



# **Pacific Northwest/Canada To Northern California Transmission Feasibility Study**

**Technical Analysis Committee**

**Presentation By**

**Ben Morris, PG&E**

**December 12, 2006**

# Topics

- ❑ Study Objectives
- ❑ Alternatives Considered
- ❑ Technical Study Process
  - Load and Resource Dispatch
  - Study Assumption
  - Base Case Development
  - Type of Studies
  - Review process
- ❑ Study Schedule

# Objectives

- ❑ Evaluate transmission alternatives to access renewable and other resources in the Pacific Northwest, British Columbia and Alberta.
- ❑ Determine the transmission impacts and costs of such alternatives.
- ❑ Seek stakeholder input on the analysis and scope of the project alternatives.
- ❑ Identify the preferred plan of service for the construction of a transmission path from Canada and the Pacific Northwest to a terminal in Northern California with a potential capability of importing up to 3000 MW of renewable and other resources to Northern California.
- ❑ Develop the path ratings for the proposed facilities.
- ❑ Determine the interactions with the existing WECC paths.

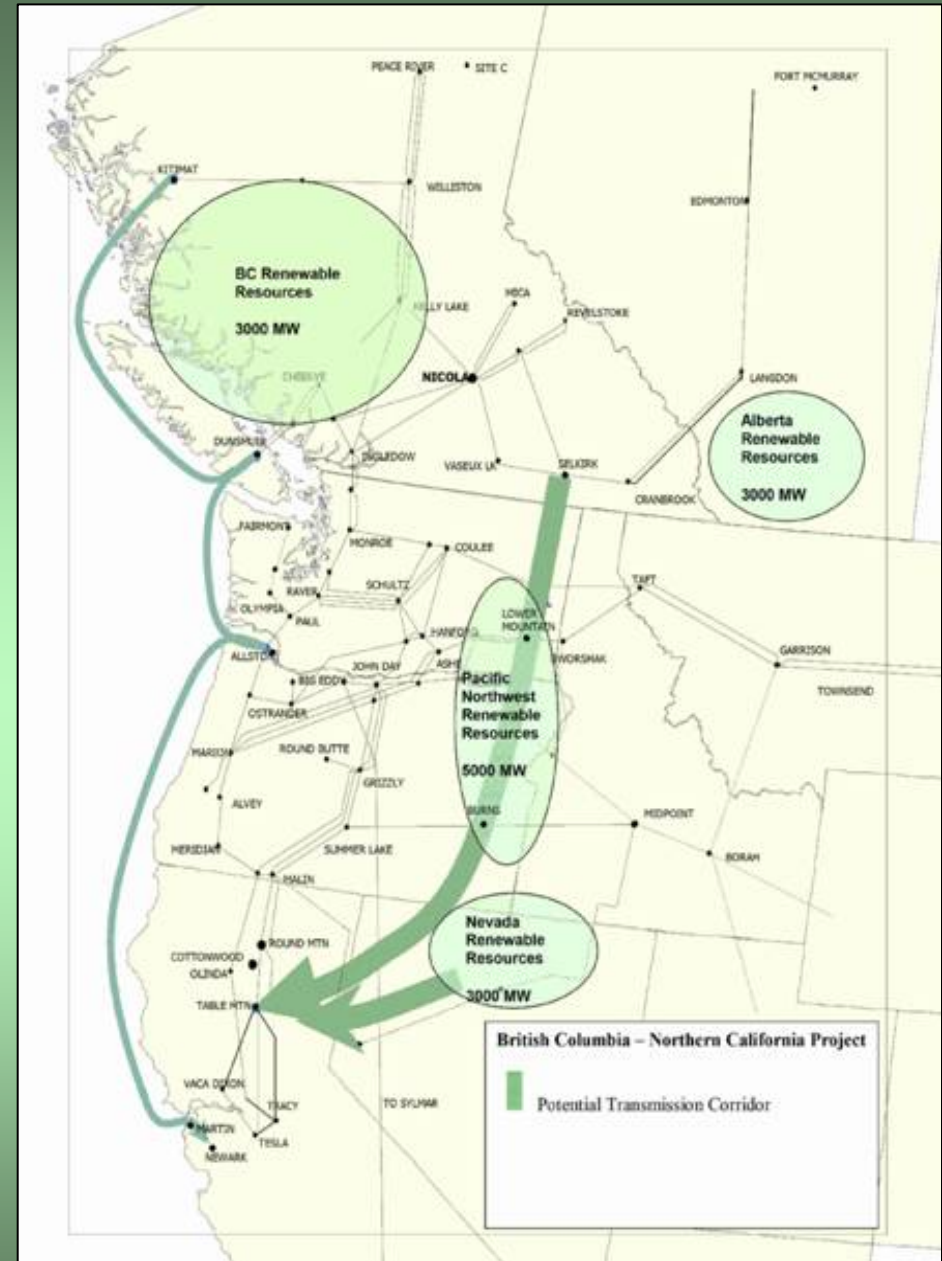
# Transmission Alternatives

Alternatives being considered for technical study are:

- ❑ **AC alternatives - Three**
  - Two 500 kV line options
  - One 765 and 500 kV line option

- ❑ **DC alternatives - One**  
This alternative is expected to have submarine DC Cables with DC conversion stations in Canada, Pacific Northwest and San Francisco Bay Area and with import levels of:

- **1600 – 2000 MW**



# AC Alternative 500 kV Option 1

- ❑ 500 kV Double Circuit Transmission Line (DCTL) from Selkirk-BC to a terminal in Northern California
  - Northern Terminal - Selkirk BC Canada
  - Termination in California
    - ❖ Table Mountain/Round Mountain or
    - ❖ Rio Oso/ Elverta or
    - ❖ Bellota
  - En Route terminals
    - ❖ Lower Monumental 500 kV station - Washington State
    - ❖ Burns 500 kV station - Oregon
    - ❖ Border Town or a new station close to Nevada/California Border
    - ❖ Others?



# AC Alternative 500 kV Option 2

- ❑ 500 kV transmission line from Selkirk-BC and a 500 kV line from Eastern Nevada and beyond to terminals in Northern California
  - Northern Terminal - Selkirk BC Canada
  - Eastern Terminal – To be Determined
  - Termination in California
    - ❖ Table Mountain/Round Mountain or
    - ❖ Rio Oso/Elverta or
    - ❖ Bellota
  - En Route terminals
    - ❖ Lower Monumental 500 kV station - Washington State
    - ❖ Burns 500 kV station - Oregon
    - ❖ Border Town or a new station close to Nevada/California Border
    - ❖ Others?



# AC Alternative

## 765 kV and 500 kV

- ❑ 765 kV Single Circuit Transmission Line (SCTL) from Selkirk-BC and a 500 kV line from Eastern Nevada and beyond to terminals in Northern California
  - Northern Terminal - Selkirk BC Canada
  - Eastern Terminal – To Be Determined
  - Termination in California
    - ❖ Table Mountain/Round Mountain or
    - ❖ Rio Oso/Elverta or
    - ❖ Bellota
  - En Route terminals
    - ❖ Lower Monumental 500 kV station - Washington State
    - ❖ Burns 500 kV station - Oregon
    - ❖ Border Town or a new station close to Nevada/California Border
    - ❖ Others?



# DC Alternative

- ❑ **Import Levels**
  - 1600 - 2000 MW (1)
  
- ❑ **Consists of two +/- 500 KV submarine DC cables with three bipolar DC terminals each at:**
  - Allston Oregon
  - Martin SF Bay Area and
  - Newark SF Bay Area
    - ❖ Same as the West Coast Cable (WCC) option which was studied by PG&E Company and Sea Breeze Corporation under the MOU in 2005-2006.
  
- ❑ **Sea Breeze Corporation has announced the commencement of WECC Phase 1 Rating Process for the WCC project.**
  
- ❑ **Results of the Phase Rating study to be included in the Regional Planning Analysis**
  
- (1) Additional 1600 MW Bi Pole DC terminals and Cables will also be considered by Sea Breeze Corporation



# System Reinforcements

## □ Northern California

- **Import of 3000 MW to Northern California will likely have some impact on local transmission system in Northern California.**
- **Conceptual transmission reinforcement plans to deliver the 3000 MW import to the load centers in Northern California will be assumed in this study. For example reinforcement plans to transfer the import to the SF Bay area will be assumed from**
  - ❖ **Table Mountain/Round Mountain**  
or
  - ❖ **Rio Oso/Elverta**  
or
  - ❖ **Bellota**

## □ Canada

- **Local system and network reinforcement may be required to interconnect new renewable and resources.**

## □ Pacific Northwest and Nevada regions

- **Local system and network reinforcement may be required to interconnect new renewable and other resources.**

# Technical Study Process

Through stakeholder process develop,

- **A study plan. PG&E has developed a preliminary draft study plan for review.**
- **Develop study assumptions.**
- **Develop base cases. Two base cases will be developed for the study a 2013 summer peak case and 2013 Spring partial peak case.**
- **The new resources identified by the stakeholder process will be incorporated into the base cases. Load and Generation balance will be adjusted such that the proposed project plan will have the desired import level.**
- **The studies will include power flow analysis, dynamic analysis and reactive margin studies for normal and abnormal system conditions.**
- **Identify path rating for the new facility.**
- **Identify impact of the proposed plan on the existing WECC paths.**

# Technical Study Process

- **Identify plan of service for the proposed alternatives.**
- **Identify system impacts and reinforcement plan.**
- **Coordinate with other WECC Regional Planning processes.**
- **Develop unit cost for transmission components.**
- **From the unit cost develop a high level cost estimate for each alternative and share the cost estimate with Economic Analysis Committee for analysis.**
- **Coordinate and conduct periodic review of the study process. At this time a monthly meeting is planned to review the progress of the technical study committee.**
- **Provide a report on Technical Analysis.**

# Technical Committee Study Schedule

Task	Task Description	Start Date	End Date
<b>Regional Planning Review</b>		8/16/2006	12/31/2007
<b>Load and Resources Working Group</b>			
1	Load and Resource Development	12/16/2006	1/15/2007
<b>Technical Study Committee</b>			
2	Conceptual Transmission Alternatives	1/15/2007	2/15/2007
3	Engineering Cost Estimate	1/15/2007	2/15/2007
4	Finalize Load Flow Cases	1/15/2007	3/1/2007
5	Technical Study Results Review and Draft Report	3/1/2007	8/1/2007
6	Technical Study – Final Report	8/15/2007	9/1/2007

Comments and Questions?