IRP Technical Workshop
Renewables

January 13, 2006
Workshop Objective

• Outline proposed renewable resource analysis

• Take questions and comments on the proposed methodology
Agenda

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

• 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
  – 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
Choose a regulating reserve margin that covers unexpected load/wind changes X% of the time.
Integration Costs – System Balancing

- 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

• 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

• 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

- 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

• 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 24th
• DSM Technical Workshop on February 10th