Integrating Variable Energy Resources
A Power Marketing Administration Perspective

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Regional High Voltage Transmission Grid

Growth of wind in the BPA Balancing Authority
Geographic Concentration of Wind Resources

Ramping Behavior of Wind Fleet

Significant Wind Ramp Event in February 2012
Regional Balancing Initiatives

Initiatives to Facilitate Shorter Transaction Intervals
- Intra-Hour Scheduling
- WebExchange
- Dynamic Scheduling System
- BPA Committed Intra-Hour Scheduling Pilot
- California ISO Intra-Hour Scheduling Pilot

Customer Self-Supply of Generation Imbalance
- BPA/Iberdrola

Initiatives to Leverage Diversity Between Balancing Authorities
- ACE Diversity Interchange Project
- Variability Energy Resource Diversity Interchange
- Reliability-based Control Field Trial

Flex-Capacity Initiative
- NTTG/ColumbiaGrid/WestConnect

Energy Imbalance Efforts
- WECC, Western PUC Group, WSPP, NWPP member utilities