

UWIG Technical Workshop

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“Wind Integration: Focus on the Northwest”

Energy Northwest Operating Experience

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Douglas PUD

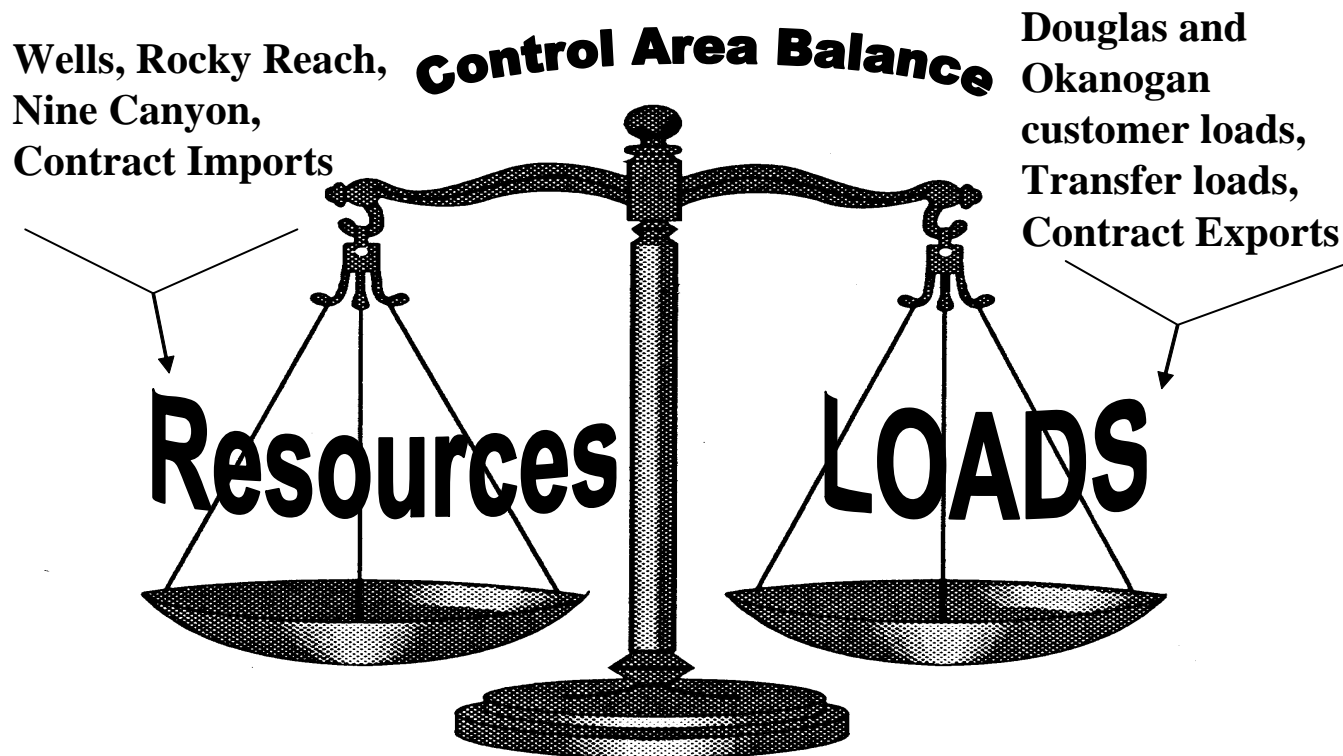
“Wind Integration: Focus on the Northwest”

- Brief overview of the Douglas PUD system
- Resource Policy
- Integration Issues
- Cost Issues
- How we use Nine Canyon output

Overview of Douglas PUD System

- Vertically integrated utility
- Operate a Load Control Area
- North Central Washington service areas
- Douglas PUD - ~16,000 customers
- Okanogan PUD - ~19,000 customers
- Combined retail load - ~1.1 billion kWh annually
- Among other things, responsible for balancing generation and load, CONTINUOUSLY

Overview of Douglas PUD System



Day ahead, week, month, seasonal and beyond (Power Planning & Contracts)
Real-time (4-sec) and current day, hourly (Power Operations & Dispatch)

Overview of Douglas PUD System



Douglas PUD

Resource Policy Issues - a convergence of several factors

- Power supply - currently firm resource surplus
- Why Nine Canyon now?
- Western Energy Crisis – curtailments, “price signals”
- State and federal policy direction
- Strong Commission and Manager interest
- Pilot-like “opportunity” to gain working knowledge
- Economics appeared reasonable and potential risks manageable
- Result: started small amount - 3 megawatt share of Energy Northwest’s Nine Canyon Wind Project (8,181,000 kWh annually, ~ 1.5% of system energy load)

Douglas PUD experience with NCW

Integration Issues - Characteristics of Nine Canyon Wind

- Variable energy output ebbs and flows, not dispatchable, NOT dependable.
- Electrically remote - not directly interconnected with owned facilities.
- To hold down direct costs and administrative overheads, generation control transferred from BPA to Douglas PUD (established a telemetry signal and firm transmission service to support deemed delivery of the variable output as though it was "internal" to our system).

Douglas PUD experience with NCW

Integration Issues (con't.)

- Requires use of dispatchable generating capacity to respond to the NET variations in load and wind generation combined.
- Over longer time horizons, the wind resource effectively augments the energy capability of our hydro-based resources, not unlike additional stream flow or spot purchases would.
- Output melds with our other resources and loads, not managed independently.
- Wind generation adds a new, but not unfamiliar, dimension or variable impacting our responsibility for continuously balancing generation and load (Mother Nature and BPA).

Douglas PUD experience with NCW

Cost Issues

- Cost to generate is known, but amount of energy produced is volatile, not unlike hydro!
- Cost of expected wind energy currently compares favorably to incremental cost of natural gas-fueled generation and other non-hydro renewable resources.
- Capacity costs to integrate wind resource not easily quantifiable.
- “Spot” energy value, perhaps incidental capacity value, offsets costs.

Douglas PUD experience with NCW

Nine Canyon Performance - FY03 period of commercial operation (Sept. 25, 2002 to Jun 30, 2003)

- Douglas PUD received 5,688 MWh, ~84% of planned levels, before wheeling losses (1.9%)
- Comparative statistics:
 - In relation to District load, 1.2% (est. 3.8% w/Phase II)
 - In relation to District hydro, equivalent to an extra 0.3 maf or 0.5% of the Sep-Jun flow of 56.9 maf flow through District's share of Wells and R. Reach (est. 1.0 maf, or 1.76% w/Phase II)

Douglas PUD experience with NCW

How the District Currently Uses Nine Canyon Output

- We don't first store all the wind energy behind Wells Dam!
- Over time variable loads and resources must be balanced by means of scheduled interchange of power with other utilities.
- Forecast amounts of energy from Nine Canyon are committed to serve load within or without the District on at least a day ahead, pre-scheduled basis - melded, not managed separately.

Douglas PUD experience with NCW

- As a practical matter, deviations between the forecast and actual generation are the only amounts of wind energy ***potentially stored*** in, or ***backed-up*** from, pondage, limited to the extent of capacity and pondage flexibility at the time.
- Complementary deviations from forecast...a good thing: higher than forecast wind generation may offset load overrun or less than pre-scheduled hydro generation from stream flow, and vice versa.
- Compounding deviations from forecast may require action: re-dispatch of District hydro ***or*** non-District owned capacity through scheduled interchange.

Douglas PUD experience with NCW

Your questions are welcome!