

STEP Meeting

Harlow Peterson

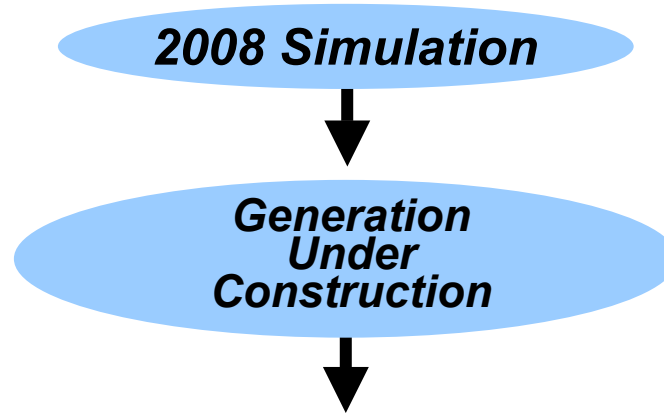
August 28, 2003



SSG-WI Transmission Study 2008 Base Case



Scenarios Included in Study



6 Gas/Hydro Sensitivities

	High Hydro	Average Hydro	Low Hydro
High Gas			
Average Gas			
Low Gas			

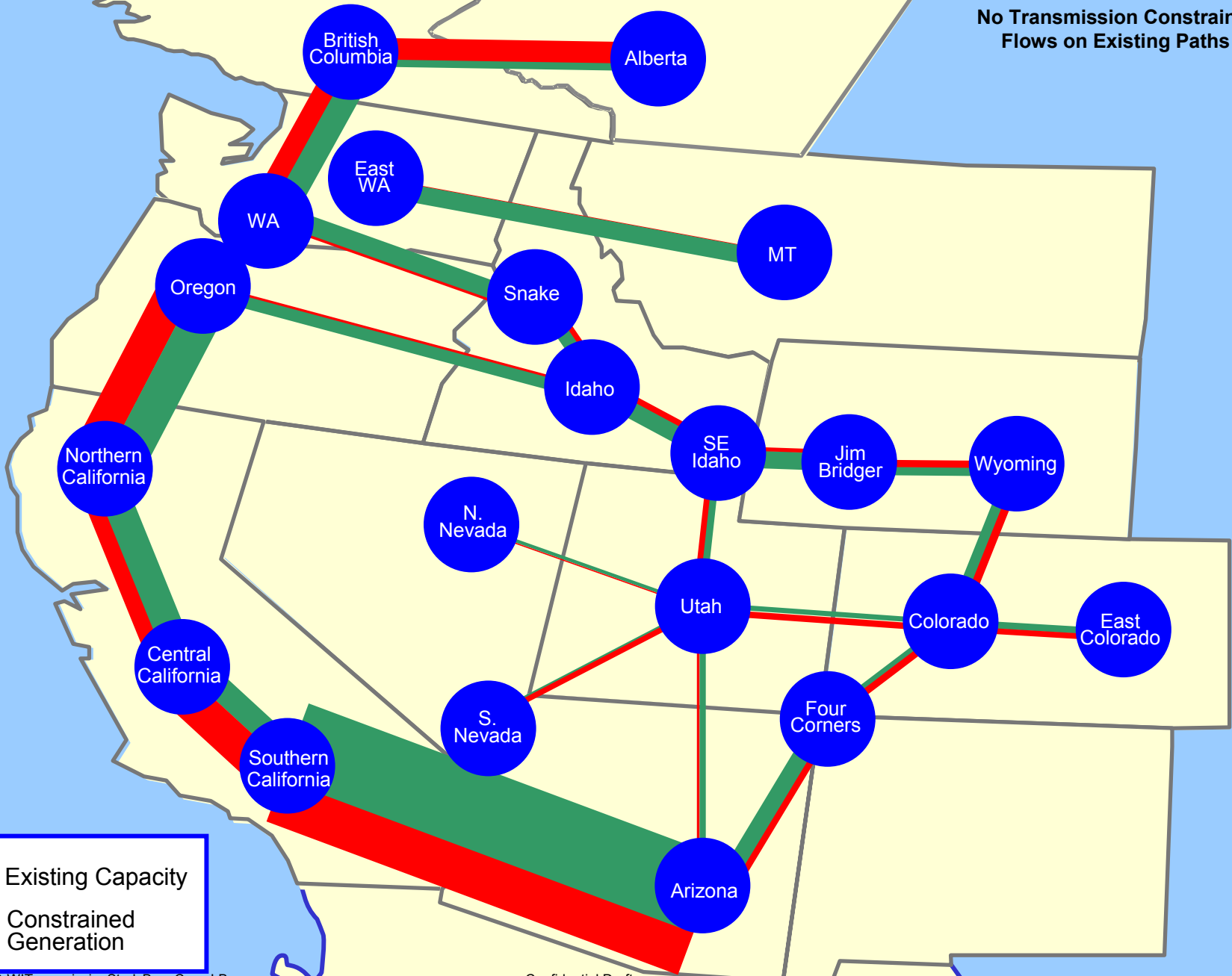
Optional

Results Summary

- ◆ Existing WECC Transmission Cost
 - WECC 2008 Case shows some bottle-necked inexpensive resources - ~\$900 millions, implying that transmission is underbuilt
- ◆ Resource Development
 - New resources are mostly gas-fired CCCTs
 - Capacity by fuel type is shifting toward gas, the % change in energy is greater than the rate of capacity increase
- ◆ Total VOM Cost Estimates
 - More sensitive to gas scenario than hydro scenario

Transmission Paths

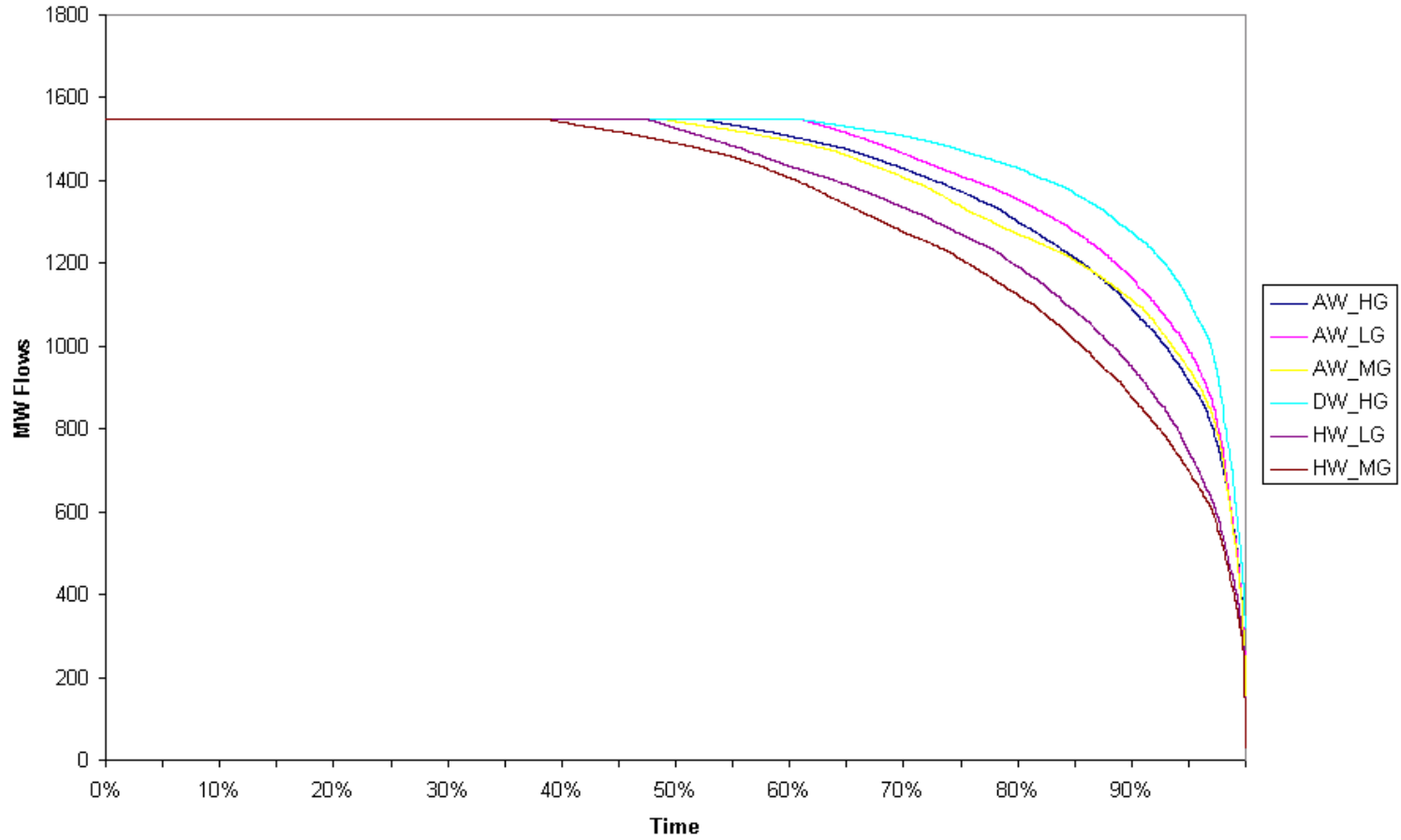
No Transmission Constraints
Flows on Existing Paths



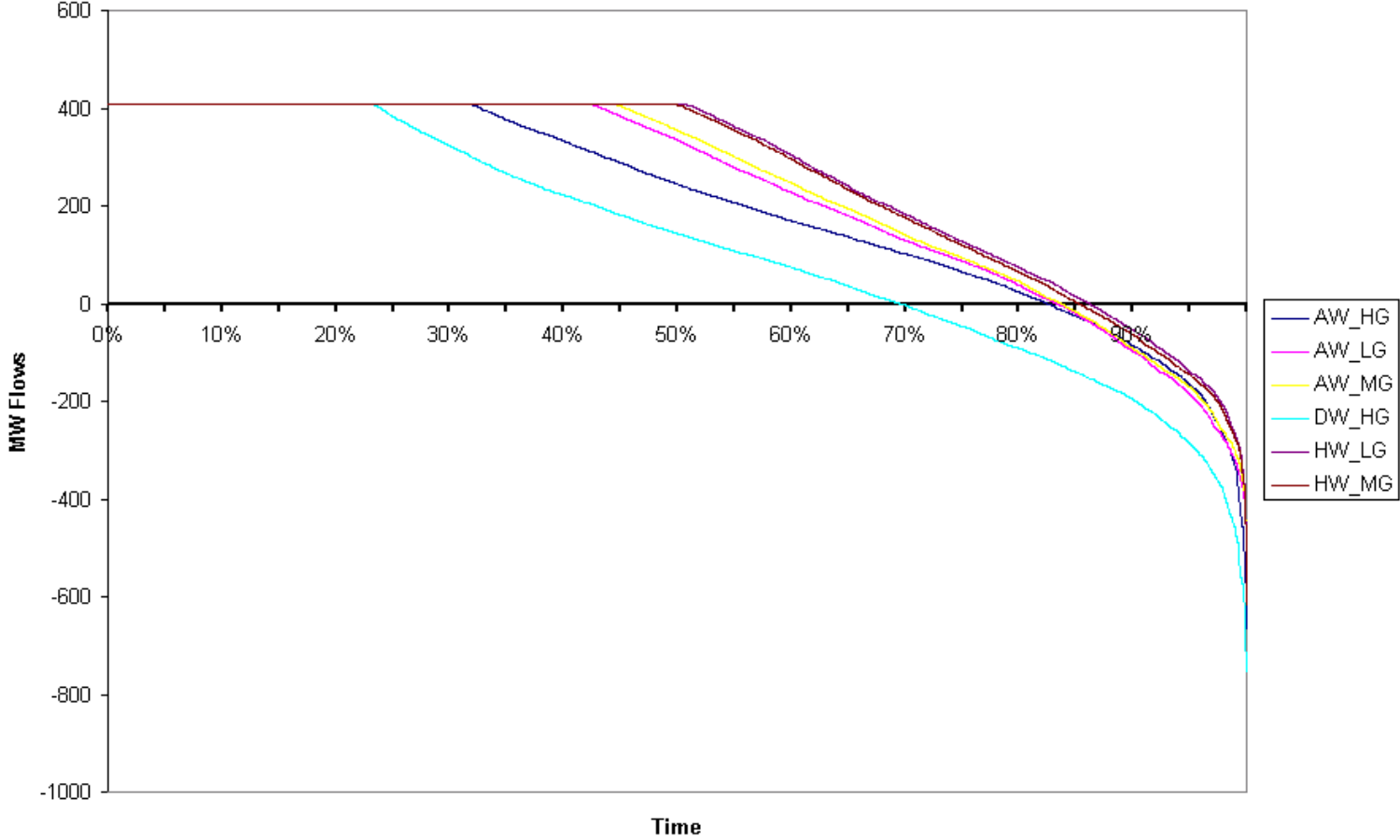
Legend

- Existing Capacity
- Constrained Generation

WOR - PV to Devers



CA Independent - Mexico

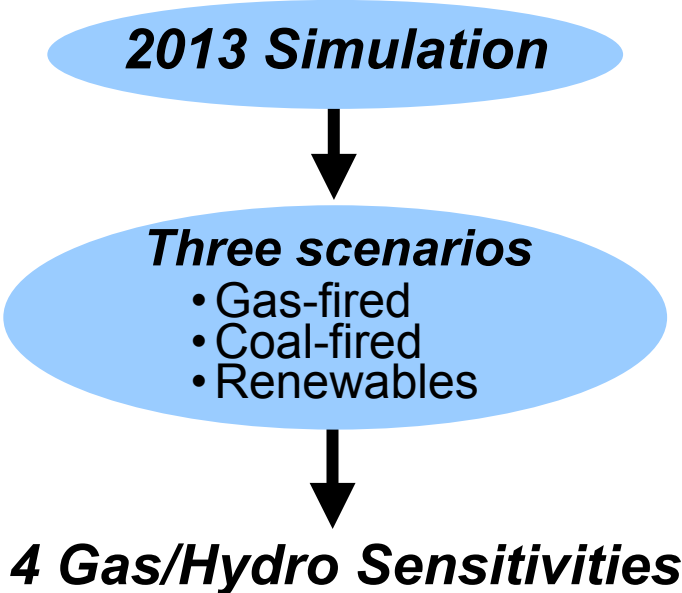


SSG-WI Transmission Study

2013 Case



Scenarios Included in Study



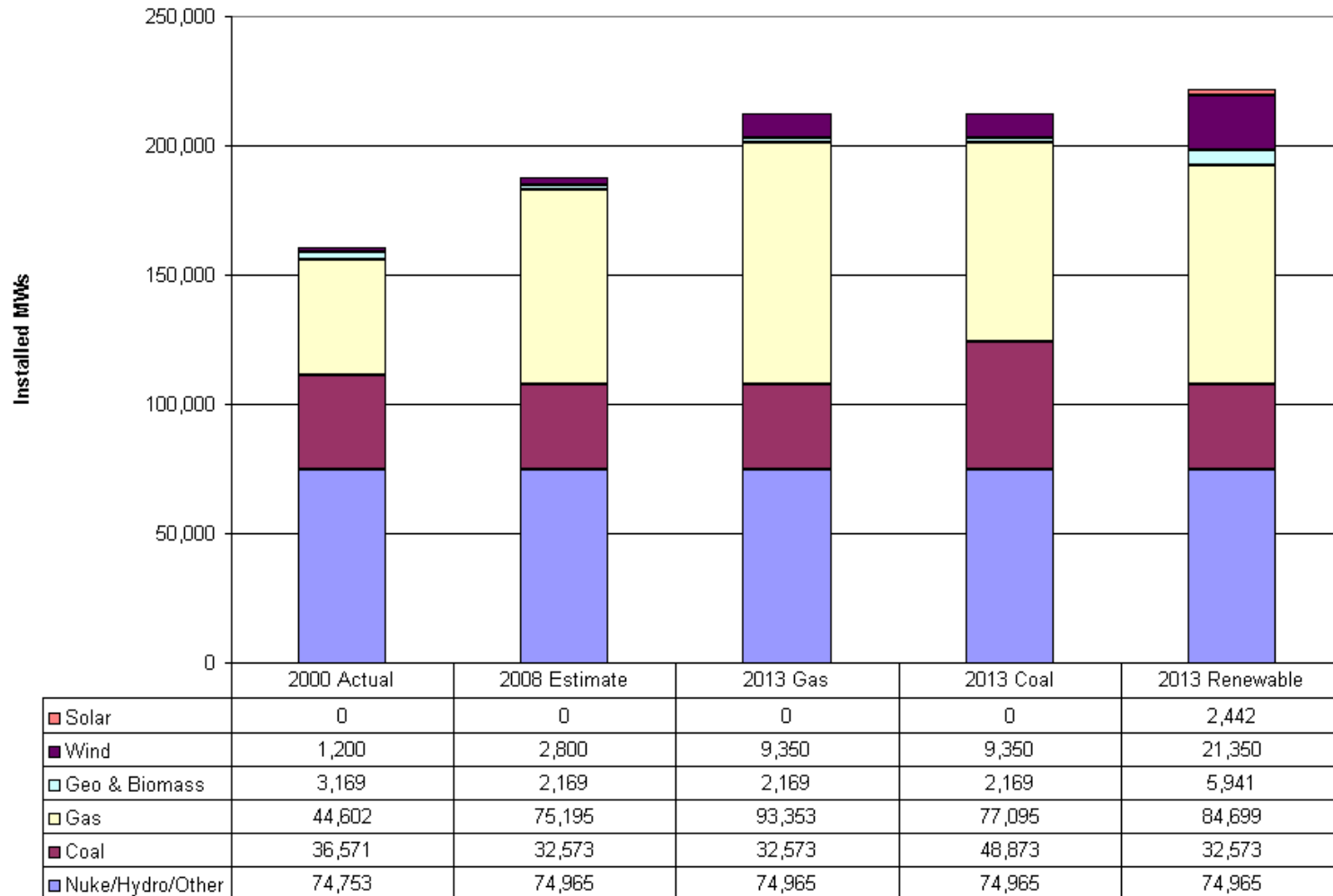
	High Hydro	Average Hydro	Low Hydro
High Gas			
Average Gas			

Generation by Scenario and Fuel Type

2008 TO 2013 Generation Additions

	<u>Coal</u>	<u>Geothermal</u>	<u>Wind</u>	<u>Solar</u>	<u>CCCT</u>	<u>Total System</u>
Gas	-	-	6,550	-	18,158	24,708
Coal	16,300	-	6,550	-	1,900	24,750
Renewab	-	3,772	18,550	2,484	9,504	34,310

WECC Capacity By Fuel Source

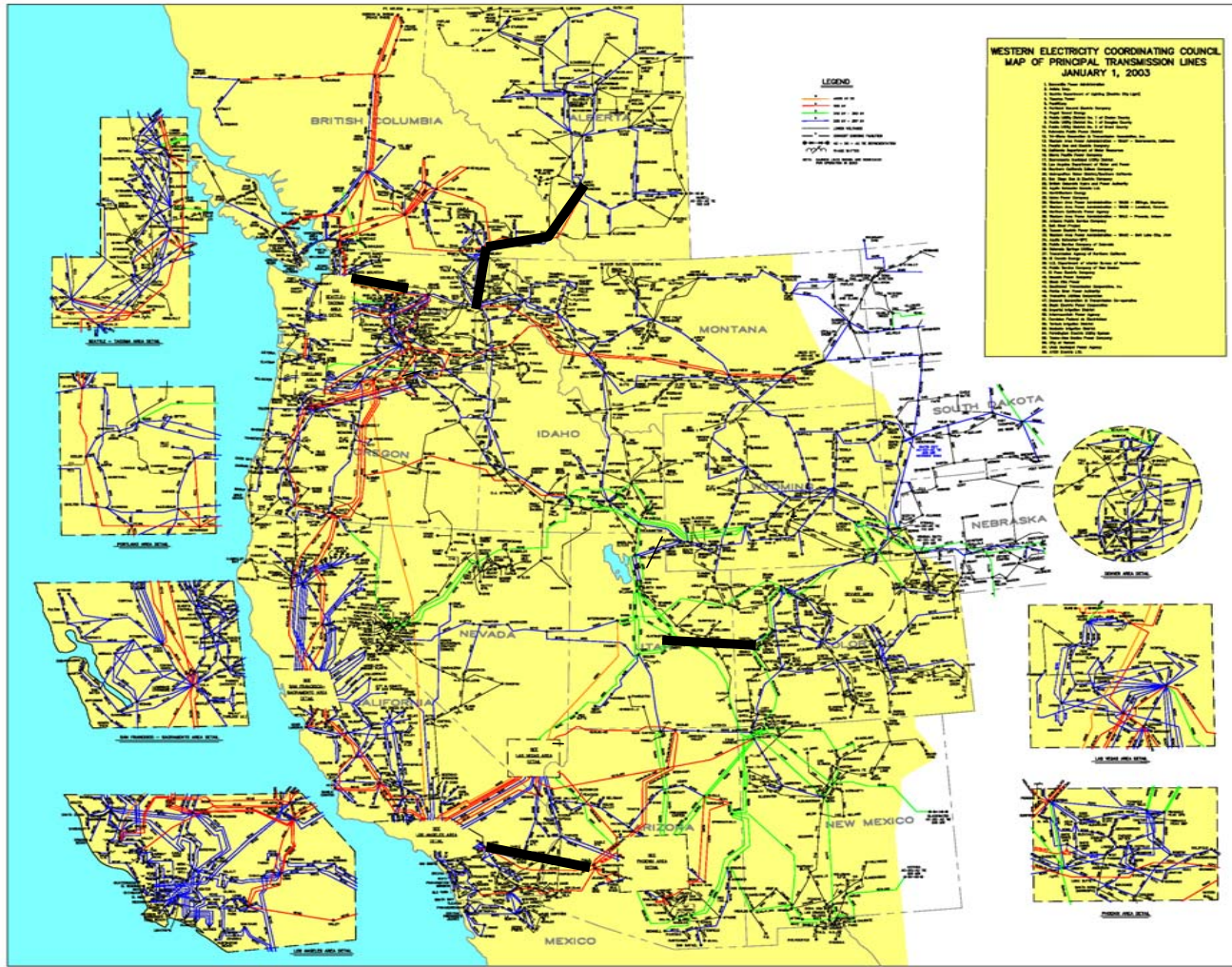


Transmission Topology

- ◆ Using the WECC 2008 LS case for system definition
- ◆ Using the most recent path rating catalog (2/03) for capacity numbers
- ◆ Using modeling nomograms reflecting system constraints
- ◆ Apply Transmission Upgrades for the three Scenarios (Gas, Coal & Renewable) based on the following criteria:
 - Lines loaded up to 75% of the time (measured on Flow Duration Curves)
- ◆ Took 1st Iteration Results to Technical Group
 - Path Total Expansion Value at \$40,000 or above
- ◆ Presenting 2nd Iteration

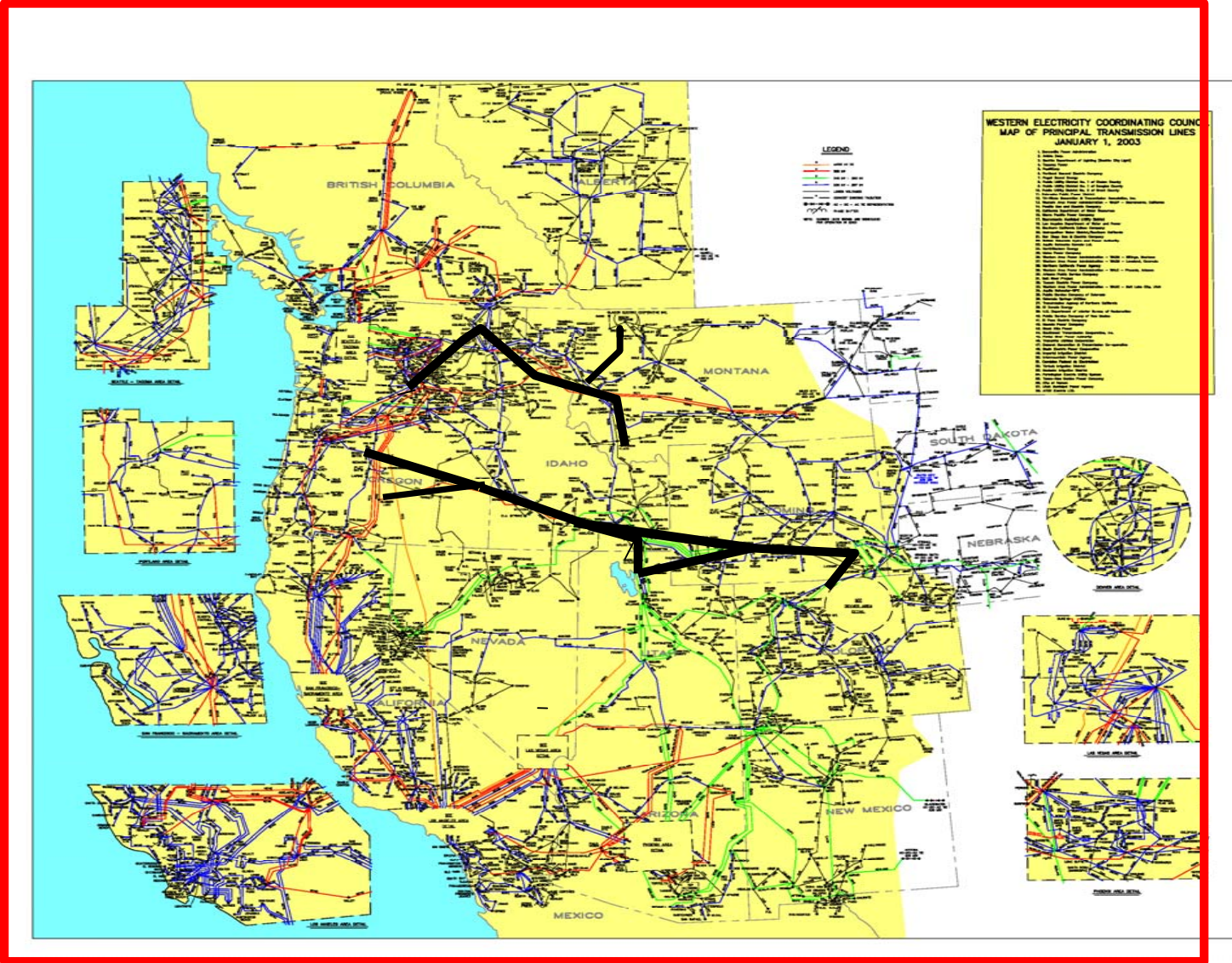
Gas Scenario (Base)

Incremental Generation Additions - Delta from 2008 (MW)		
Wind	CCCT	Total
6,550	18,158	24,708



Renewable Scenario

Incremental Generation Additions - Delta from 2008 (MW)				
Geothermal	Wind	Solar	Gas Fire	Total Area
3,772	18,550	2,484	9,504	34,310



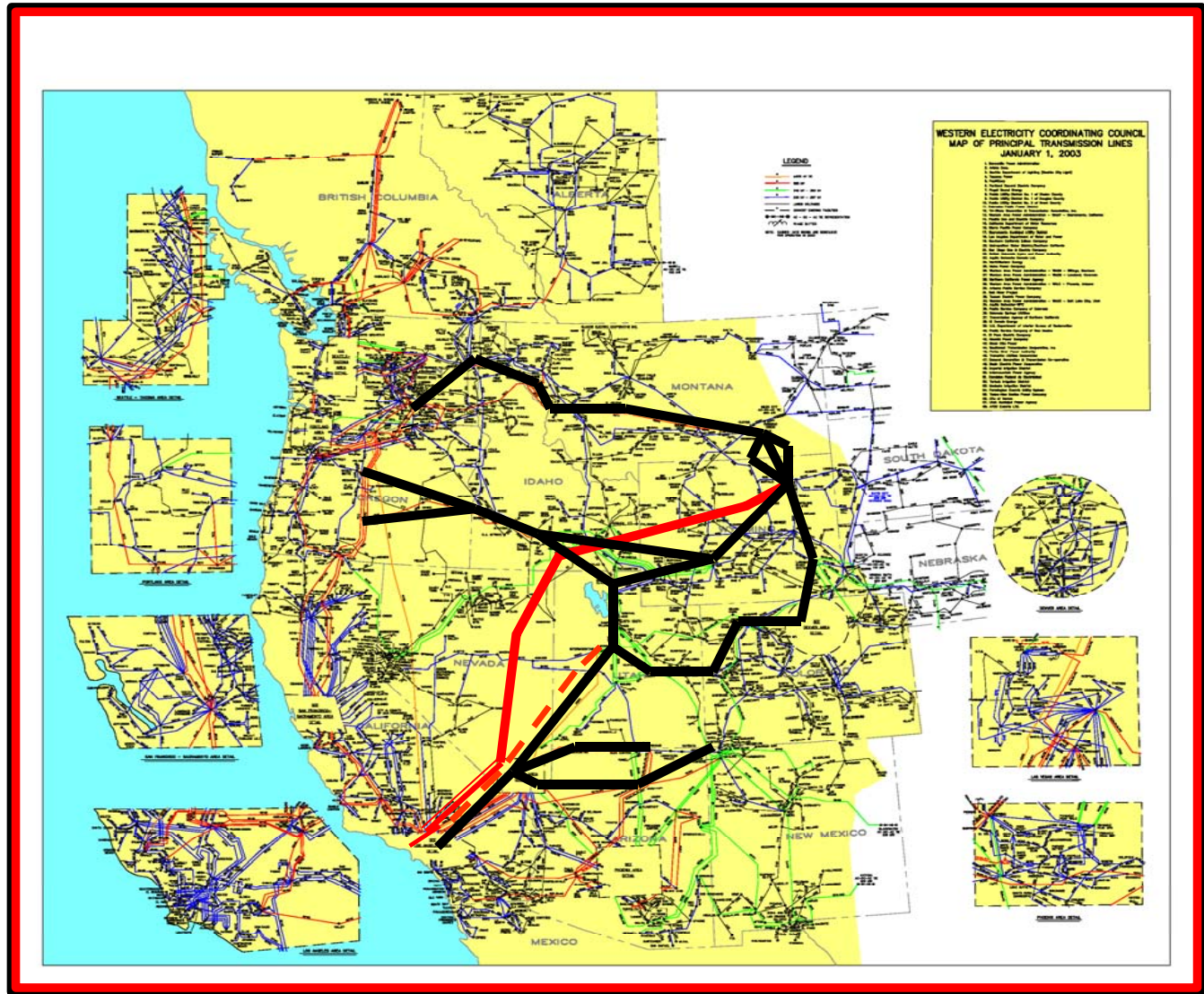
Coal Scenario

Incremental Generation Additions - Delta from 2008 (MW)			
Coal	Wind	Gas Fire	Total Area
16,300	6,550	1,900	24,750

AC Line



DC Line



Economic Value of Added Transmission (LMP Value) - (continued)

Updated Transmission Addition - Sensitivities

	Coal	Renewable	Gas
Load (K\$)	(2,747,807)	(255,246)	
Load Avg Price (\$)	(2.86)	(0.27)	
Gen (K\$)	1,604,569	1,434,817	
Gen Avg Price (\$)	1.67	1.49	

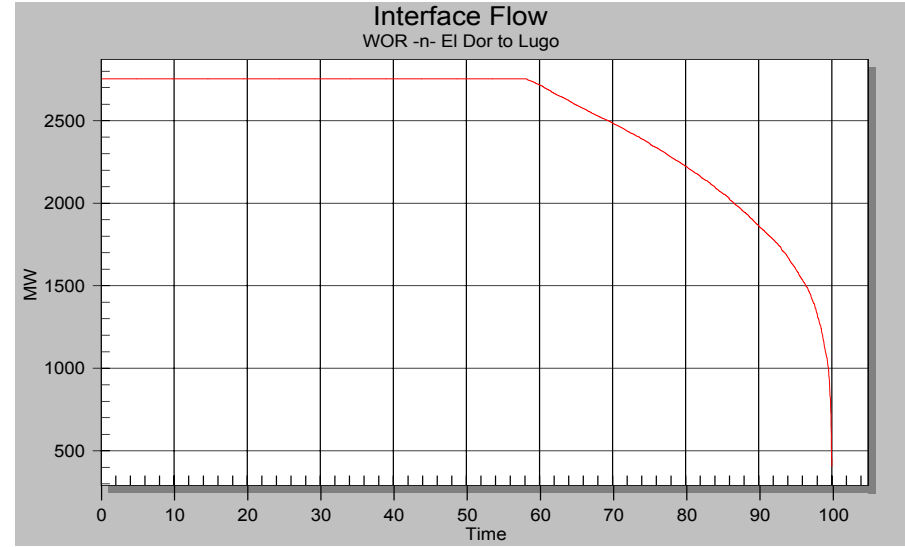
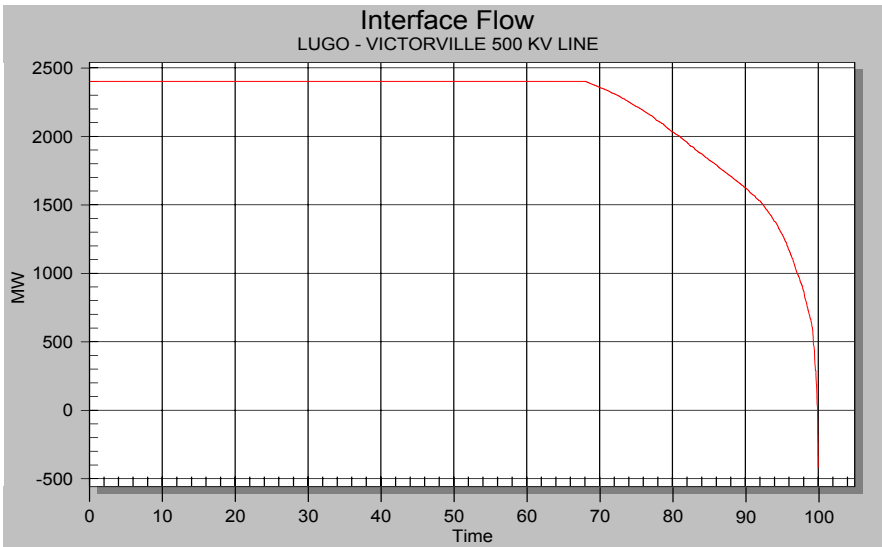
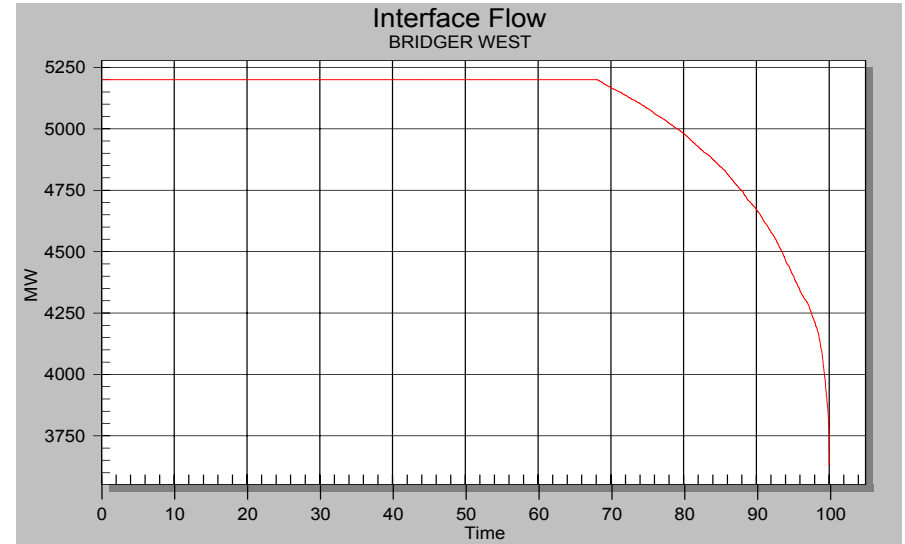
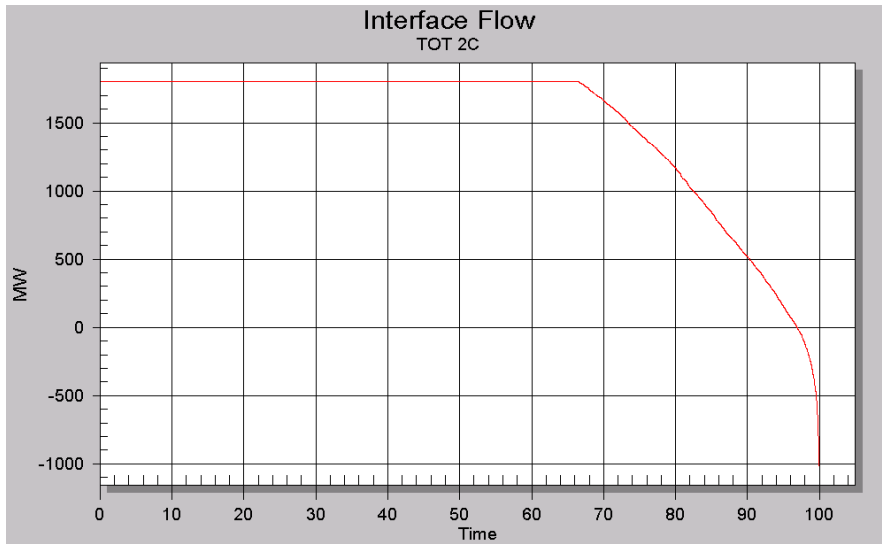
◆ Renewable

- Load's payment is reduced by \$255M
- Generation's revenue is increases by \$1.4B

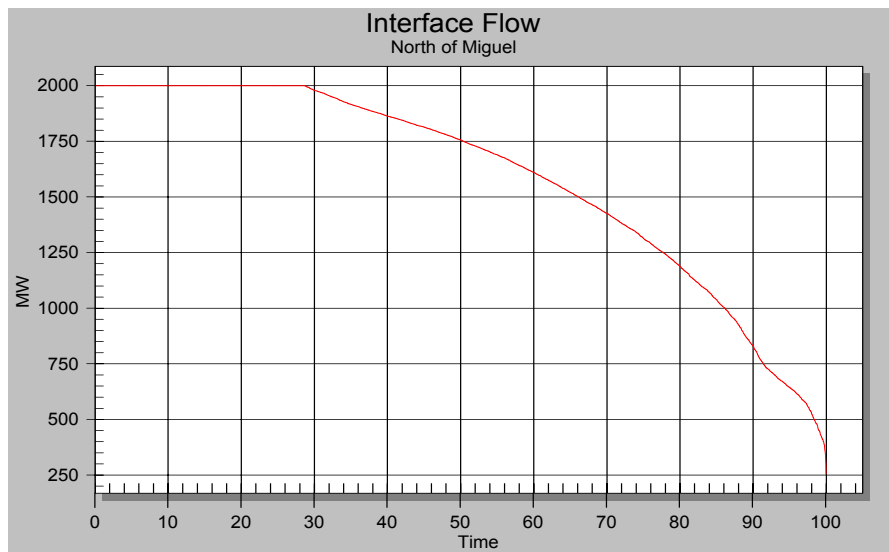
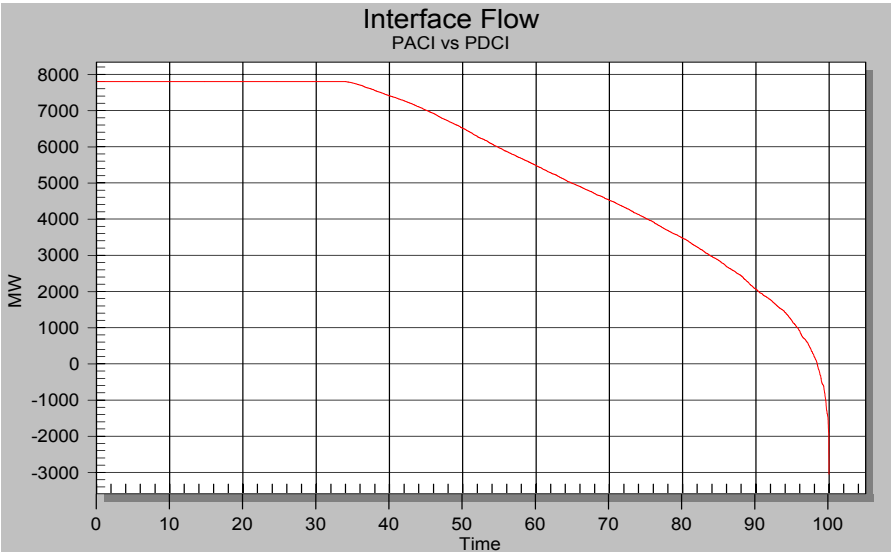
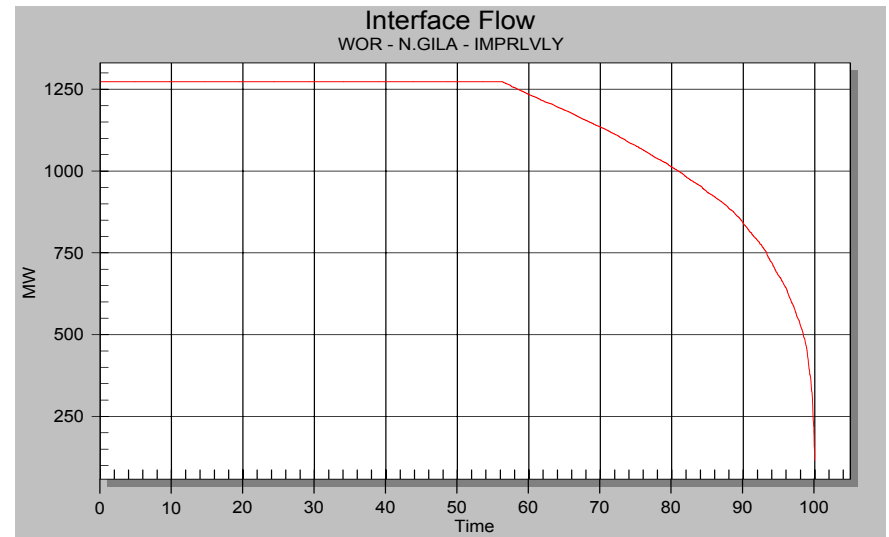
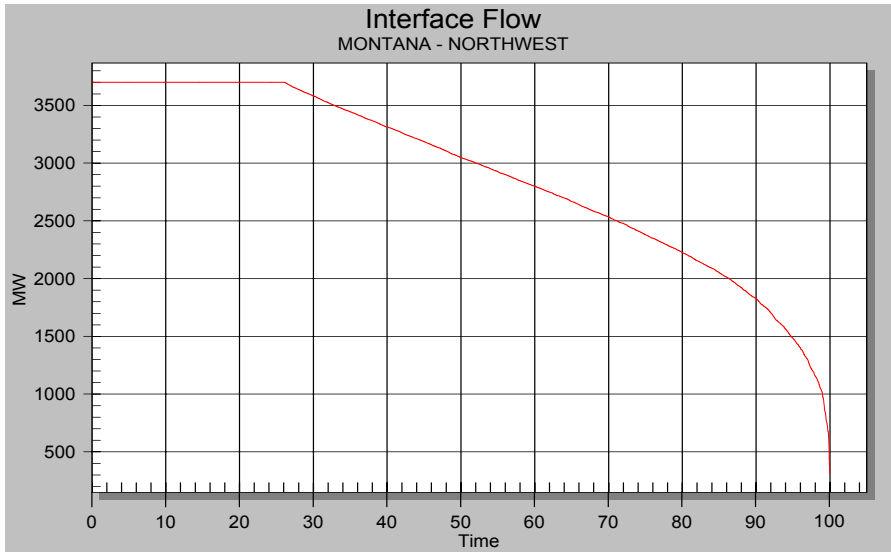
◆ Coal

- Load's payment is reduced by \$2.7B
- Generation's revenue is increases by \$1.6B

Coal Scenario - Flow Duration (w/new Transmission)



Renewable Scenario - Flow Duration (w/new Transmission)



Preliminary Results

◆ Existing WECC Transmission

- SSG-WI 2013 Cases show considerable bottle-necks more in Coal and Renewable Scenarios

Implication - Transmission is needed to integrate new resources in all three scenarios

◆ Resource Development: 2008 to 2013

- Coal
- Gas
- Renewable

◆ Total VOM Cost Estimates

- More sensitive to gas scenario than hydro scenario

Next Steps

- ◆ Workgroup need to meet and agree on what transmission iteration to use
- ◆ Base Case 2013 Validation for the three scenarios (Gas, Coal, Renewable)
 - SSG-WI consensus

Sensitivities & Analysis

- Need Capital Cost of Additions
- Discount Rate to use
- Discount Period

Analytical Support

- Provide analytical summaries to report writers

FERC Filing/WGA Report Filing