



# IRP Technical Workshop Renewables

January 13, 2006



# Workshop Objective

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- Outline proposed renewable resource analysis
- Take questions and comments on the proposed methodology

# Agenda

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- Review and discuss Wind Resource Analysis Plan
- Discuss Capacity Expansion Module (CEM) renewable supply curve modeling approach
- Summary
- Comments, Questions, and Suggestions



# Wind Resource Analysis Plan



# Overview

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- General comments
- Update and refine wind integration cost analysis
  - Incremental Regulating Reserve Requirement
  - System Balancing costs
- Refine capacity contribution analysis
- Revisit green tag valuation
- Develop wind resource supply curves

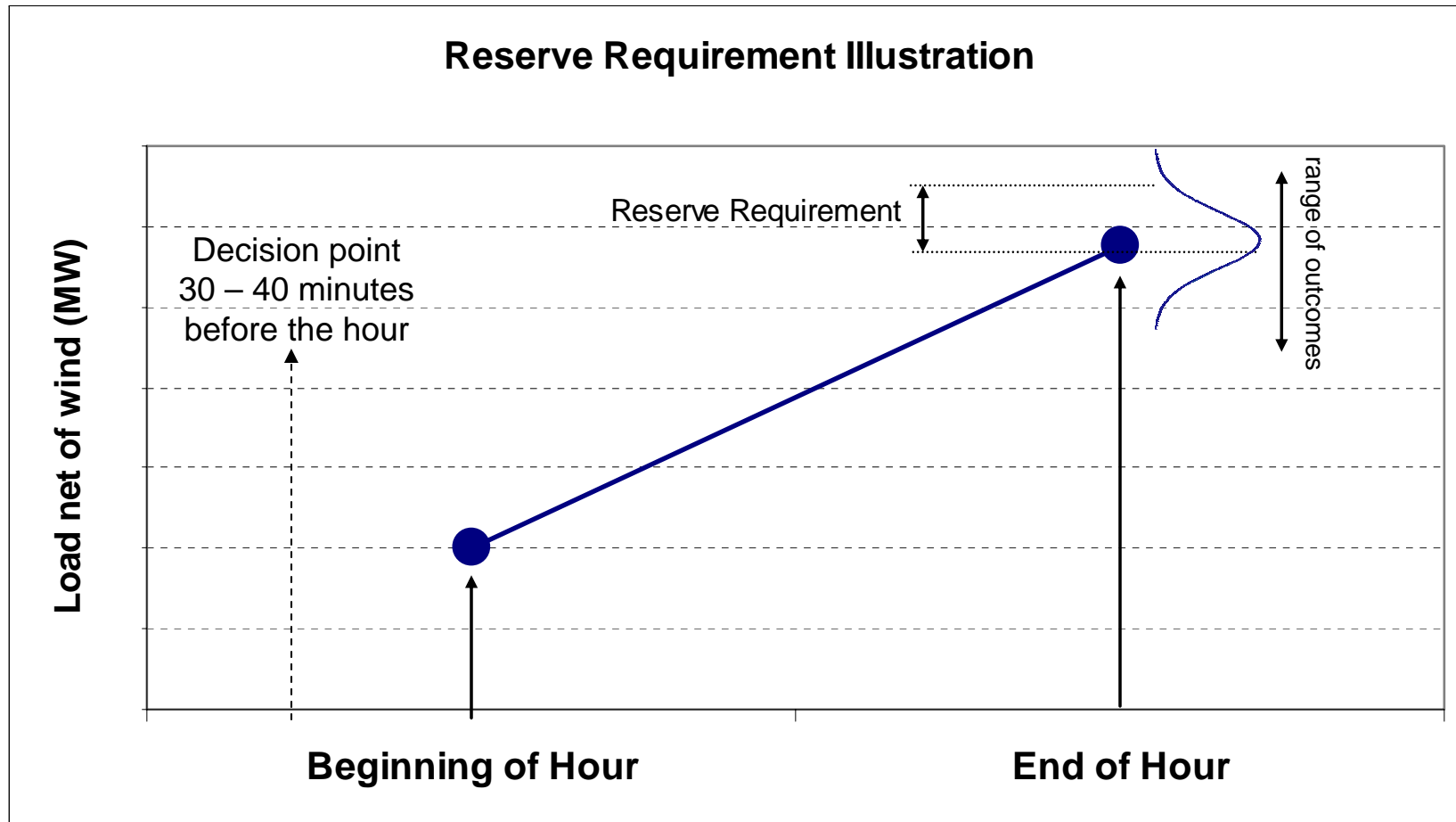
# General Comments

- Continue to use wind as the generic renewable resource
  - Additional information on selected resources (e.g., solar) will be available in the supply table and accompanying text
  - Wind still represents the least cost renewable resource with widespread availability
    - Other resources (e.g., Geothermal) may be more cost effective, but not broadly representative of other similar resources
- Use hourly historical and quasi-historical data where possible and reasonable
  - Actual generation data from existing projects on PacifiCorp system
  - Supplement with data from RFP 2003-B bids where available
- Develop quasi-generic wind resources based on information we have about actual sites
  - E.g., use available wind data to determine the range of capacity contributions from various geographically diverse projects
  - Will need to make some estimate of how much wind from each represented site

## **Integration Costs – Incremental Reserve Requirements**

- Calculate Incremental Reserve Requirements for a set of representative wind projects
  - Likely representative sites: north-central Oregon, southeast Washington, south-central Washington, southeast Idaho, Nevada, and Wyoming
  - Use hourly rate of change methodology that compares the forecast hour-to-hour change in load net of wind with the actual, to assess the incremental amount of regulating (spinning) reserve needed as wind is added to the system
  - Assess whether incremental reserve requirements affect resource addition decisions

# Integration Costs – Incremental Reserve Requirements



- Choose a regulating reserve margin that covers unexpected load/wind changes X% of the time.

# Integration Costs – System Balancing

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- Cost of system operations due to fluctuating wind resource will be calculated by the PaR and CEM models
- Additional potential cost component will be caused by potential for errors in day-ahead natural gas nominations due to mis-forecasting load and wind
  - Possibility of increased non-economic purchases and sales due to unexpected wind performance

# Capacity Contribution Analysis

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- Assess capacity contributions for a set of representative sites
- Analysis will base capacity contribution on peak load carrying capability
- Propose to use an analytic method to assess the capacity contribution of representative sites
  - The Z-Method approximates stochastic methods of determining load carrying capability based on maintaining a constant Loss of Load Probability (LOLP) and can be applied to a wide range of resource types and attributes.

# Green Tag Valuation

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- Need to update assessment of green tag value
  - Established as the present value of \$5/MWh for five years (nominal) in 2003 IRP
- Assess the progress of renewable resource portfolio in the states served by PacifiCorp and the surrounding regions
- Evaluate the effect of green tag value from RPS legislation
  - Estimate the timing of RPS in PacifiCorp's service territory and green tag value in view of other states' experiences



# Modeling Renewables

Capacity Expansion Module (CEM)  
renewable supply curve modeling approach



# Renewable Resources in the CEM

- Develop supply curve of renewable resources based on data received in RFP 2003-B
  - Update capital, O&M and transmission costs for representative wind farms of varying capacity factors, and generation patterns
    - Need to estimate relative effects of cost escalation and technology improvements
    - Revisit assumptions regarding PTC renewal
- Make representative resources available to the CEM allowing the model to select the optimal quantity and timing on the same basis as other resources

# Summary

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- **Revise Wind Integration Costs**
  - Refine incremental reserve requirement calculation
  - Use hourly historical and quasi-historical generation from representative projects
- **Revise Capacity Contribution Analysis**
  - Based on load carrying capability of representative projects
- **Green Tag Valuation**
  - Based on the value of green tags in surrounding states, and estimated progress of RPS in PacifiCorp states
- **Wind Penetration**
  - Create supply curve of representative projects and allow CEM to choose from the supply curve on same basis as other resources
- **Complete analysis in March for presentation at April PIM**



# Comments, Questions, and Suggestions





# Next Steps



# Next Steps

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- Meeting Summary
- Action Items and Parking Lot from today's meeting
- Complete analysis in March for presentation at April PIM

## Other near-term Workshops:

- Load Forecasting Technical Workshop on January 24<sup>th</sup>
- DSM Technical Workshop on February 10th