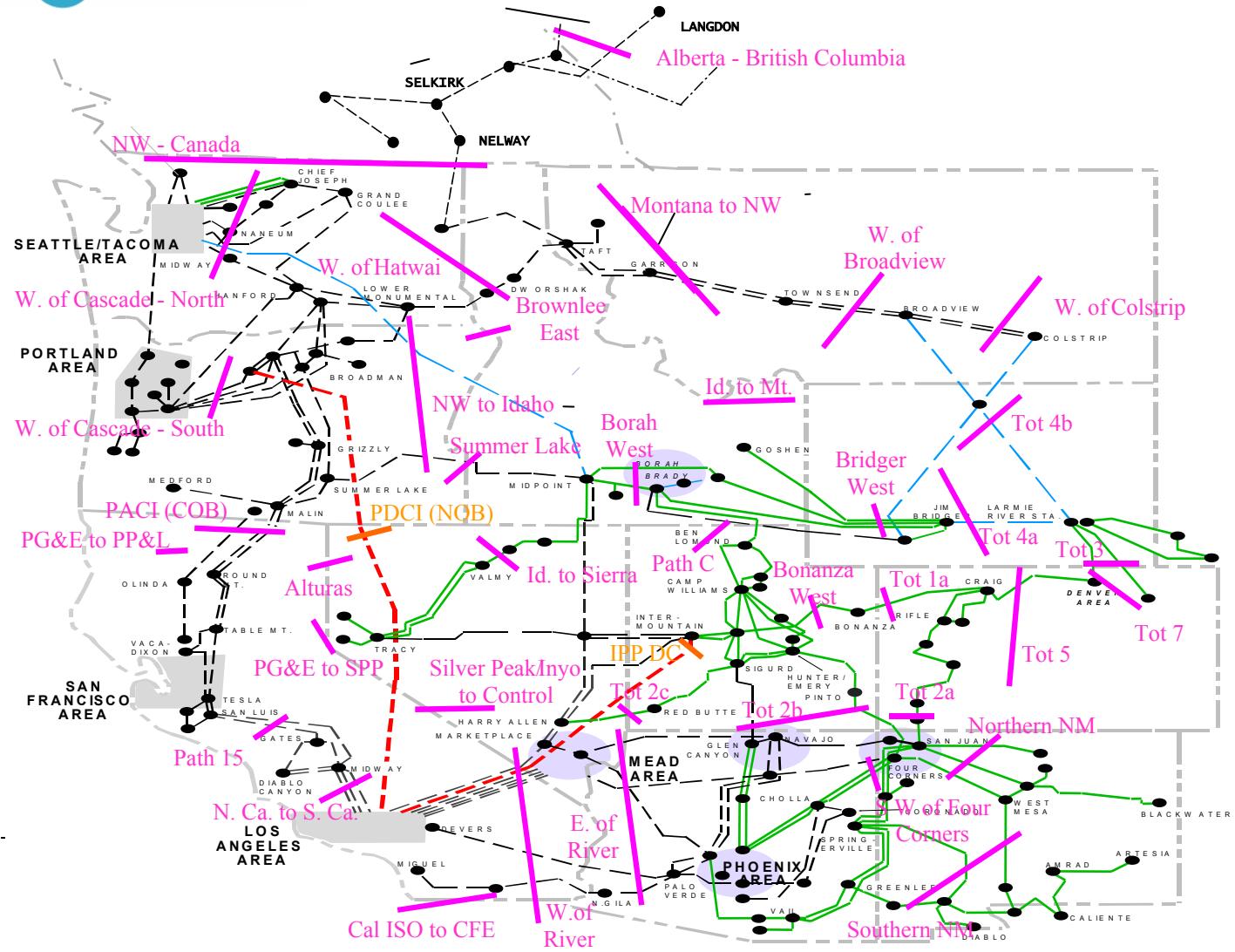
Appendix A

Data Assumptions

Slides lifted from SSG-WI and RMATS presentations

Seams Steering Group of the Western Interconnection

Western Interconnect Transmission Paths



1	Alberta-BC
2	Alberta – Saskatchewan
3	Northwest – Canada
4	West of Cascades – North
5	West of Cascades – South
6	West of Hatwai
7	Blank
8	Montana to Northwest
9	West of Broadview
10	West of Colstrip
11	West of Crossover
12-13	Blank
14	Idaho to Northwest
15	Midway – Los Banos
16	Idaho – Sierra
17	Borah West
18	Idaho – Montana
19	Bridger West
20	Path C
21	Arizona to Calif
23	Four Corners 345/500
24	PG&E – SPP
25	PacifiCorp/PG&E 115 Intercon.
26	Northern – Southern Calif
27	Intermountain Power Project
28	Intermountain – Mona 345 kv
29	Intermountain – Gonder 230 kv
30	TOT 1A
31	TOT 2A
32	Pavant/Intermtn Gonder
33	Bonanza West
34	see paths 78 & 79
35	TOT 2C
36	TOT3
37	TOT 4A
38	TOT 4B
39	TOT 5
40	TOT 7
41	Sylmar to SCE
42	IID – SCE
43	North of San Onofre
44	South of San Onofre
45	SDG&E Comision Fed. de Elect.
46	West of Colorado River (WOR)
47	Southern New Mexico (NM1)
48	Northern New Mexico (NM2)
49	East of the Colrado River
50	Cholla – Pinnacle Peak
51	Southern Navajo
52	Silver Peak – Control 55 kv
53	Billings – Yellowtail
54	Coronado West
55	Brownlee East
56-57	Blank
58	Eldorado – Mead 230 kv Lines
59	WALC Blythe – SCE Blythe

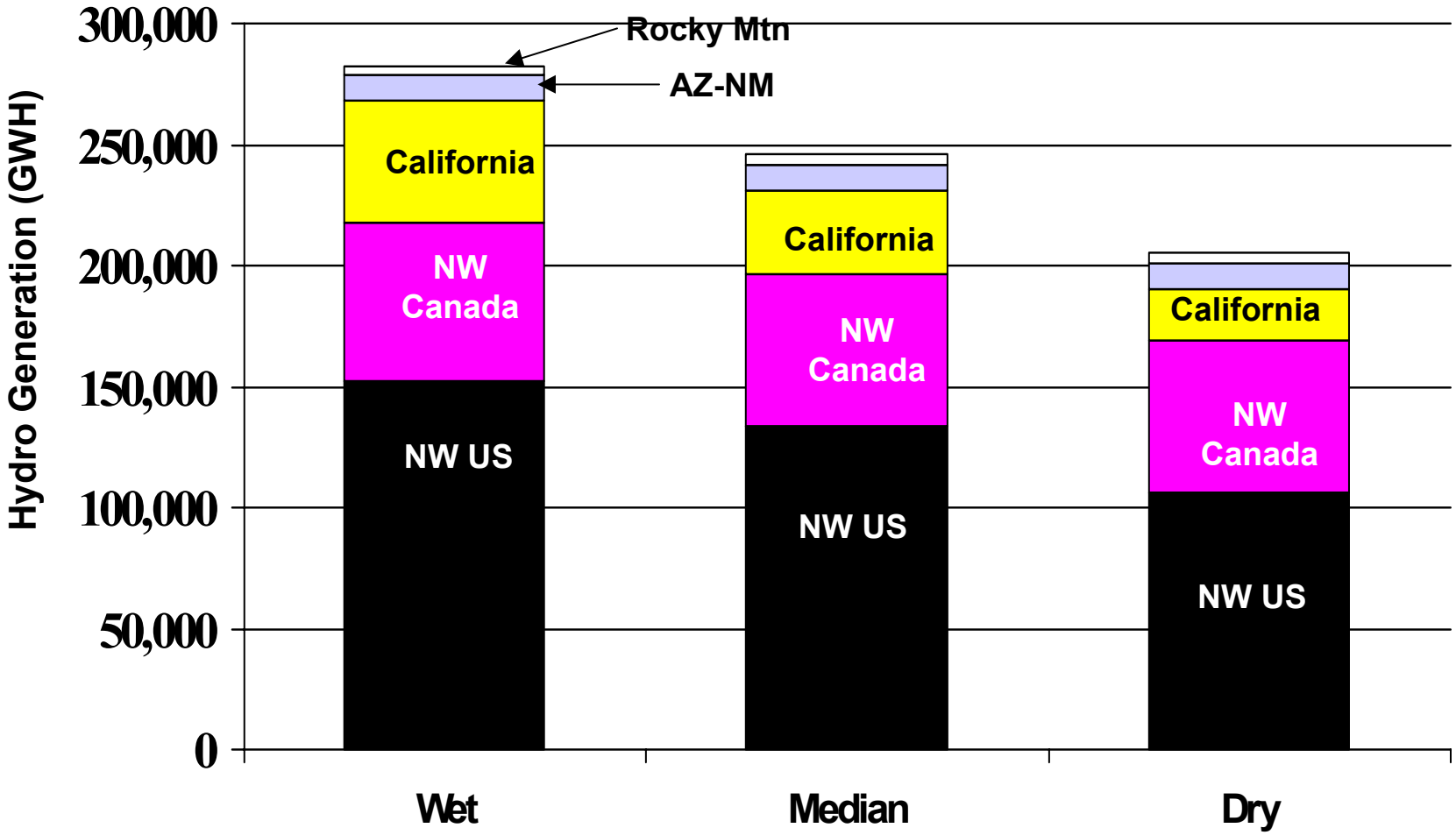
June 15, 2005

Preliminary Draft

SSGwi

Seams Steering Group of the Western Interconnection

SSG-WI Hydro Modeling



Thermal Plant by Technology

	Nuclear	Coal	Geothermal	New CCCT Gas Fire	Older CCCT Gas (or Oil)	"Good" SCCT/ST	HHR SCCT/ST	Other	Total Area
				HtRt <7500	ca. 9300	9500-10500	> 10500		
Model Areas									
ALBERTA	0	5,898	0	2,441	0	1,417	295	41	**10,092**
AQUILA	0	0	0	0	0	0	0	0	**0**
ARIZONA	3,733	7,351	0	6,558	776	877	1,555	0	**20,850**
B.C.HYDR	0	0	0	250	0	1,000	1,000	60	**2,310**
IDAHO	0	2,110	0	0	0	0	0	0	**2,110**
IMPERIAL	0	0	283	78	295	0	0	50	**706**
LADWP	0	1,710	0	574	0	2,370	431	0	**5,085**
MEXICO-C	0	0	675	1,100	428	465	60	0	**2,728**
MONTANA	0	2,311	0	0	0	0	0	39	**2,350**
NEVADA	0	595	0	3,022	298	603	227	0	**4,745**
NEW MEXI	0	1,885	0	0	0	713	412	0	**3,010**
NORTHWES	1,170	1,938	0	4,354	495	812	628	272	**9,669**
PACE	0	4,612	23	0	0	345	235	53	**5,268**
PG AND E	2,192	90	985	7,474	372	6,222	1,468	275	**19,078**
PSCOLORA	0	2,607	0	913	19	2,723	278	0	**6,540**
SANDIEGO	0	0	0	764	65	1,638	539	0	**3,006**
SIERRA	0	532	47	0	20	978	12	100	**1,689**
SOCALIF	2,167	1,677	56	2,678	1,176	6,294	2,767	0	**16,815**
WAPA L.C	0	0	0	2,227	0	0	0	0	**2,227**
WAPA R.M	0	3,546	0	480	116	778	143	0	**5,063**
WAPA U.M	0	0	0	0	0	0	0	0	**0**
Total By type	**9,262**	**36,862**	**2,069**	**32,913**	**4,060**	**27,235**	**10,050**	**890**	**123,341**

Typical Values – Used in SSG-Wi 2003

Per Generation Technology / Age

Fuel Type	Technology	Size	Vintage	Heatrate	VOM $/MWh
Gas/Oil	Steam	<100 MW	Pre 1960	12,500	$5.00
Gas/Oil	Steam	>100 MW	Pre 1960	11,500	$5.00
Gas/Oil	Steam	<100 MW	Post 1960	10,500	$5.00
Gas/Oil	Steam	>100 MW	Post 1960	9,500	$3.00
Gas	SCCT		Pre 1985	13,500	$8.00
Gas	CCCT		Pre 1985	9,300	$5.00
Gas	SCCT	<70 MW	Post 1985	9,500	$5.00
Gas	SCCT	>70 MW	Post 1985	10,500	$5.00
Gas	CCCT		Post 1985	7,250	$2.00
Coal	Steam	<100 MW	Pre 1960	12,000	$4.00
Coal	Steam	>100 MW	Pre 1960	11,000	$2.00
Coal	Steam	<100 MW	Post 1960	11,000	$3.00
Coal	Steam	>100 MW	Post 1960	10,500	$2.00
Coal	Fluid Bed			10,500	$2.00
Diesel				11,000	$12.00
Gas/Oil	CCCT		Post 2001	7,000	$2.00

Note: - KLG Judgement
Peakers
Cycling Plants
Aero-Derivatives, Optimized for SC
Larger Units, Optimized for CC
Combined Cycles
On peakers it is assumed that the maintenance is deferred until a set number of hours is reached. Baseload plants are assumed to be staffed & running.

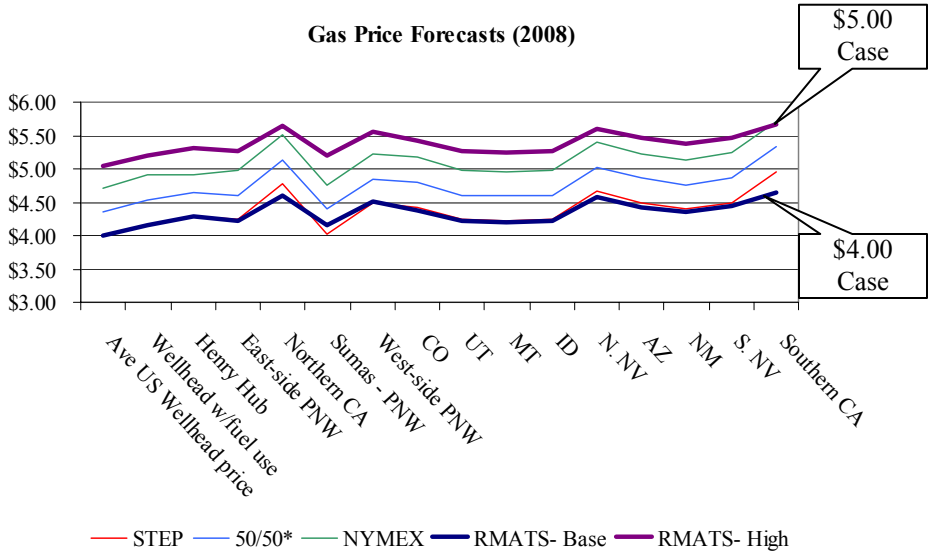
Gas Prices – RMATS Cases

New studies run with the $4/mmbtu values

	$4 Case	$5 Case	Basis
Average US Wellhead price	$ 4.00	$ 5.04	$ -
Wellhead w/Fuel use (4%)	4.16	5.20	0.16
Henry Hub-Wellhead w/fuel use	4.28	5.32	0.28
AECO	3.83	4.87	(0.17)
East-side PNW	4.23	5.27	0.23
Northern CA	4.61	5.65	0.61
Station 2	3.93	4.97	(0.07)
Sumas - PNW	4.15	5.19	0.15
West-side PNW	4.52	5.56	0.52
San Juan	4.02	5.06	0.02
CO - PSColorado	4.38	5.42	0.38
Rockies	3.88	4.92	(0.12)
UT-PACE	4.23	5.27	0.23
Wyoming	4.28	5.32	0.28
Montana	4.21	5.25	0.21
Idaho	4.23	5.27	0.23
N. NV-Sierra	4.57	5.61	0.57
Permian	4.11	5.15	0.11
Arizona	4.43	5.47	0.43
New Mexico	4.35	5.39	0.35
S. Nevada	4.44	5.48	0.44
CA Border	4.44	5.48	0.44
Southern CA	4.64	5.68	0.64

Base case assumptions:

- The 2008 US average Wellhead price set at $4.00 / MMBtu and at $5.00 / MMBtu
- The basis differential is set to match the fifth Northwest Conservation & Electric Power Plan
- For comparison, current 2008 Henry Hub Gas Future Price $4.70/MMBtu range (nominal $)



* 50/50 is an average of STEP & NYMEX

California prices include interstate pipeline charge of ~20¢

Appendix B

Current Study Results

Test runs for Grid West using SSG-Wi 2003 and RMATS 2004 data and assumptions.

Klg June 15, 2005

Annual Generation Costs					*Draft*
Based on SSG-WI 2003 & RMATS 2004 Data					*klg 6/13/05*
Variable Fuel and Operating Dollars in Millions					
Phase Shifters moving freely					
	Base Full TTC	**Base 10% OTC Derate**	**GW Full TTC**	**GW 10% OTC Derate**	**GW 5% OTC Derate**
Variable Fuel and O&M Costs (M$)	$ 14,072	$ 14,124	$ 14,046	$ 14,100	$ 14,070
Base Full TTC vs GW Full TTC					
Change in Generation Cost (M$)			$ (26)		
Base 10% Derate vs GW 10% Derate					
Change in Generation Cost (M$)				$ (24)	
Base 10% Derate vs GW 5% Derate					
Change in Generation Cost (M$)					$ (54)
Base 10% Derate vs GW Full TTC			$ (78)		
Change in Generation Cost (M$)					
				Total Fuel Savings w/ 5% OTC Boost	$ (54)
				Savings GW 10% Less Base 10% DR case	$ (24)
				Gain from 5% OTC Boost	$ (30)
				Total Fuel Savings w/ 10% OTC Boost	$ (78)
				Savings GW 10% Less Base 10% DR case	$ (24)
				Gain from 10% OTC Boost	$ (54)

Annual Transmission Penalties

Draft

Congestion Costs, Wheeling Charges and Transaction Friction Costs

klg 6/13/05

Dollars in Thousands

Phase Shifters moving freely

	Base Full TTC	Base 10% OTC Derate	GW Full TTC	GW 10% OTC Derate	GW 5% OTC Derate
Total Interface Congestion, Wheel & friction	$ 1,418,510	$ 1,542,138	$ 927,801	$ 1,078,023	$ 979,378
Wheel & friction	$ 874,053	$ 857,311	$ 501,230	$ 483,643	$ 493,133
Congestion	$ 544,457	$ 684,827	$ 426,571	$ 594,380	$ 486,245
GW Change in Wheeling & Friction					
GW - Base			$ (372,822)		
GW 10% DR - Base 10% DR				$ (373,668)	
GW 5% DR - Base 10% DR					$ (364,178)
GW Change in Congestion Costs					
GW - Base			$ (117,886)		
GW 10% DR - Base 10% DR				$ (90,447)	
GW 5% DR - Base 10% DR					$ (198,582)
GW Full TTC - Base 10% DR			$ (258,256)		

Annual Generation Costs

Draft

Based on SSG-WI 2003 & RMATS 2004 Data

klg 6/13/05

Variable Fuel and Operating Dollars in Millions

Phase Shifters moving for $10/degree

	Base Full TTC	Base 10% OTC Derate	GW Full TTC	GW 10% OTC Derate	GW 5% OTC Derate
Variable Fuel and O&M Costs (M$)	$ 14,078	$ 14,139	$ 14,059	$ 14,127	$ 14,087
Base Full TTC vs GW Full TTC					
Generation Cost (M$)			$ (19)		
Base 10% Derate vs GW 10% Derate					
Generation Cost (M$)				$ (12)	
Base 10% Derate vs GW 5% Derate					
Generation Cost (M$)					$ (52)
Base 10% Derate vs GW Full TTC			$ (80)		
Generation Cost (M$)					

Total Fuel Savings w/ 5% OTC Boost	$ (52)
Savings GW 10% Less Base 10% DR case	$ (12)
Gain from 5% OTC Boost	$ (39)
Total Fuel Savings w/ 10% OTC Boost	$ (80)
Savings GW 10% Less Base 10% DR case	$ (12)
Gain from 10% OTC Boost	$ (67)

Annual Transmission Penalties

Draft

Congestion Costs, Wheeling Charges and Transaction Friction Costs

klg 6/13/05

Dollars in Thousands

Phase Shifters moving for $10/degree

	Base Full TTC	Base 10% OTC Derate	GW Full TTC	GW 10% OTC Derate	GW 5% OTC Derate
Total Interface Congestion, Wheel & friction	$ 1,455,440	$ 1,630,857	$ 960,156	$ 1,222,874	$ 1,047,659
Wheel & friction	$ 1,209,981	$ 1,184,776	$ 701,222	$ 674,434	$ 689,279
Congestion	$ 245,459	$ 446,081	$ 258,934	$ 548,441	$ 358,380
GW Change in Wheeling & Friction					
GW - Base			$ (508,759)		
GW 10% DR - Base 10% DR				$ (510,342)	
GW 5% DR - Base 10% DR					$ (495,496)
GW Change in Congestion Costs					
GW - Base			$ 13,475		
GW 10% DR - Base 10% DR				$ 102,359	
GW 5% DR - Base 10% DR					$ (87,701)
GW Full TTC - Base 10% DR			$ (187,147)		