

State-Provincial Steering Committee

Update on Developing a 10 Year Transmission Plan

February 10, 2011

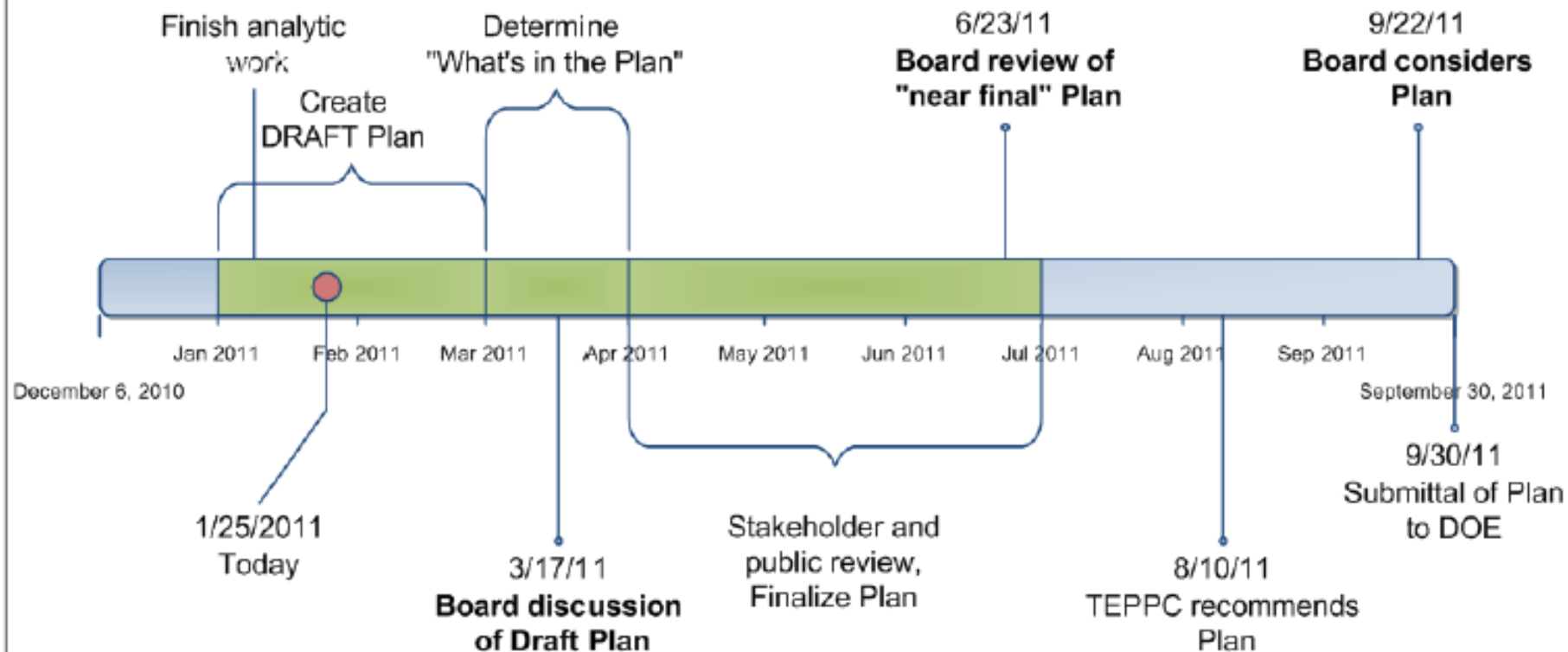
Outline

- Recent Developments from WECC/TEPPC
 - WECC meetings and plan schedule
 - Dashboard and congestion metrics
 - Emerging paths of concern
 - Modeling concerns raised
 - Direction of WECC's 10 Year Plan
- Questions and feedback

WECC meetings and plan schedule

- Past –
 - Jan. 25-26 Technical Advisory Subcommittee (TAS) meeting
 - Feb. 9 Studies Work Group meeting
- Upcoming –
 - Feb. 16 TAS meeting
 - Feb. 23-25 Scenario Planning Steering Group (SPSG) and Transmission Planning Policy Committee (TEPPC)
 - Mar. 17 WECC Board

Plan Development Timeline



TAS meeting Jan. 25-26

- Review of study results (Jan. 25)
 - 2019 Relocation Cases
 - Shift 12,000 GWh from CA to 8 areas (AZ/S.NV, N.NV, NM, WY, MT, AB, BC, NW coastal)
 - 2020 Cases
 - SPSC Reference Case, High Load, High DSM, Carbon reduction
 - Aggressive MT & WY wind case
 - Shift 24,000 GWh to MT and WY
 - Total of 16 cases with results
- Dashboard and congestion metrics (Jan. 26)
 - Framework to evaluate congestion across WECC paths using the 16 study cases

WECC 10-Year Plan Dashboard

Main View

Expected Futures

Resource Changes

Path #	Path Name	Voltage (kV)	Path Rating (MW)	Historical Congestion	Design Congestion	Project Development	Recurrent Development	Recurrent Count	← Conditional Congestion Score →																	
									2019 Base Case (2019 PC1A)	2020 Base Case (2020 PC0)	SPSC Reference Case (2020 F)	AZ/ S. Nevada (2019 PC1)	Wyoming (2019 PC7)	British Columbia (2019 PC8)	Northern Nevada (2019 PC9)	Alberta (2019 PC10)	Montana (2019 PC11)	New Mexico (2019 PC12)	Northwest Coastal (2019 PC13)	Carbon Reduction (2019 PC14)	Aggressive MT Wind (2019 PC15)	Aggressive WY Wind (2019 PC16)	High Load (2019 PC17)			
1	ALBERTA - BRITISH COLUMBIA	500	1000	X	-	4	8	1.57	0.17				0.16	0.16	0.39	0.15		0.13	0.16	0.25						
3	NORTHWEST - CANADA	500	3150	X	-	5	3	2.48							0.54						0.96					0.98
8	MONTANA - NORTHWEST	500	2200	X	-	0	15	9.61	0.41	0.51	0.56	0.42	0.53	0.35	0.34	0.42	1.40	0.44	0.35		2.11	0.88	0.46	0.45		
14	IDAHO - NORTHWEST	500	2400	-	-	1	0	0.00																		
17	BORAH WEST	345	2557	X	-	3	0	0.00																		
18	IDAHO - MONTANA	230	337	-	-	3	2	1.64									0.41				1.24					
19	BRIDGER WEST	345	2200	X	X	3	1	1.35														1.35				
20	PATH C	345	1000	X	-	5	0	0.00																		
22	SOUTHWEST OF FOUR CORNERS	500	2325	X	-	1	3	2.36					0.60					1.07				0.69				
23	FOUR CORNERS 345/500	500	840	-	-	1	0	0.00																		
27	IPP DC LINE	500	1920	X	X	1	14	6.88		0.50	0.50		0.55	0.25	0.60	0.18	0.39	0.38	0.24	0.45	0.78	0.77	0.34	0.94		
30	TOT 1A	345	650	X	-	0	1	0.25														0.25				
31	TOT 2A	345	690	X	-	0	2	0.54					0.20									0.34				
34	TOT 2B	345	900	-	-	0	0	0.00																		
35	TOT 2C	345	300	X	-	6	15	4.41	0.34	0.19	0.18	0.31		0.40	0.55	0.36	0.34	0.30	0.39	0.20	0.14	0.19	0.26	0.24		
36	TOT 3	345	1605	X	-	5	2	2.24					0.60									1.64				
45	SDG&E - MEXICO (CFE)	230	800	-	-	0	7	0.00		X	X									X	X	X	X	X		
46	WEST OF COLORADO RIVER (WOR)	500	10623	-	-	2	0	0.00																		
47	SOUTHERN NEW MEXICO (NM1)	345	1048	X	-	4	0	0.00																		
48	NORTHERN NEW MEXICO (NM2)	345	1970	-	-	3	0	0.00																		
49	EAST OF COLORADO RIVER (EOR)	500	9300	X	-	2	0	0.00																		
50	CHOLLA - PINNACLE PEAK	345	1200	X	-	0	1	0.06									0.06									
51	SOUTHERN NAVAJO	500	2800	-	-	1	0	0.00																		
65	PACIFIC DC INTERTIE	500	3100	-	-	4	5	2.33		0.33	0.36										0.35	0.41		0.87		
66	COI	500	4800	X	-	4	16	30.04	1.39	1.90	1.94	1.53	1.61	2.04	1.14	1.59	2.18	1.45	2.03	2.88	2.19	1.93	1.27	2.96		

Dashboard: Congestion Metrics

■ Recurrent count

- Each transmission path evaluated for a “screening test” for each of the 16 study case
- Passes test if the path utilization rate high enough to meet one of three criterion
 - (U₇₅ > 50% of the time; U₉₀ > 20% of the time; or U₉₉ > 5% of the time)
- Maximum potential value = 16 (16 study cases)

Dashboard: Congestion Metrics

■ Conditional Congestion Score

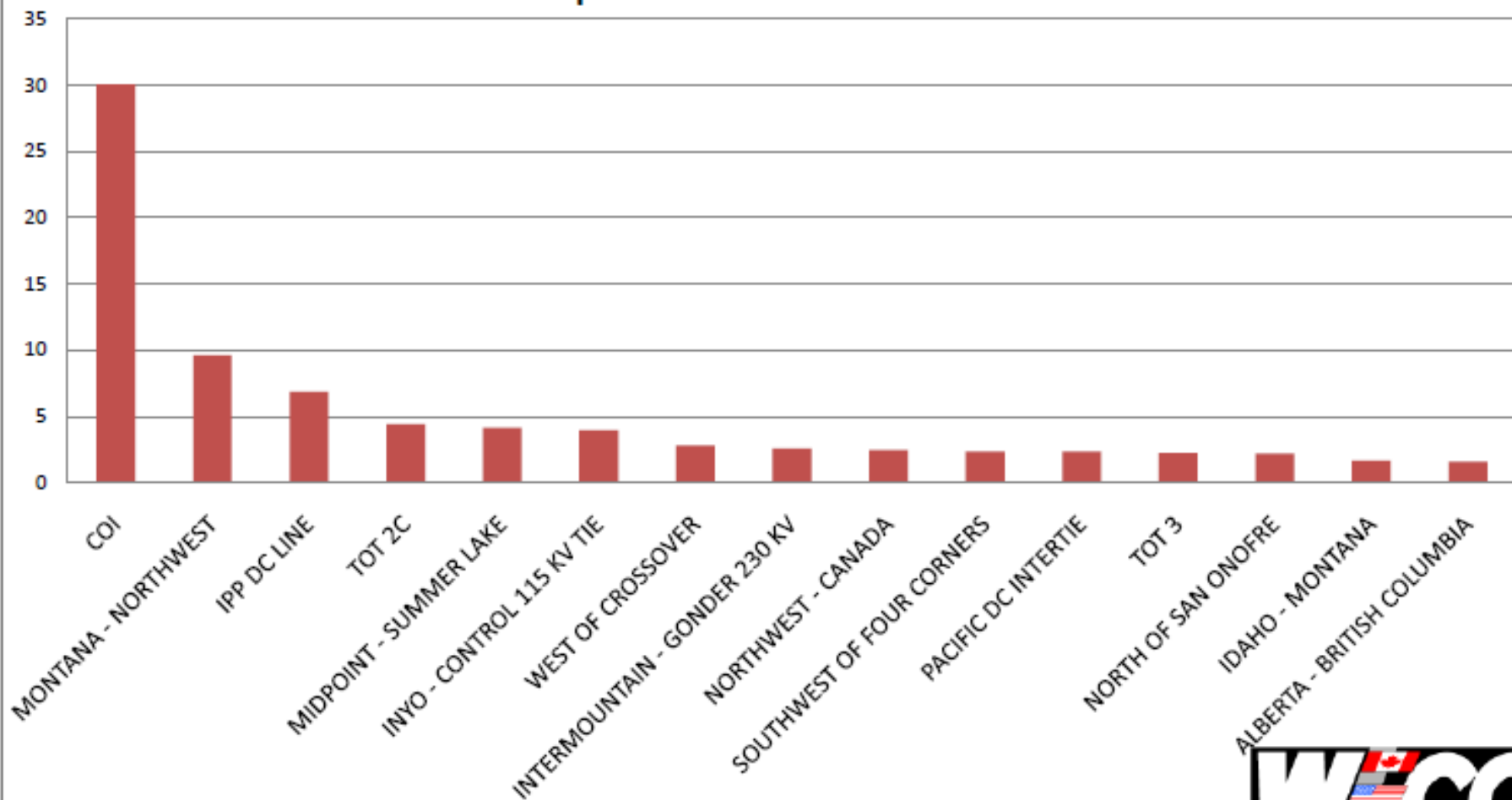
- Sum of 3 metrics (value + risk + utilization) for a single study on a single path
 - Value = difference of LMPs over the path times the amount of energy on the path
 - Risk = LMP times energy on path when exceeds 90% utilization
 - Utilization = % of year that flow is greater than 90% of the path limit
- All three metrics normalized to an index from 0 to 1 to enable comparative rankings.
- Maximum potential score = 3.0 (value=1, risk=1, utilization = 1)

■ Recurrent Congestion Score

- Sum of a path's conditional congestion scores across all studies
- Maximum potential score = 48.0 (16 studies x 3.0)

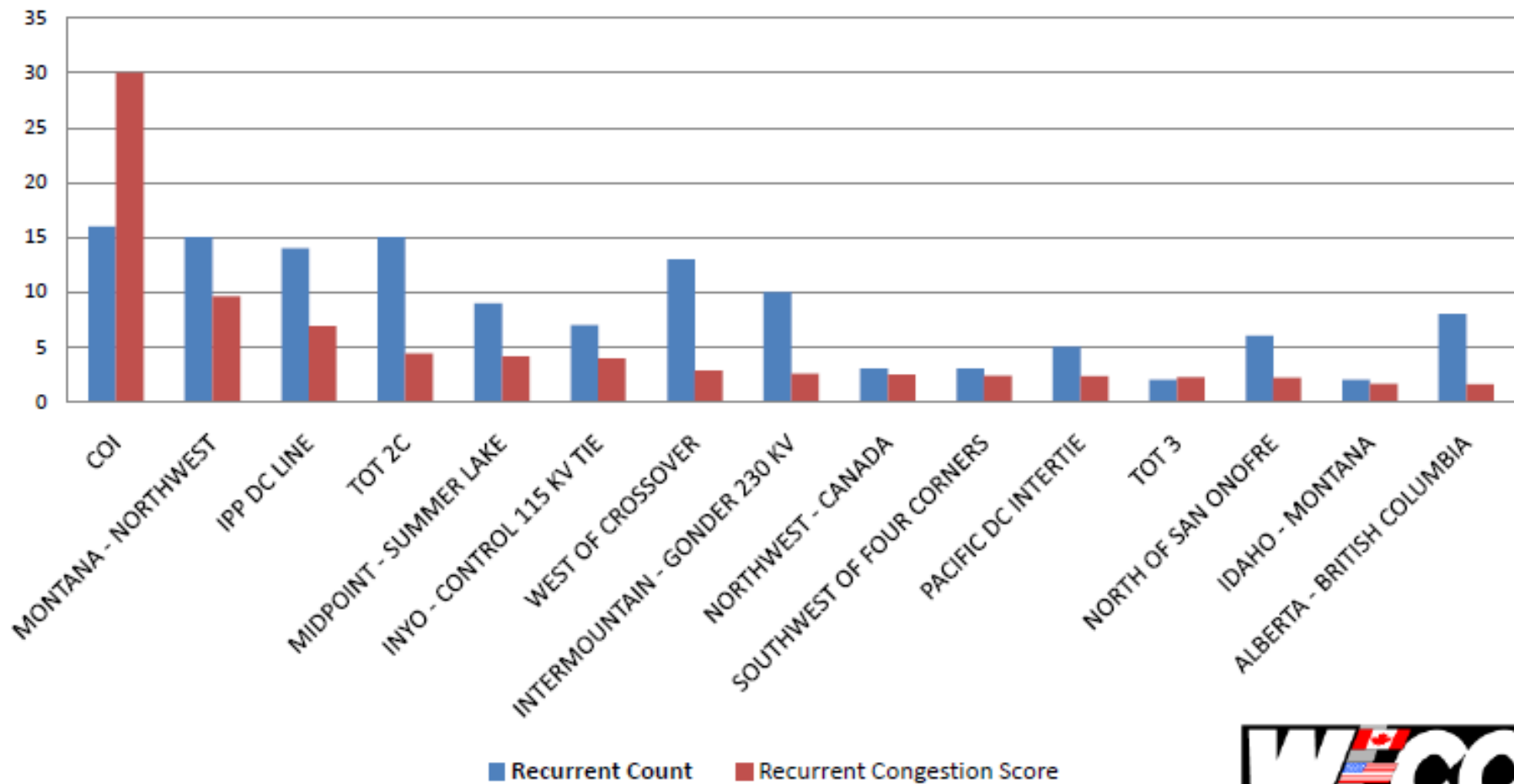
Ranking Based on Recurrent Congestion Score

Top 15 Recurrent Score



Recurrent Score and Count

Top 15 Recurrent Score and Recurrent Count: Sorted by Score



Emerging Paths of Concern

- Top 5 Paths with highest ranking for recurrent congestion
 - COI (and PDCI) (Path 66, Path 65)
 - Montana – Northwest (Path 8)
 - IPP DC (Path 27)
 - TOT 2c (Path 35)
 - Midpoint-Summer Lake (Path 75)

Modeling & Metric Concerns

- DC v. AC line modeling problem
 - Promod bias to use AC lines over DC lines
 - Linked to differences in estimating line losses
 - 3 existing DC lines, 8 potential projects
 - Potential fixes
 - Use nomogram to tie DC line flow to generation output
- Metrics “value” and “risk” problematic
 - Concern that inappropriate to multiply shadow price times quantity as an indicator of congestion
 - Staff agreed to explore alternatives and compare

Missing from the Analysis

- Developer business model perspective missing
 - Dashboard aggregated metrics miss the value proposition of these projects in the eyes of the developer
- Economic analysis of transmission alternatives
 - Agreed to evaluate capital costs and operating costs to derive delivered cost of power for 2019 relocation expansion cases
 - Inform us on the most promising areas to be developed, i.e. conditional congestion concept

WECC staff next steps

- WECC staff issued letter Feb. 4 outlining their next steps for the next TAS meeting Feb. 16.
 - Revise structure of Dashboard for easier comparison of similar study cases, and remove Foundational sensitivities from the Dashboard
 - Run expansion cases (9 identified) on the 2020 Reference Case and perform capital cost analysis
 - DC lines will be modeled using nomograms
 - Will perform economic analysis that includes capital and operating costs that enables comparison of developing resources in different areas
 - Will derive shadow price conditional congestion metric and compare with “value” and “risk” metrics.

Plan Report Outline (1)

1. Executive Summary ~10 pages
2. Introduction ~20 pages
 - Uses and Limitations
 - Process
 - Acknowledgements
3. Recommendations ~20 pages
 - Critical Network Needs (Paths)
 - Other insights (Resource and Load change cases)
 - Policy-based (Process and Structure)
4. Discussion of WECC Paths ~70 pages
 - Conclusions about each Path
5. Study Case Results – question, assumptions, analysis, results ~150 pages
 - 2019 – question, assumptions, results, conclusions
 - 2020

Plan Report Outline (2)

5. Screening information ~75 pages

- Capital Cost
- Reliability
- Environmental
- Water

6. Appendices

- Sources of information
- Study requests
- Foundational List Report
- Economic benefits of transmission – SCG paper
- Steve's commentary on planning
- Historical analysis – synopsis of past reports
- Links to related material
- Terms & acronyms

Questions and feedback

- Does the WECC approach to a 10 year transmission plan meet the expectations of the SPSC?
- Feedback from SPSC members to communicate at the TAS and TEPPC meetings?