

Western Governors' Clean and Diverse Energy Initiative: Findings and Recommendations

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Outline of Presentation

- I. Background
- II. Key Findings
- III. Modeling Transmission
- IV. Policy Recommendations

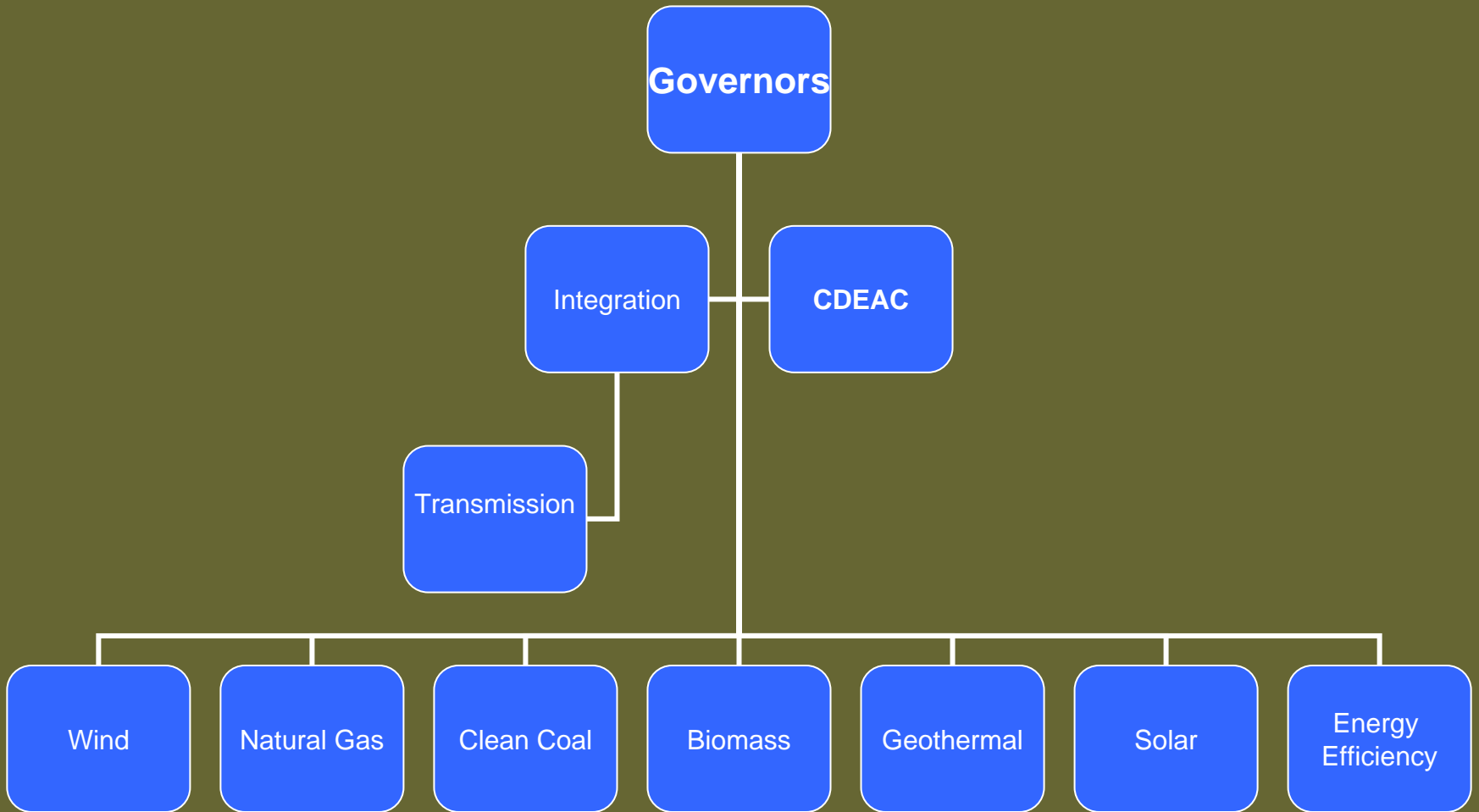
I. Background

- North American Energy Summit
- June 2004 Governors' Resolution / Goals
 1. Add 30,000 megawatts of clean and diverse energy by 2015
 2. Increase energy efficiency 20% by 2020

I. Background

- Clean and Diversified Energy Advisory Committee (CDEAC)
 - Advise Governors on recommendations to attain the goals
- 8 Task Forces
 - Analyze resource potential
 - Policy recommendations
 - Prepare reports

Clean and Diversified Energy Advisory Committee



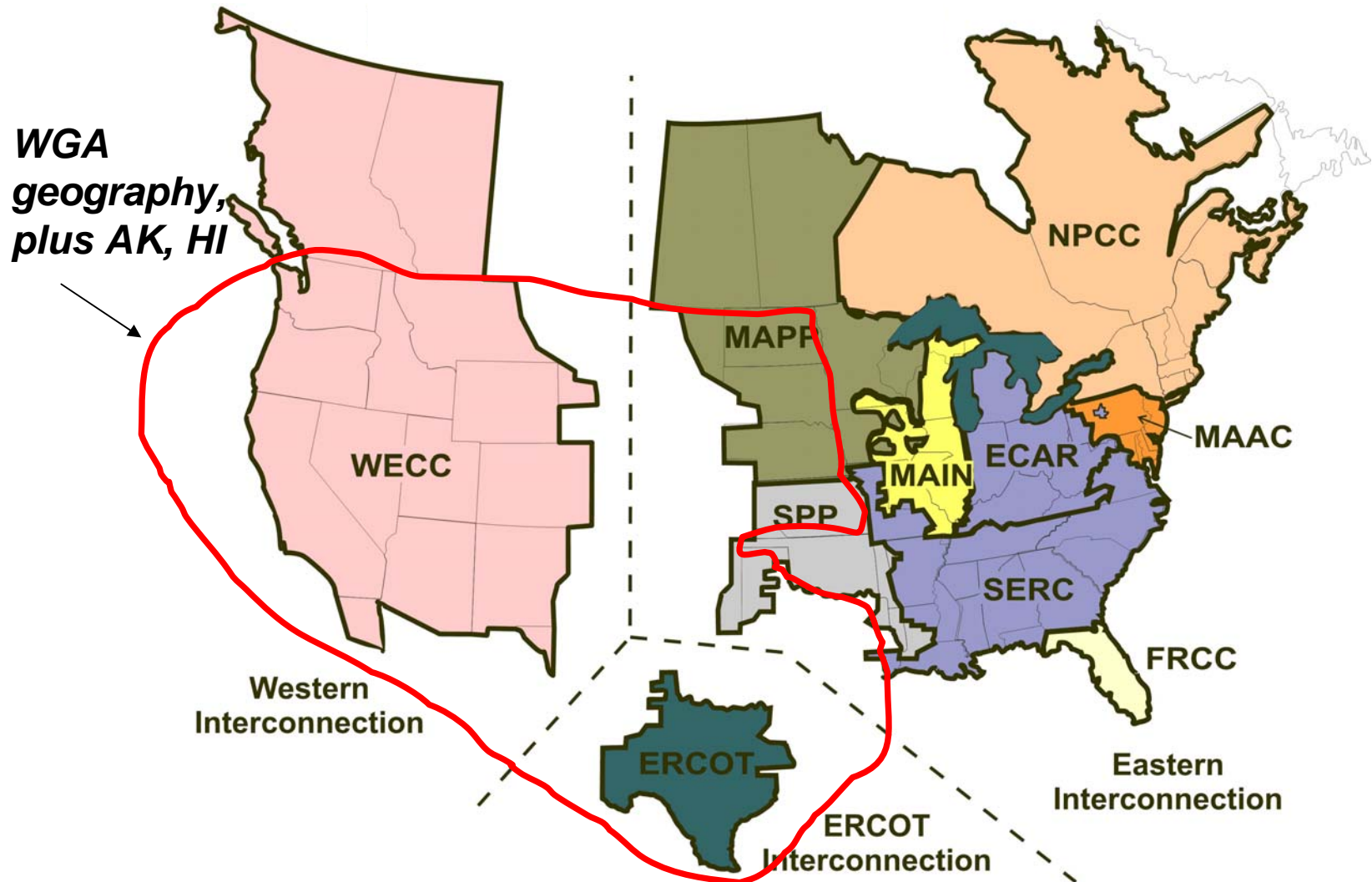
II. Findings

- Energy Efficiency – 48,000 MW decrease in forecasted demand (by 2020)
- Advanced Coal – 5,000 MW
- Biomass – 10,000 MW
- Geothermal – 5,600 MW
- Solar – 8,000 MW
- Wind – 54,000 MW

III. Modeling Transmission for CDEAC Scenarios

- CDEAC covers the 18-state WGA footprint
 - Eastern Interconnection and ERCOT
 - Relied upon existing studies
 - Western Interconnection – new transmission modeling project;
 - Builds upon the existing transmission modeling effort of the Seams Steering Group – Western Interconnection (SSG-WI)

North American Grids



CDEAC Scenarios

- **SSG-WI Reference Case 2015**
 - Assumptions reflect utility resource plans (IRPs) and compliance with renewable portfolio standards (RPS)
- **CDEAC Reference Case:**
 1. High Efficiency Scenario
 2. High Renewables Scenario
 3. High Coal Scenario


CDEAC Modeling: Process and Participants


- Coordinator among CDEAC, PacifiCorp, ABB Modelers
 - Donald Davies, WECC
- Generation Inputs –
 - High Efficiency – Howard Geller, Donald Davies, Dick Watson
 - Renewables – NREL Team: Ron Benioff, Michael Milligan, Mark Mehos, Ralph Overend, Martin Vorum, Donna Heimiller
 - High Coal – Jerry Vaninetti
- Generation Removals –
 - Dick Watson & Doug Arent, Quantitative Work Group
 - Thomas Carr & Doug Larson, WIEB

CDEAC Modeling: Process and Participants cont.

- New Transmission Identified
 - SSG-WI Transmission Group: Dean Perry (SSG-WI), Jeff Miller (PacifiCorp), Marv Landauer (BPA), Ray Brush (NWE/RMATS), Chris Reese (PSE/NTAC), Peter Krzykos (APS/SWAT), Irina Green (CAISO), Donald Davies (WECC), Roger Hamilton, William Pascoe
- Running the Model for CDEAC Scenarios
 - ABB Modeling Team: Henry Chao, Lan Trinh, Maria Moore
- In very short timeframe, remarkable job by ABB, WECC, SSG-WI Transmission Work Group


SSG-WI Reference Case 2015 Transmission

 Added Transmission-
SSG-WI Reference Case


 Upgraded Transmission
SSG-WI Reference Case



CDEAC Reference Case Transmission

 Added Transmission-
SSGWI Reference Case

 Upgraded Transmission
SSG-WI Reference Case

 Added Transmission-
CDEAC Reference

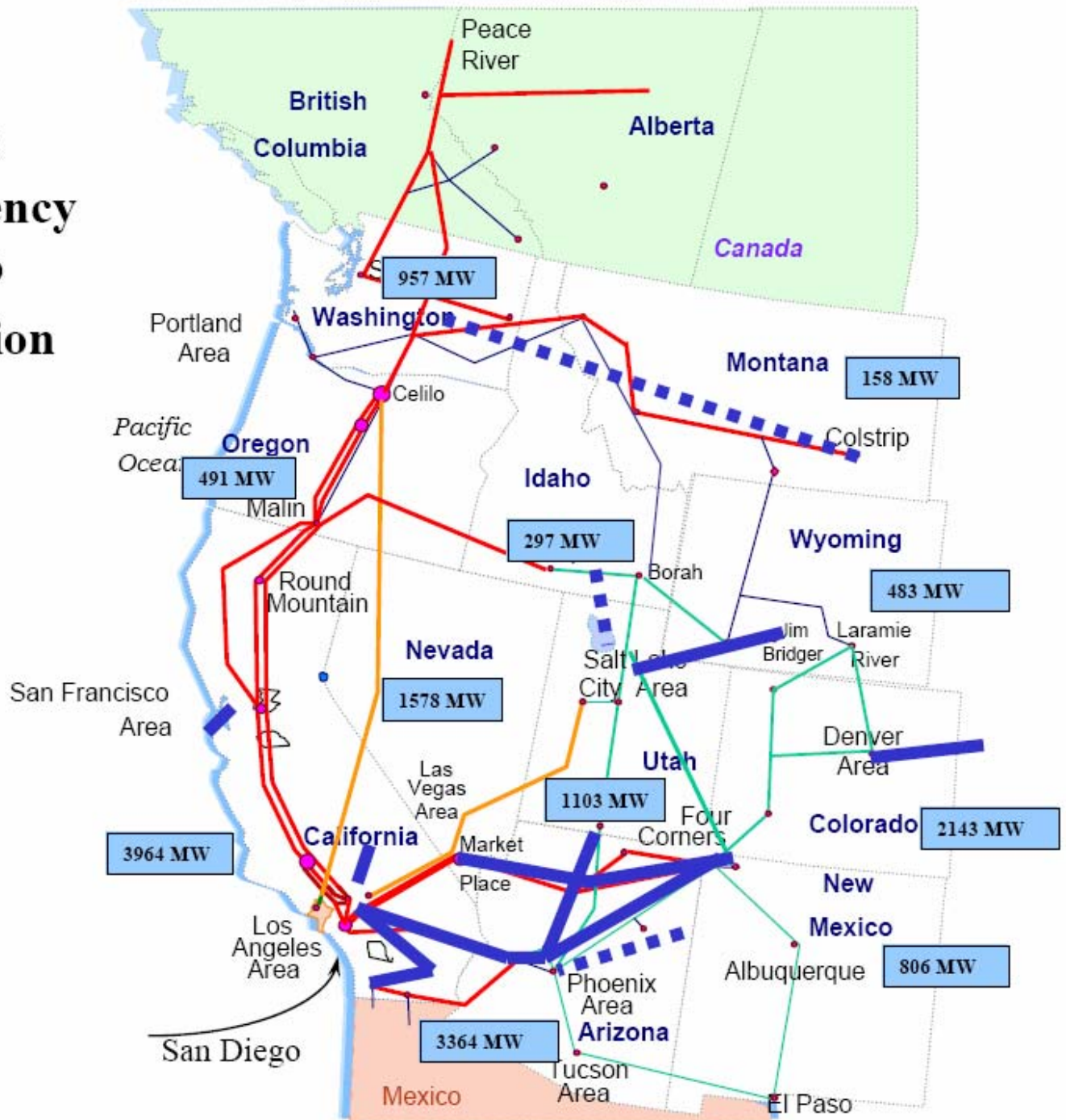


CDEAC High Efficiency Scenario Transmission

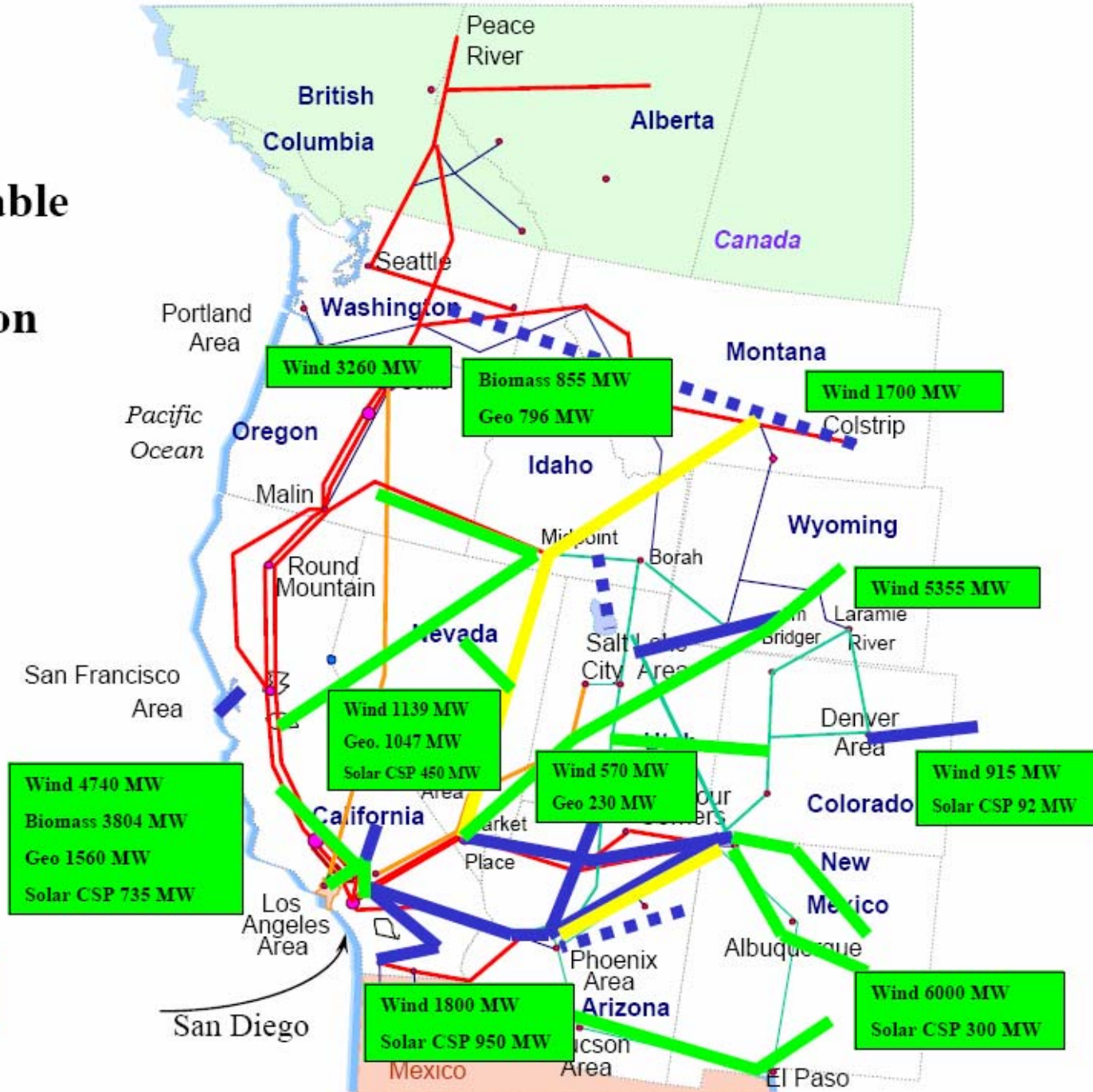
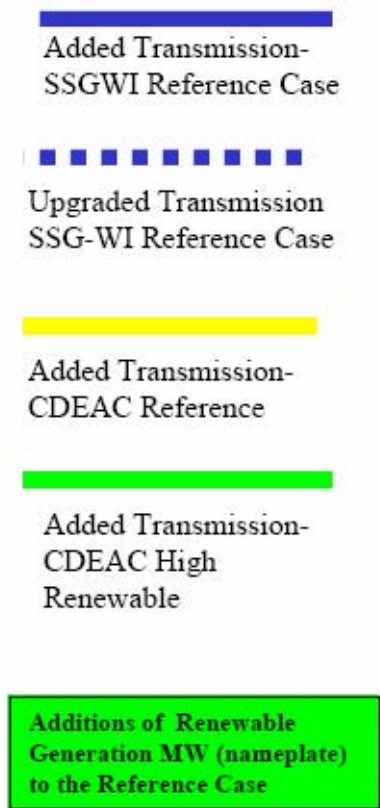
**Added Transmission-
SSGWI Reference Case**

**Upgraded Transmission
SSG-WI Reference Case**

**Reductions of Peak from
DSM/DR (MW) to the
Reference Case**



CDEAC High Renewable Scenario Transmission



CDEAC High Coal Scenario Transmission

Added Transmission-
SSGWI Reference Case

Upgraded Transmission
SSG-WI Reference Case

Added Transmission-
CDEAC Reference

Added Transmission-
CDEAC High Fossil

Additions of Coal
Generation MW
(nameplate) to the
Reference Case



CDEAC Scenario Transmission Expansion

Scenario	Line Miles	Capital Costs (million\$)
CDEAC Reference Case	3,956	8,382
CDEAC-High Efficiency	2,807	6,231
CDEAC-High Renewables	7,535	15,167
CDEAC-High Coal	7,860	15,363
Difference from CDEAC Reference Case		
CDEAC-High Efficiency	-1,150	-2,151
CDEAC-High Renewables	3,578	6,786
CDEAC-High Coal	3,903	6,982

IV. Policy Recommendations

- General Categories
 - A. Efficient Use of the Existing Transmission System
 - B. Transmission Expansion

Efficient Use of Existing Transmission System

- **#1: Adopt Conditional Firm and related transmission tariff products**
- **#2: Review & assess Available Transfer Capability (ATC) levels**
- **[#2: Wind TF -- Reform Imbalance penalty policy]**
- #3: Eliminate Rate Pancaking (i.e. multiple fees imposed across multiple control areas)
- #4: Promote control area consolidation
- #5: Encourage economic dispatch
- #6: Support common OASIS sites

Transmission Expansion

■ Transmission Planning

– #7: Support Regional Planning

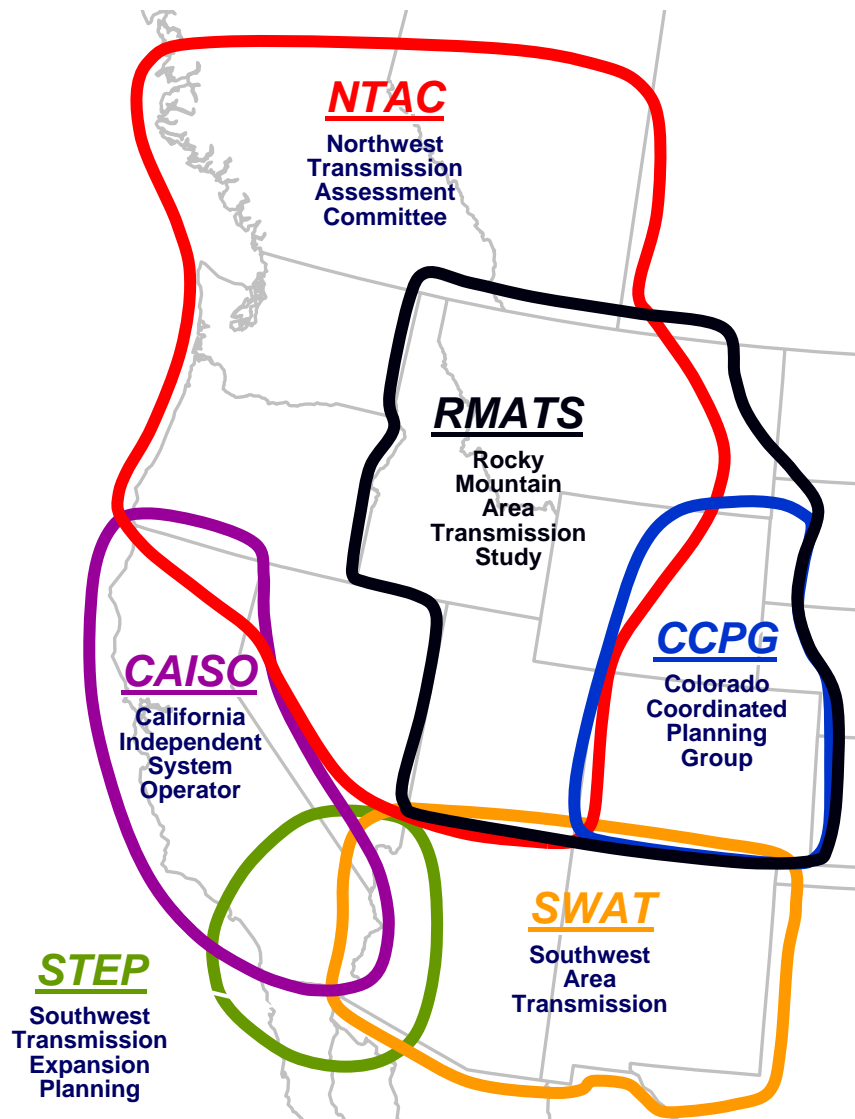
- 7(a) – Resources and institutions
- 7(b) – Regional impacts in regulatory reviews
- 7(c) – Planning supports regulatory analysis
- 7(d) – Synchronize planning efforts

– # 8: State leadership role

– #9: Queue reform for interconnection

– #10: Open season process

Sub-Regional Planning Groups



Transmission Expansion

■ Cost Allocation & Cost Recovery

- #11: Presumption of Prudence
 - Reduce risk with tiered standard of review
- #12: Public Interest & Regulatory Incentives
 - Transmission to meet RPS goals public interest
 - Factors in regulatory decisions on transmission
- **#13: Transmission in Advance of generation**
 - Texas and Minn. Legislation
 - Tehachapi model
- #15: Transmission Incentives
 - E.g. Higher rates of return, quicker cost recovery, avoid unrecoverable trapped costs

Transmission Expansion

■ Transmission Siting and Permitting

– #18: Siting and Permitting Arenas

- #18(a): Implement WGA and MGA Transmission Protocols
- #18(b): Consider Interstate Siting Compact in response to **Section 1221** of EPOA 2005
- #18(c): Governors coordinate siting processes within their own state

– #19: Federal Land Coordination

- **Section 368** of EPOA 2005 federal land corridors

Appendix

■ Detailed Tables

- SSG-WI Transmission Project List
- CDEAC Transmission Project List
- Generation Assumptions for SSG-WI and CDEAC Scenarios

SSG-WI Reference Case:

Transmission Additions and Upgrades

(million \$)

Facility	Line Miles	Line Costs	Equip. Costs	Total Cap.Costs	
AZ-IIM					
R-1	Four Corners-Pinnacle #1 (Phoenix) 500 kV	289	577.0	577.0	
R-2	Navajo/Desert Rock; Four Corners-Moenkopi	220	560.0	560.0	
R-3	Moenkopi to Market Place	218	436.0	436.0	
R-4	Coronado to Silver King line including series comp		20.0	20.0	
R-5	Pinal Project	60	204.6	257.2	
R-6	Capacity upgrade at N. Gila		5.2	5.2	
CA					
R-7	Trans Bay Area Project	55	300.0	300.0	
R-8	Palo Verde-Devers #2	230		628.0	
R-9	Tehachapi Wind transmission -- 2 lines	72		94.0	
R-10	West of Devers upgrade			101.0	
R-11	San Diego Sunrise Link & Imperial Valley Central 500/230 kV	120		1,400.0	
R-12	Imperial Valley Upgrade 500/230 kV	280	249.3	259.2	
R-13	Otay Mesa	70		209.0	
CO					
R-14	Kansas-Colorado added lines to integrate 2-700 MW coal plants	830	747.0	758.5	
MT-IW					
R-15	Colstrip to Spokane Upgrade (series compensation)			142.0	
WY-UT					
R-16	Bridger-- Wasatch Front TX 345/230 kV	363	409.0	409.0	
R-17	Path C Upgrade		65.0	65.0	
R-18	Amps Phase Shifter (Mill Creek Phase Shifter)		10.0	10.0	
Total		2,807	3,548.0	109.2	6,231.1

CDEAC Scenarios: Transmission Additions and Upgrades

(million \$)

Facility	Ref Case	High Effic.	High Ren	High Fossil	Line Miles	Line Costs	Equip. Costs	Total Cap.Costs
CDEAC Reference Case Additions								
1 SVMP (Midpoint-Rocky Pk-Robinson-Crystal)	X		X	X	462	739.2	73.9	813.1
2 Broadview-Midpoint 500 kV (Broadview-Towns-Midpoint)	X		X	X	399	638.9	63.9	702.8
3 Four Corners-Pinnacle #2 500 kV	X		X	X	289	577.0	57.7	634.7
Subtotal					1,150	1,955.1	195.5	2,150.6
CDEAC Scenarios								
4 Dave Johnston-Bridger-Mona 500 kV			X	X	462	739.2	73.9	813.1
5 Mona-Crystal (Marketplace) 500 kV			X	X	319	510.4	51.0	561.4
6 Midpoint-Grizzly 500 kV			X	X	539	862.4	86.2	948.6
7 Midpoint-Tesla 500 kV			X	X	550	880.0	88.0	968.0
8 Grand Junction-Emery 345 kV			X	X	151	242.0	24.2	266.2
9 Upgrade thermal limits on 5 lines: Shasta-Flanigan; Silver Park-Silver PS; Ft. Chur-Ft. Ch.PS; Cal.Sub-Cal. S. PS; Flanigan-Keswich			X		20	13.0	40.0	53.0
10 Falcon to Robinson 345 kV added			X		133	213.0	21.3	234.3
11* NM Wind Export Plan: 4 x 500 kv in NM			X*			1,441.0	300.0	1,741.0
1 x 500 kV Route 1: ENM-Las Vegas-Taos-Ojo-San Juan-Four Corners					352	352.0		
2 x 500 kV Route 2: ENM-West Mesa-Four Corners					308	616.0		
1 x 500 kV Route 3: ENM-Amrad-Newman-Luna-Hildago-Saguro					473	473.0		
12* Tehachapi Wind -- Phases 1-4			X*					1,200.0
Phase 1: Antelope-Pardee, Antelope-Vincent, Antelope-Tehachapi					69			
Phase 2: Antelope-Mesa					60			
Phase 3: Tehachapi-Vincent, SCE & PG&E network upgrades					45			
Phase 4: Tehachapi-PG&E Midway					97			
13 Dave Johnston-Mira Loma 3000 MW DC line				X	968	1,548.8	154.9	1,703.7
14 Colstrip-Dave Johnston 500 kV				X	218	348.5	34.8	383.3
15 Mona-Huntington-Four Corners 500 kV				X	297	475.2	47.5	522.7
16 Mohave-Lugo upgrade 500 kV				X			12.0	12.0
17 Eldorado-Lugo upgrade 500 kV				X			12.0	12.0
18 Reno to Sylmar 500 kV (Limit PDCI + fossil gen.added at Sylmar to 4330 MW total)				X	399	718.7	71.9	790.6

