NORTHWEST PowerPool

N T A C

NW Transmission Assessment Committee

Northwest Transmission Assessment Committee Meeting
May 15, 2007 – Portland, OR

Attendance List

	Name	*Company*	*Phone Number*	*Email*
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May 16, 2007 – Portland, OR

Attendance List

	Name	*Company*	*Phone Number*	*Email*
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35	Ed Chang			
36	Elroy Switlishoff	Columbia Power Corp.		
37	Bill Pascoe			
38	Hugh Nguyen	PSE		
39				
40				

NWIAP Actions

ACTION 4: By September 2007 the Northwest Transmission Assessment Committee (NTAC) should propose a formal technical transmission planning methodology for regional wind development. This methodology should identify the data requirements and capacity and energy planning tools needed to identify the optimal level of transmission investment needed to efficiently serve future wind development.

ACTION 5: By the end of 2007, Columbia Grid and the Northern Tier Transmission Group should convene a joint session to begin applying the transmission planning methodology for regional wind produced by the NTAC organization.

Suggested Meeting/Conference Call June 7th

Proposed East of the Rockies Wind Resources to Washington/Oregon Loads Study

There has been continual interest in determining the transmission options that could be used to integrate a large (1500-3000 MW) amount of wind resources located east of the Rocky Mountains with the intent to serve loads located in Washington/Oregon . This study plan proposes mirror the type of work performed in the Canada-Northwest-California study coupled with an updated RMATs-type study. The updated RMATs-type would use a production cost scenario that roughly models the western NWPP LSE's Integrated Resource Plans with a few of the transmission options that would be tested with a physical study that use power flow and stability analysis.

The physical studies could partition a transmission study into three components: a subregional resource integration component-east of the Rockies, a transfer path component from the eastern resources to the eastern Washington/Oregon transmission system, and a subregional load delivery component through Washington/Oregon load Delivery requirements. The objective is to give a ballpark accuracy estimates for both the MW integration capability and costs for wind generation acquisition. The delivery of the wind resources to loads outside of Washington and Oregon could be addressed in NTTG forum.

Resource Identification

The suggested approach would be to assign generation to 230 and 500 kV buses.

1. Montana Resources – Up to 2000 MW

    - North Central Montana-assigned to 230 kV or new 500 kV buses
    - North East Montana-assigned to 230 kV or new 500 kV buses
    - Along Colstrip-Garrison 500 kV System-assigned to whatever buses

2. Wyoming Resources – Up to 2000 MW

    - Central Wyoming-assigned to 230 kV or new 345 kV buses
    - Eastern Wyoming- assigned to whatever kV buses

Conceptual Ideas

- 1-13 Transmission Options-see diagram

Challenges

Do the options physically work, at what risk, and at what cost

Methodologies

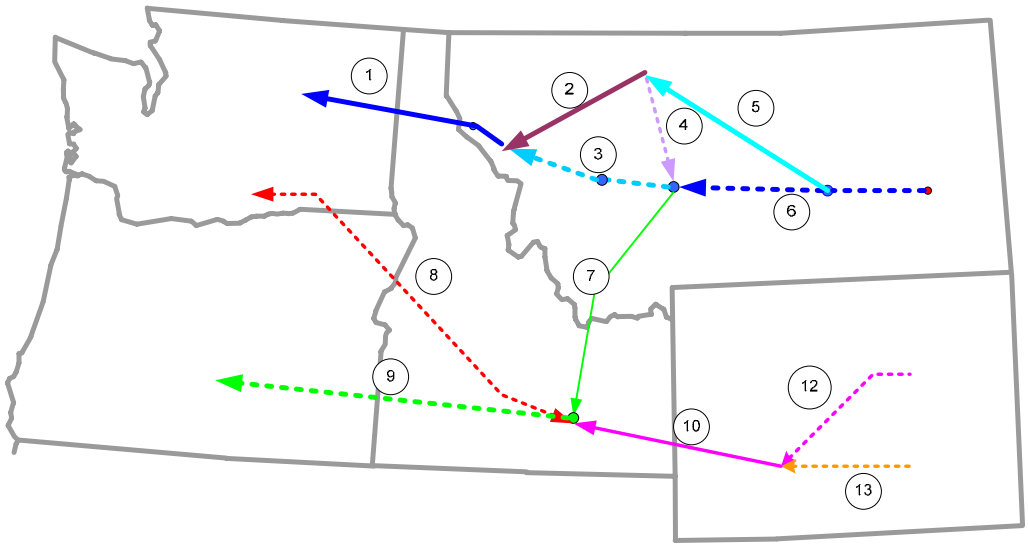
- Use existing information were available
- Power flow analysis of transmission options
    1. simultaneous transmission capacity performance increase (no derate of other rated paths during similar operating conditions)
    2. Other

- Measures of system performance

    1. Production Cost assessment
    2. Conditional firm assessment-Historical Use (and related views) and poweflow analysis
    3. Full year round capacity

Deliverables

Cost and Performance of Options



Update on Canada/Pacific Northwest to Northern California Regional Planning

Presentation to NTAC
May 15, 2007
Sherman Chen,
PG&E, Transmission Planning

Pacific Gas and Electric Company
WE DELIVER ENERGY.

California RPS Program

- California Renewables Portfolio Standard Program (RPS Program)
  - Established by SB1078 January 2003
  - Requires PG&E to increase procurement of capacity & energy from renewables by 1% annually
  - SB107
    - January 2007 requirement: serve 20% of energy sales by 2010
    - Allows delivery anywhere in the CAISO Controlled Grid
    - Requires construction of needed transmission by Electric Corporation
- Investigating Potential 33% target by 2020
- PG&E has issued RFOs for renewables and is working to achieving 20% RPS Goal and beyond

Need for Network Upgrades

- Resource Locations
  - Investigations of renewable resources indicate they generally are in locations remote from PG&E load center
  - Sufficient renewable resources in California to achieve the 20% renewable goal
  - Need to consider renewable resources outside California to achieve a 33% renewable goal
- Transmission Planning Studies >> Shows need for additional transmission capability to many renewable resource areas
  - Network upgrades within California are being being developed to meet 20% renewable goal
  - Transmission projects to points outside California plus additional network upgrades in California needed to meet 33% renewable goal

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Regional Planning Objectives

- Evaluate transmission alternatives to access up to 3000 MW of renewable resources in the Pacific Northwest, British Columbia and Alberta.
- Determine the transmission benefits and costs of such alternatives.
- Seek stakeholder input on the analysis and scope of the alternatives.

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Process

- Periodic public stakeholder meetings
- Project Committees: working groups of interested stakeholders
  - Loads & Resources (complete)
    - Identify resource scenarios
  - Technical Analysis (in process)
    - Develop transmission alternatives including network upgrades
    - Perform power system studies
    - Prepare rough cost estimates for the alternatives and the network upgrades
  - Economic Analysis (just getting started)
    - Evaluate the benefits, costs and cost-effectiveness of the alternatives
- Prepare regional planning report

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Schedule

- Regional Planning Schedule
  - Initiated in August 2006
  - Kick-off meeting in December 2006
  - Committee work: December 2006 to October 2007
  - Completion: November 2007
- Target Operating Date: 2013
- For more information about the Regional Planning Process and upcoming meetings, please see http://www.pge.com/biz/transmission_services/canada/

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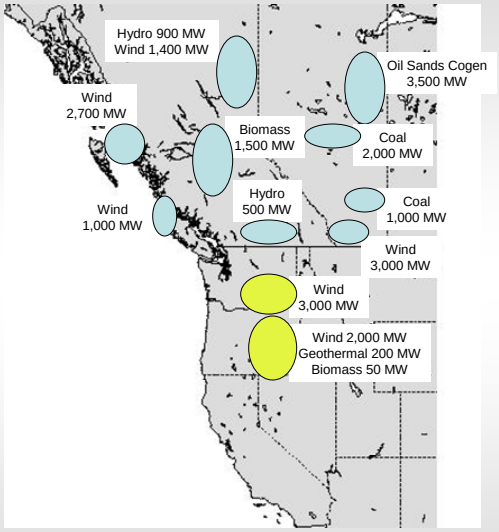
L&R Committee Resource Scenarios



Scenario 1: Canada Resources

Scenario 2: Northwest U.S. Renewables

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Transmission Alternatives

- Inland Alternatives
  - Two 500 kV lines (or one 765 kV line) from Canada to NE California through Oregon and Washington
  - One 500 kV line from Canada to Northern California and one 500 kV line into Nevada
  - En-route stations (on-ramps/off ramps) for generation interconnection and network connections
  - Upgrades required in Northern California
- Coastal Alternatives
  - DC submarine cables/ overhead transmission with DC conversion stations in Canada, Pacific Northwest and San Francisco Bay Area

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BC/PNW to Northern California Base Case Development

- Benchmark case developed from WECC 2016 HS1A base case
- Major path flows represent corner point on NOPSG 2006 NJD Nomogram
- 500 kV DCTL inserted between Selkirk (BC) and Raven Sub (California) with connections to Tesla and Elverta
- 3000 MW additional renewable resources added in Canada to fill the line
- Resources backed down in northern California

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Major Path Flows for Benchmark and Project Base Cases

#	Path Name	Path Rating	2016 HS1A	Benchmark Case	Project Case
3	**Northwest – Canada**	3150 MW (n2s)	2302 MW (n2s)	3150 MW (n2s)	3150 MW (n2s)
26	**Northern – Southern Calif.**	4000 MW (n2s)	2185 MW (n2s)	4000 MW (n2s)	4000 MW (n2s)
65	**PDCI**	3100 MW (n2s)	2980 MW (n2s)	2850 MW (n2s)	2850 MW (n2s)
66	**COI**	4800 MW (n2s)	3776 MW (n2s)	4400 MW (n2s)	4400 MW (n2s)
73	**North of John Day**	8400 MW (n2s)	7949 MW (n2s)	7800 MW (n2s)	7808 MW (n2s)
75	**Midpoint – Summer Lake**	1500 MW (e2w)	85 MW (w2e)	236 MW (w2e)	247 MW (w2e)
76	**Alturas Project**	300 MW (n2s)	263 MW (n2s)	264 MW (n2s)	259 MW (n2s)
X	**BC – California**	3000 MW (n2s)	N/A	N/A	3000 MW (n2s)

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Resource Additions Modeled in Canada

- 600 MW BC Coastal Wind at Skeena 500 kV
- 250 MW Vancouver Island Wind at Dunsmuir 500 kV
- 1100 MW Wind and Site C Hydro at Peace Canyon 500 kV
- 300 MW Small Hydro at Ashton Creek 500 kV
- 750 MW Alberta Wind, Coal, and Oil Sands Cogeneration represented at Cranbrook 500 kV

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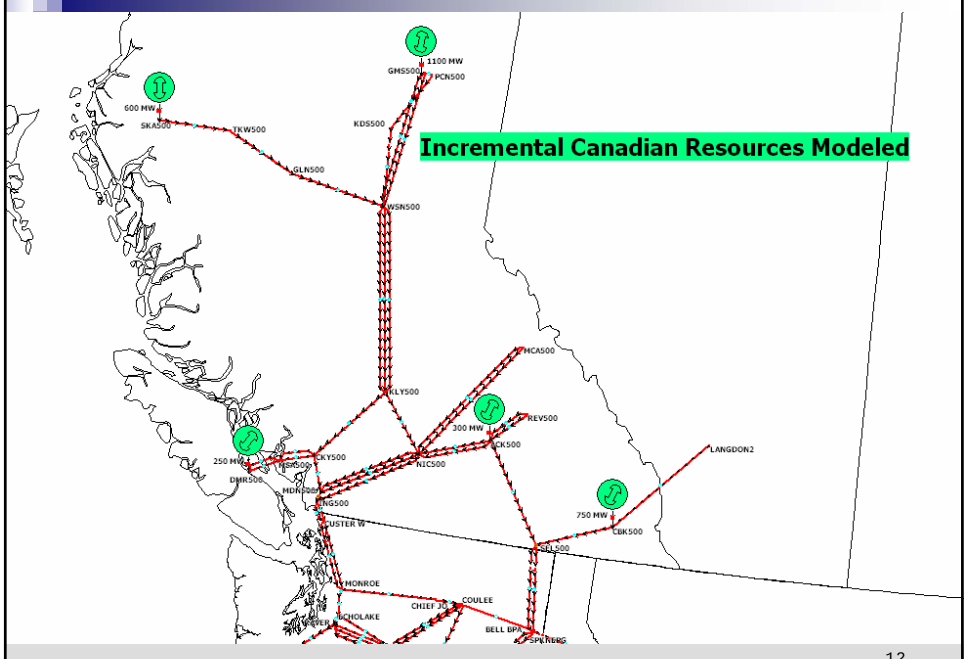

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500 kV DCTL Model

- Approximately 50% series compensation
- No network connections between Selkirk and Raven initially
- Intermediate 500 kV stations at Spokane, Mid-C, and Burns
- Synchronous condensers modeled at intermediate 500 kV stations for voltage control (to be replaced later with static var devices)
- Line shunt reactors for light load conditions

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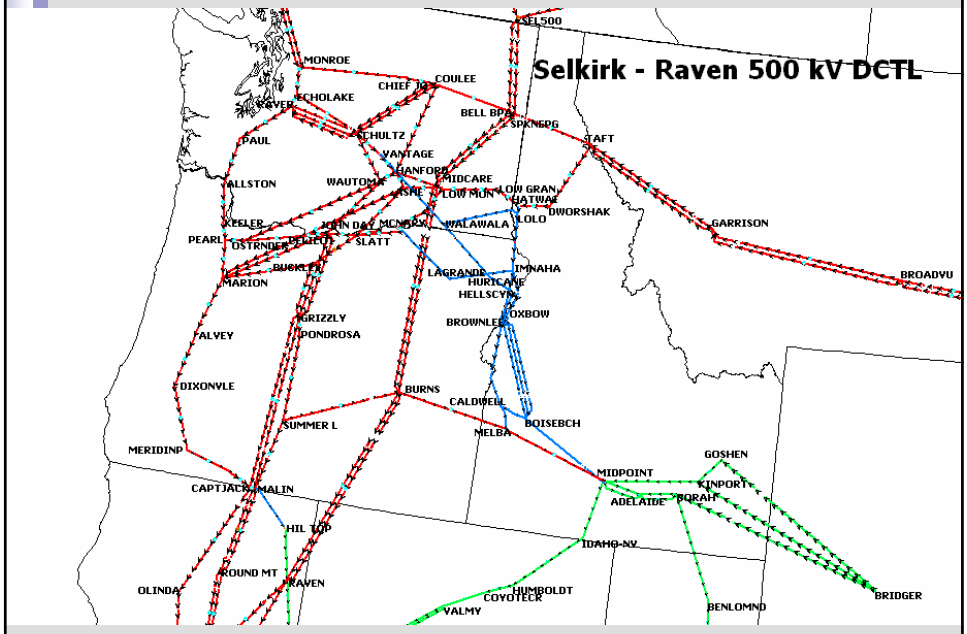

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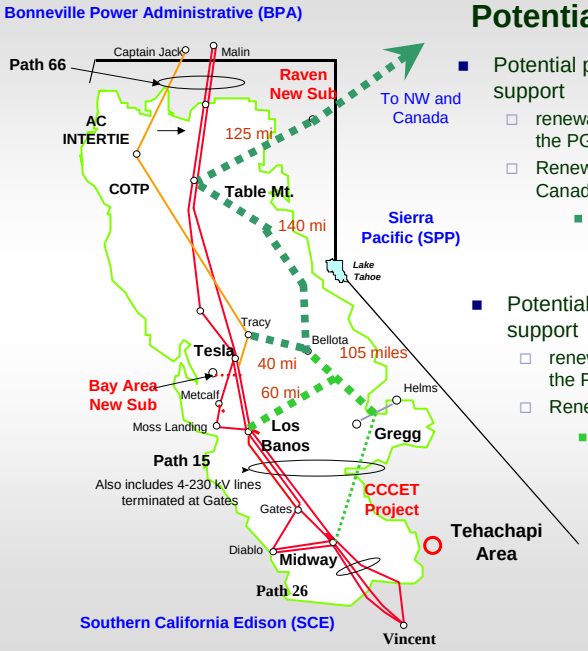
Next Steps for Technical Studies

- Model intermediate resource on-ramps and network connections between Selkirk and Raven
- Incorporate eastern option into base cases
- Create winter base case to study heavy south-to-north flows
- Contingency analysis

Potential Projects 2013+



- Potential projects north of Tesla support
  - renewables in the northern portion of the PG&E service territory
  - Renewables imported from the NW and Canada at proposed Raven Substation
- Potential projects south of Tesla support
  - renewables in the southern portion of the PG&E service territory
  - Renewables imported from the South

Regional Plan Project Template

For large projects, >200-kV, 300 MW

- Project Name
- Short Project Description
- Sponsor
- Commitment Level
- Energization Date
- Geographic Location (need consistent method: State/province, city, area {ie, Puget Sound}, geographic {ie south central Washington}, location map)
- Cost of Project
- Project Need/Driver
- Project One-Line
- More Detailed Project Description
- Possible alternatives
- Required construction outages
- Two pages maximum

For small projects, 100-kV to 200-kV

- Project name/description
- Voltage
- Energization
- Location
- Sponsor
- Commitment level

mjl 11-30-04