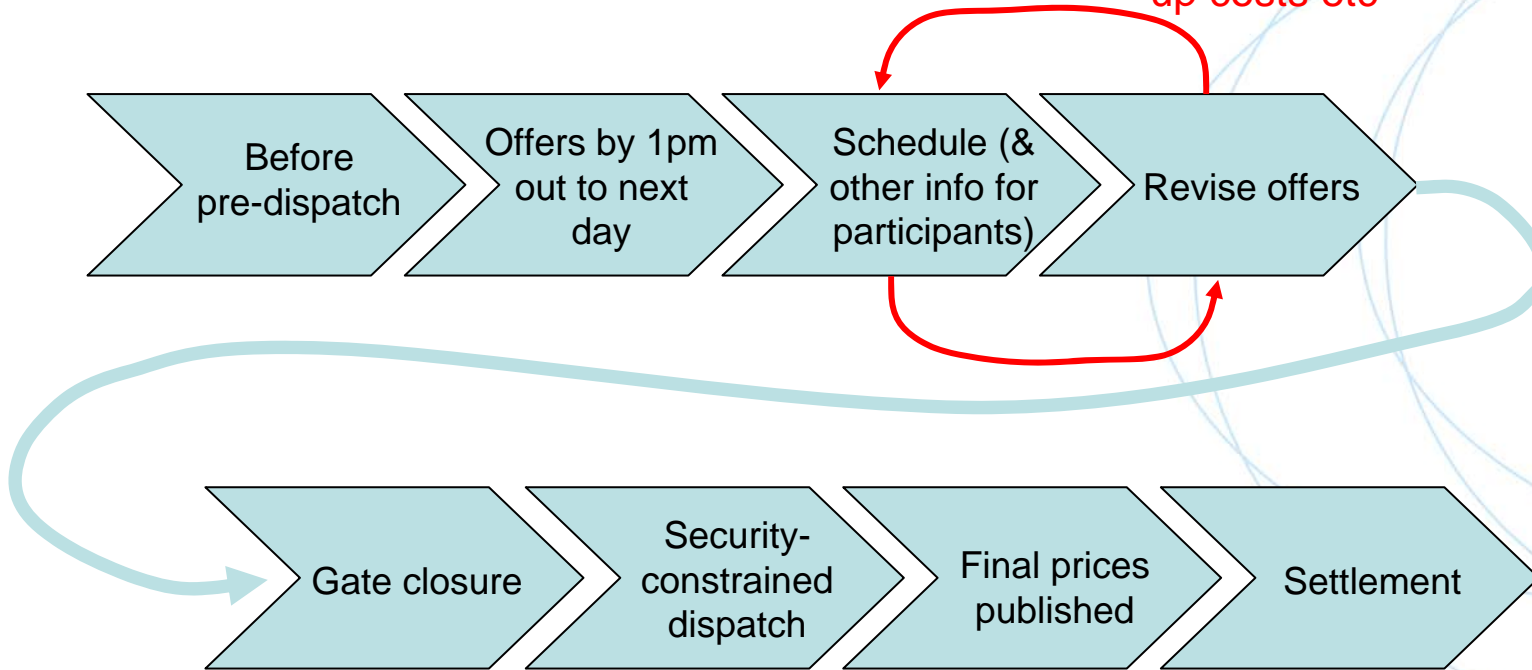
- Draw on WGIP work and extend it in places
- Make rule change proposals where appropriate
- Adopt a “practical approach” to those rule changes
  - Simple changes may deliver substantial benefits
  - Other more fundamental changes will be considered in conjunction with the Commission’s market development program



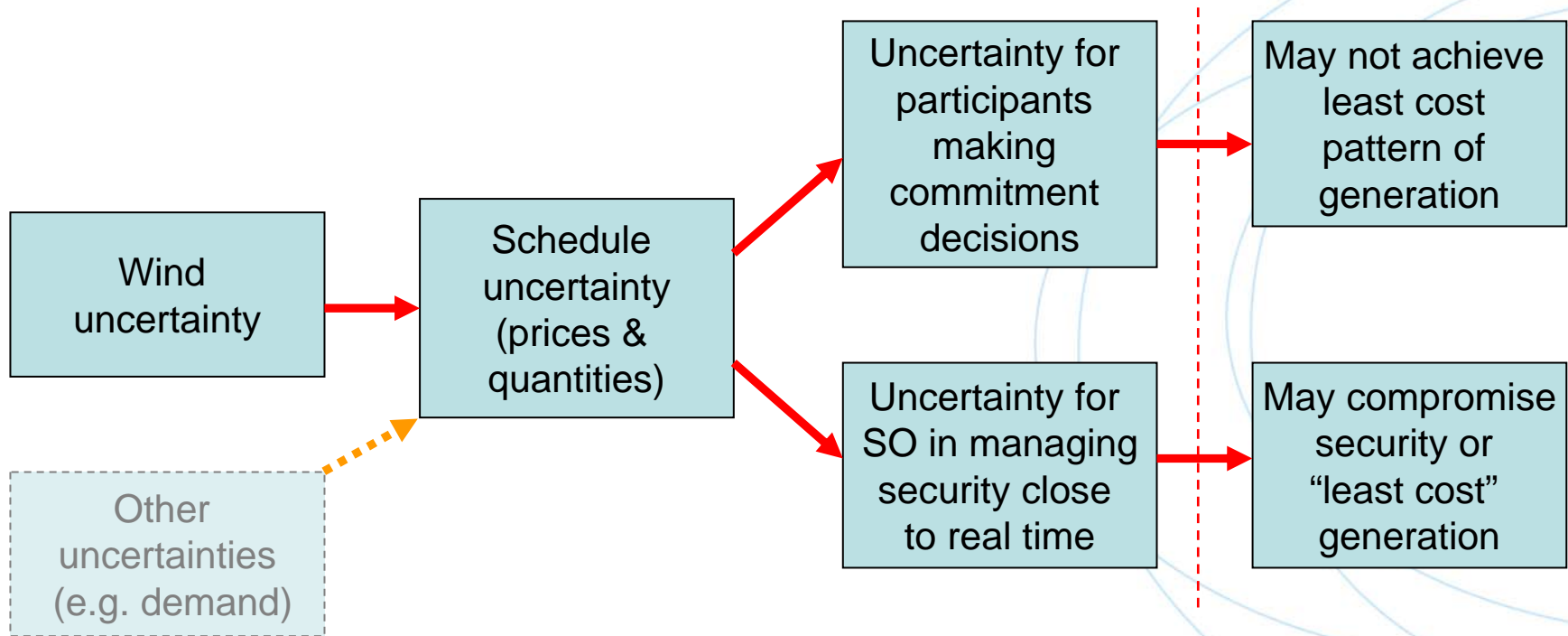
## 2. The Challenge: uncertainty and scheduling

### *Pre-dispatch and scheduling*

Iterative process used to deal with inter-temporal effects, start-up costs etc

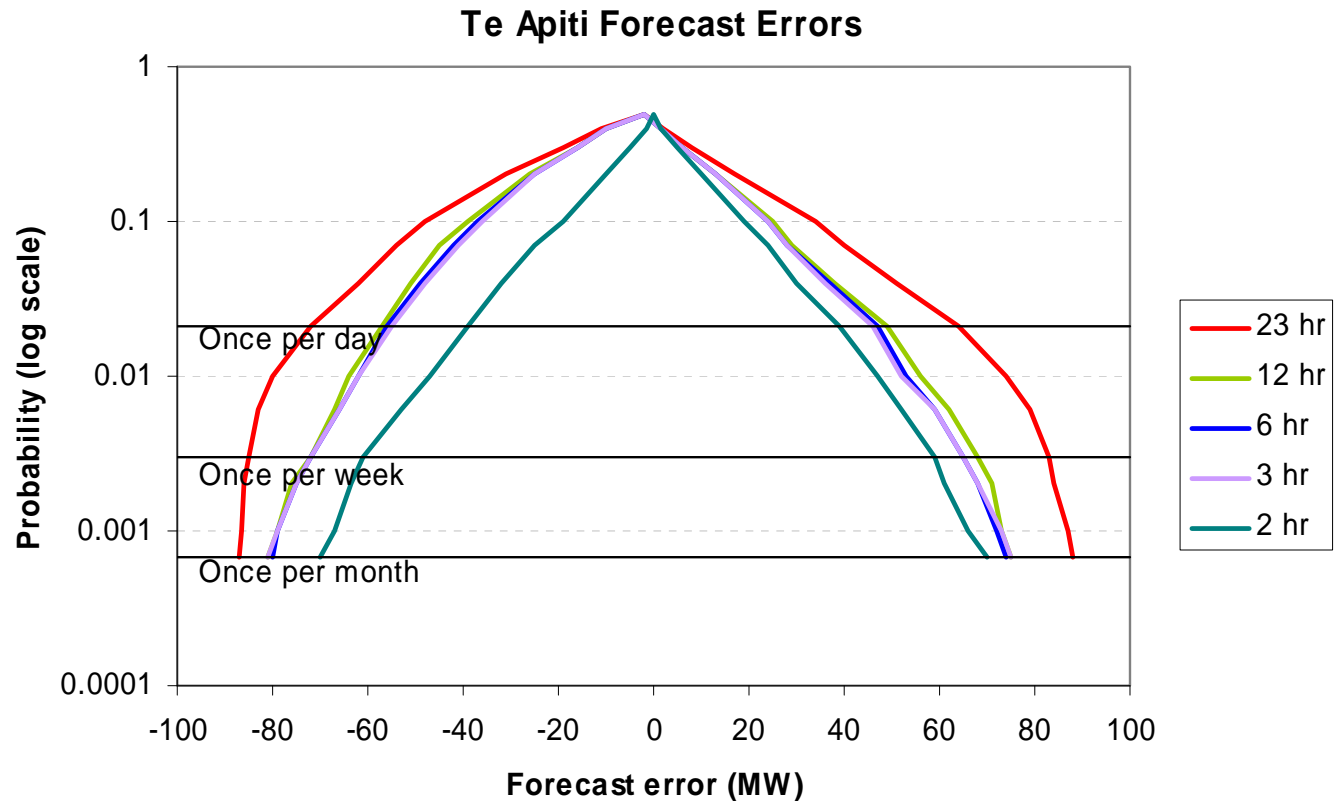


## 2. The Challenge (cont...)



*How important are these effects?*

# 3. Size of wind forecasting errors



From Garrad Hassan (2007)

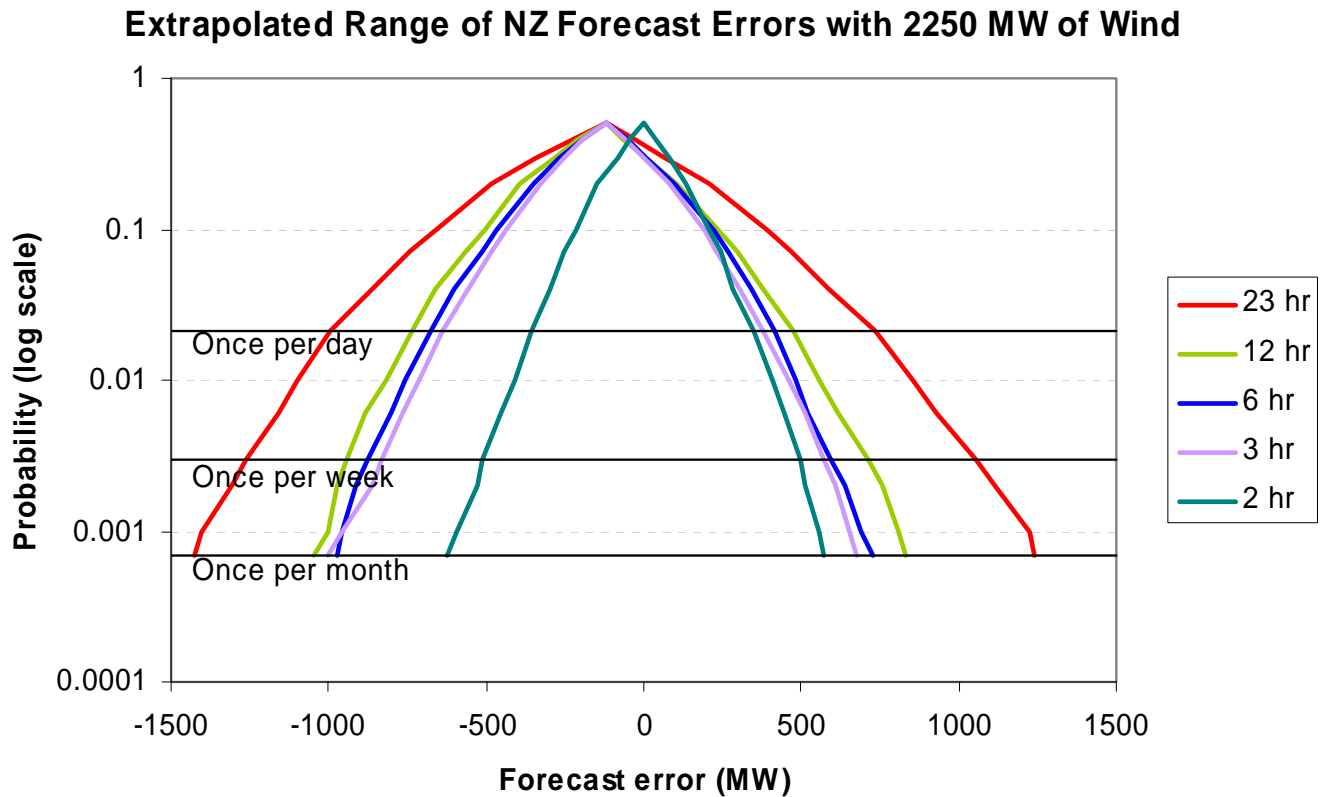
- Using calendar 2005 data
- (Te Apiti has capacity of 91MW)



### 3. Size of wind forecasting errors (cont...)

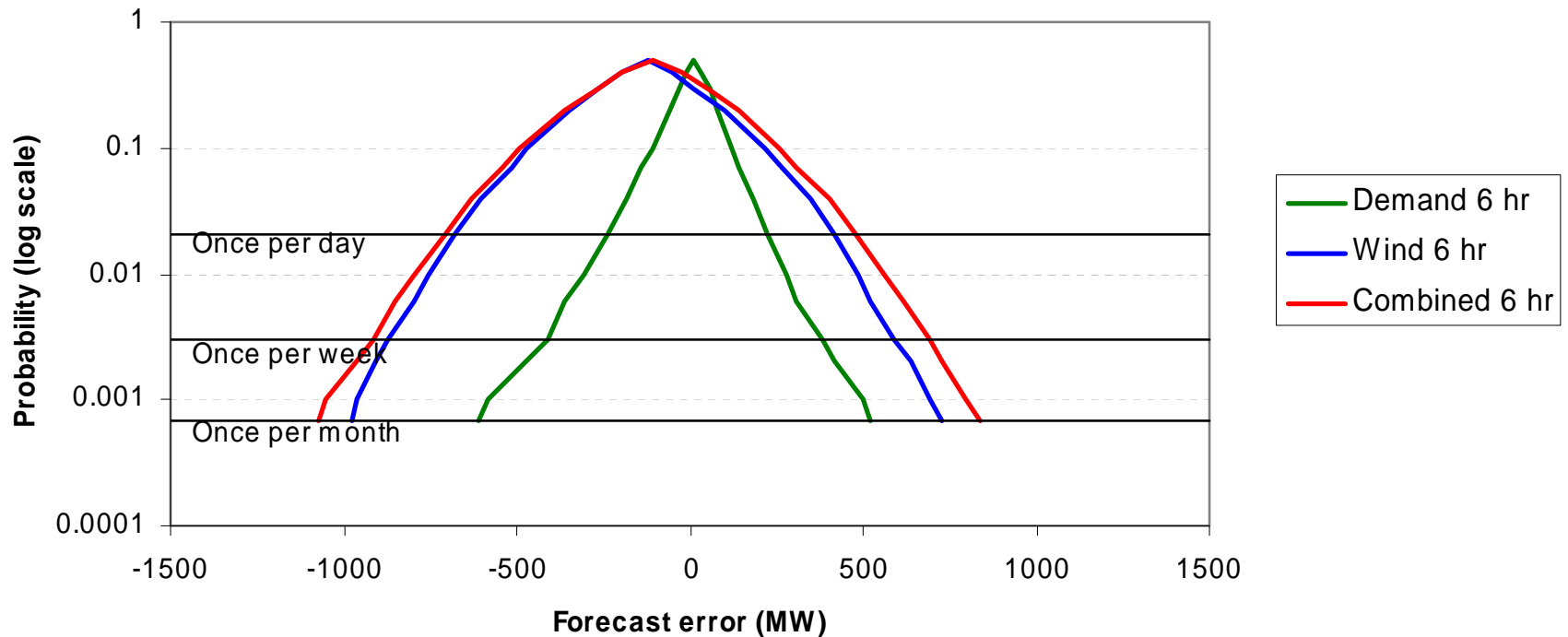
Applying regional correlations and conservative assumptions to a scenario with **2,250 MW** wind

# 3. Size of wind forecasting errors (cont...)



# 3. Size of wind forecasting errors (cont...)

Extrapolated Range of NZ Demand, Wind and Combined Forecast Errors with 2250 MW of Wind



# 3. Size of wind forecasting errors (cont...)

## *Further work by WIP*

- Using more data
  - Historical forecasts provided by Meridian (Te Apiti, White Hill) and TrustPower (Tararua)
  - Longer historical time series than available to Garrad Hassan
- Different ways of looking at the data / developing better understanding of the data
  - How correlated are *forecast errors* between windfarms?
  - How good is persistence compared with forecasts based on modelling the atmosphere? Over 2 hours? Over longer time periods?
  - Have individual wind farm forecasts improved over time?
  - Particular focus on extreme events and how forecasts tend to change as real time approaches

# 4. Incentives for wind forecasting

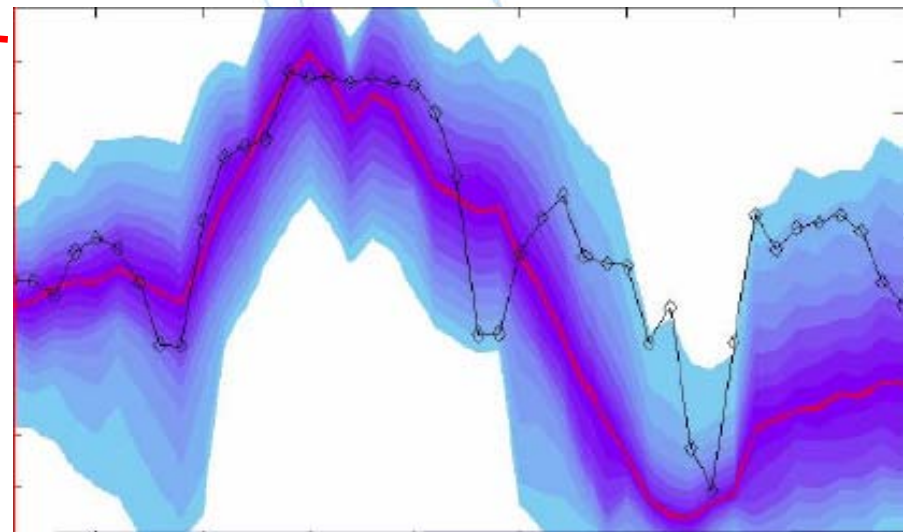
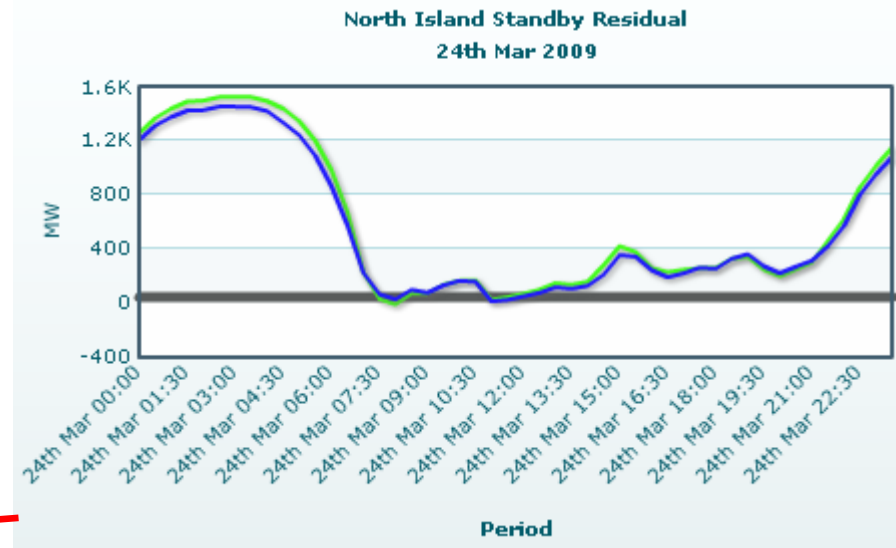
- Are the incentives in place to encourage “optimal effort” at wind forecasting?
- Probably not
  - There is some incentive to forecast well (e.g. effect on price shape, managing portfolio of generators), but not likely to be big enough
  - “Reasonable estimate” requirement in the Rules is not very specific, and is therefore difficult to enforce
- But...
  - There have been some (limited) improvements over time
  - Some wind generators are working with the Metservice on further improvements

# 5. Forecasting improvements

- Many different potential sources of improvement
  - Many different steps to produce a wind generation forecast, e.g. running a model of the atmosphere, applying a power curve and accounting for turbine outages
  - Different parties involved at each stage
  - Improvements could occur anywhere along chain
  - Improvements might arise from introducing quite different processes (e.g. using an ensemble of different models with some statistical weighting)
- Is there a net benefit from investment in better forecasting?
  - NZ has considerable flexibility (e.g. hydro). So is better forecasting really needed?
  - WIP aiming to model commitment decisions under uncertainty to get a better understanding of the size of the benefits from better forecasting

# 6. Information for participants

- (Possible “quick win”) Publish quantity of wind in schedule
  - Allows participants to form a rough view of the wind risk
- Do participants want information about wind risk?
  - e.g. Analysis similar to the existing standby residual check using “P90” wind forecast
  - e.g. Publication of wind confidence intervals



# 7. Areas of focus for possible changes

- Incentives / arrangements for wind forecasting
- Information provided to participants to assist the iterative scheduling process (i.e. to help make better commitment decisions)
- Enable existing hydro/thermal flexibility to be used more easily to offset wind uncertainty
  - e.g. Gate closure, block dispatch
- Treatment of wind when there is “too much” generation on the system
  - E.g. must run dispatch auction, circumstances in which wind dispatched down
- Others?



## 8. Next steps

- High level consultation paper – targeting Q3 2009
  - Commission would outline preferred approach while also describing high level alternatives
  - Consider submissions and review preferred approach
- Further consultation paper with detailed rule change proposals
  - Consider submissions and review preferred approach
- Make recommendation for any rule changes to the Minister of Energy