

# **ELECTRIC TRANSMISSION 203:**



## **Planning To Expand and Upgrade The Electric Grid**

**June 28, 2010 2:00P.M.**

**FACULTY:** **385 Russell Senate Office Building**

- Steve Herling, Vice President—Planning, PJM Interconnection*
- Jay Caspary, Director, Transmission Development, Southwest Pool Power*
- Daniel Kline, Regional Transmission Planning, Xcel Energy*
- Bill White, Energy Future Coalition*
- Admiral John Nathman, U.S. Navy (ret.)*
- Hannes Pfeifenberger, Principal, The Brattle Group*
- James Hoecker, Counsel to WIRES; former Chairman of FERC; Husch Blackwell, Moderator*

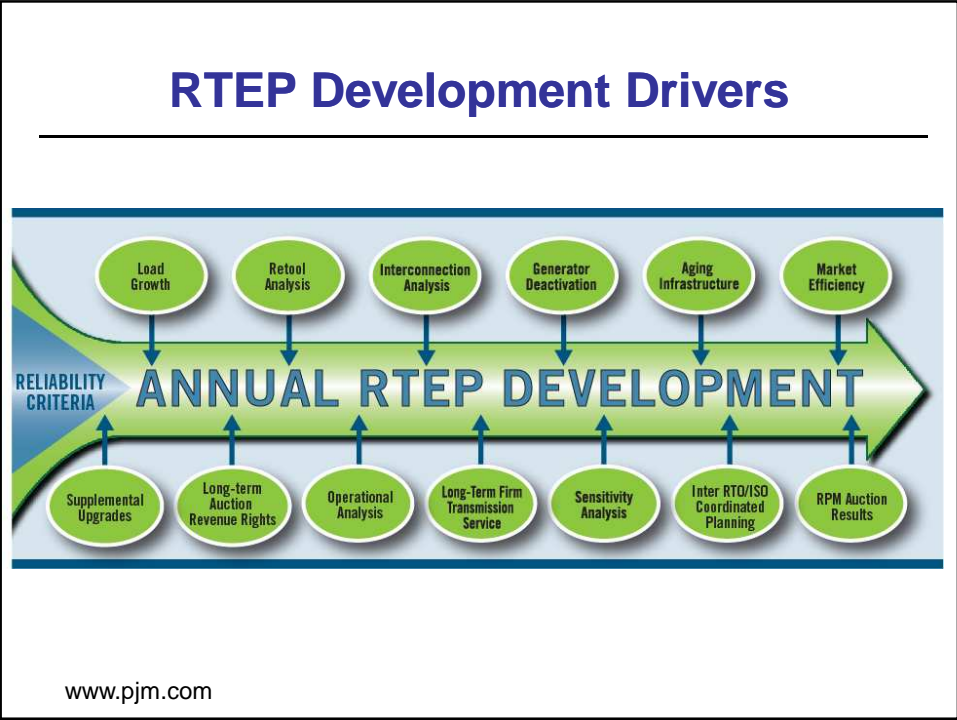
*Presented by WIRES - a national coalition of investor- and publicly-owned transmission providers customers, renewable energy developers, and technology and service companies dedicated to promoting investment in strong, well-planned, and beneficial high voltage electric transmission infrastructure*



### **Steven R. Herling**

**Vice President, Planning  
PJM Interconnection, L.L.C.**

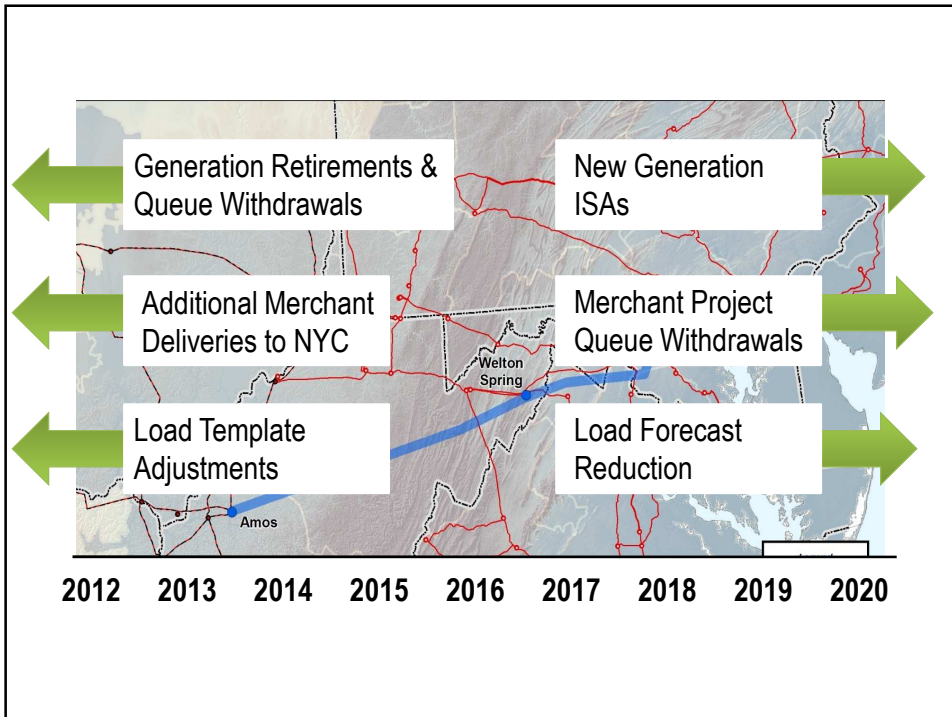
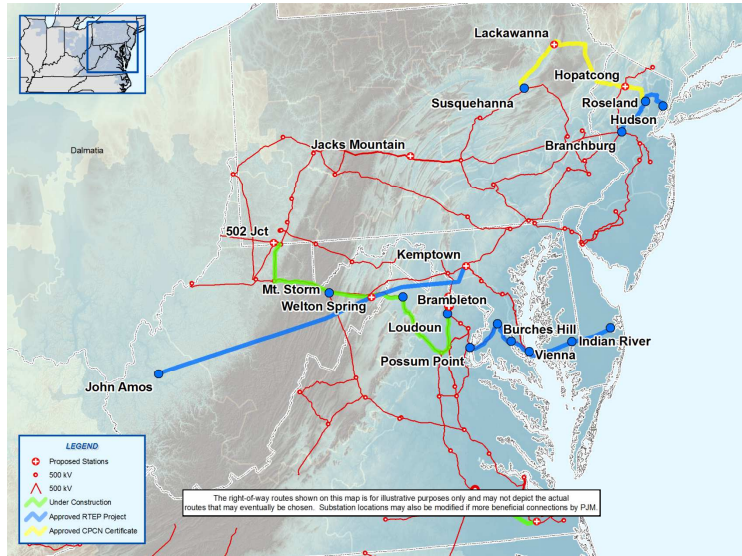
### **PJM Regional Transmission Expansion Plan (RTEP)**

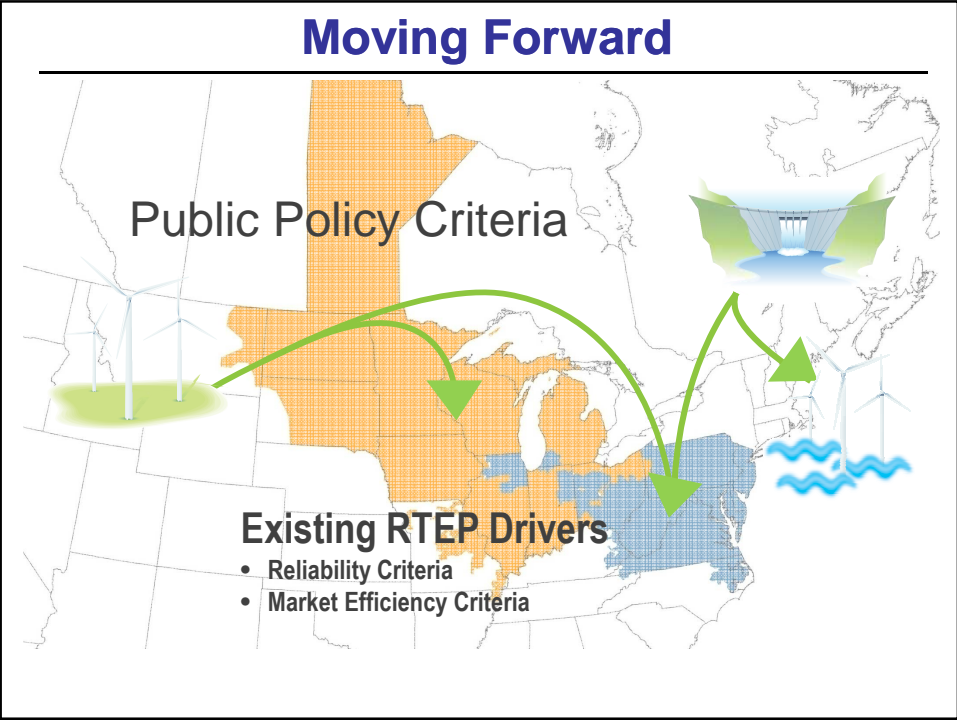


### Planning Horizon

5-YEAR PLANNING HORIZON	15-YEAR PLANNING HORIZON
195 upgrades approved 115 kV, 138 kV, 230 kV \$1,331 million	970 upgrades approved 115 kV, 138 kV, 230 kV \$5.23 billion
11 upgrades approved 500 kV \$90 million	76 upgrades approved 500 kV and 765 kV \$6.56 billion
2000   2001   2002   2003   2004   2005	2006   2007   2008   2009   2010

## Approved PJM Backbone Facilities





**Jay Caspary**  
Director Transmission Development  
Southwest Pool Power

## Transmission Development Update

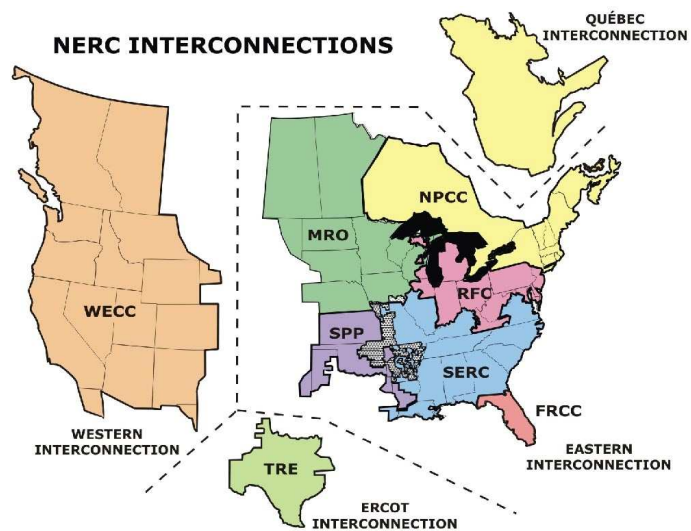
## SPP Mission

Helping our members work together to keep the lights on – today and in the future.

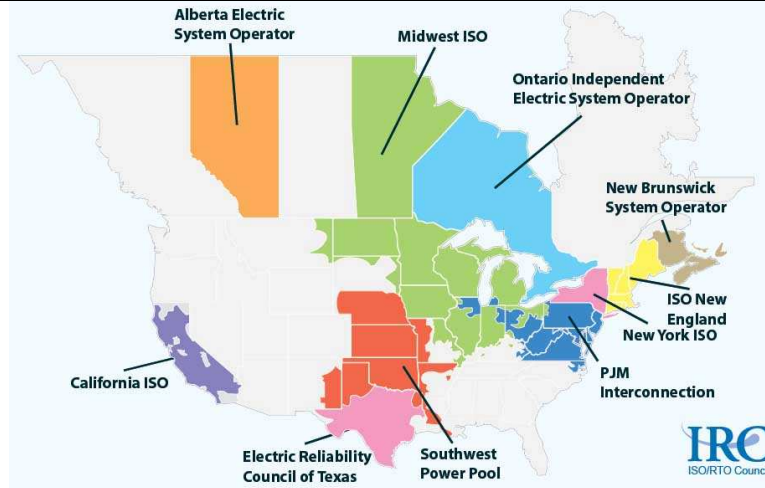


Updated Oct. 9, 2009

## 3 Interconnections / 8 NERC Regions

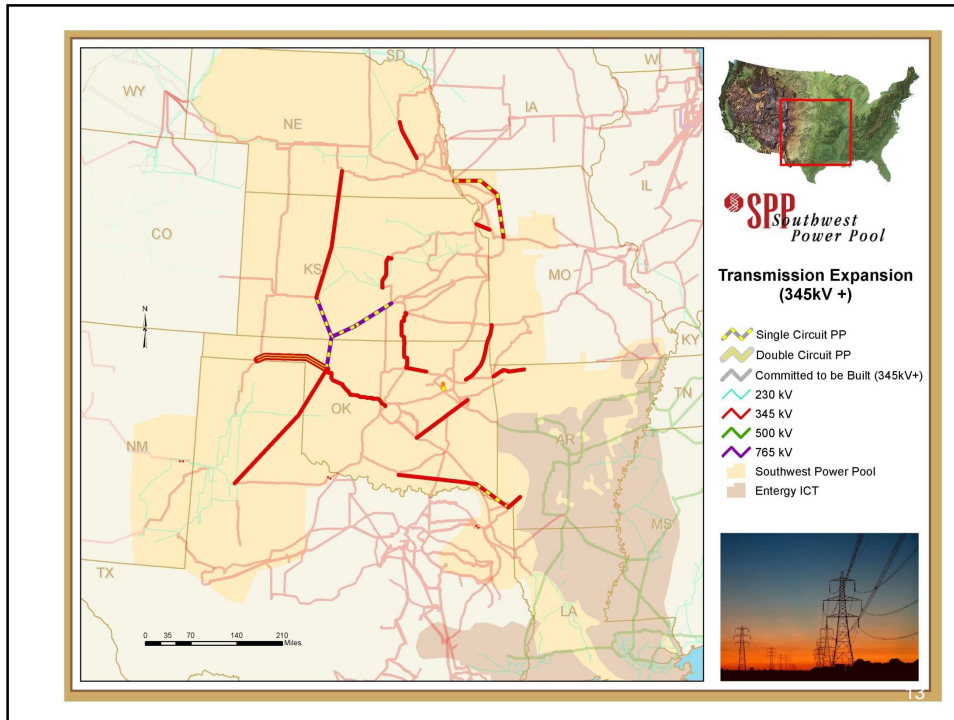


## Independent System Operator (ISO) / Regional Transmission Organization (RTO) Map



## Certainty Regarding Cost Allocations / Recovery Is Key Success Factor at SPP

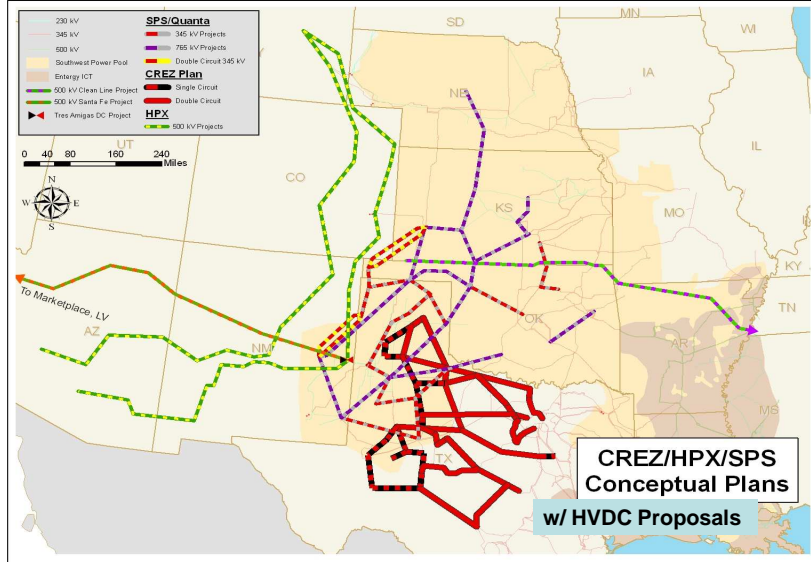
- Regional State Committee is responsible for cost allocation for the SPP RTO
- Cost Allocation mechanisms have evolved with time from Base Plan Funding for reliability projects and Economic/Sponsored Upgrades in 2005 to Highway/Byway approach just approved by FERC. Balanced Portfolio of economic upgrades was interim step at SPP.
- Industry needs fair and simple cost allocation approaches and effective seams agreements



## SPP's Next Steps

- Integrated Transmission Planning in process with first plan due January 2011
  - 20 year scenarios with 40 year financials
  - Approved Priority Projects – 765 or 345 kV?
- Support inter-regional planning (EIPC) and other initiatives to quantify benefits of robust ties while getting the best lines in the best corridors
- Reality vs. costs/schedules of approved projects?
- SPP's continued evolution with consolidated BAs and Day 2 markets in process

## HVDC PROPOSALS ON TOP



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**Director, Transmission Development**  
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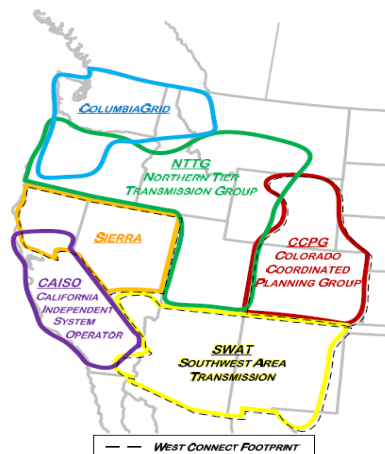




**Daniel Kline**  
Regional Transmission Planning  
Xcel Energy

**Transmission 203 – Planning to  
Expand and Upgrade the Grid**

**Western Planning Efforts**



## Why is the West Different?

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- No Regional Transmission Organization
  - Collection of planning groups that address planning and operations issues
  - Each balancing area responsible for its own generation dispatch
  - No formal cost allocation/sharing mechanism
  - Governors given great latitude in dealings between states (Western Governors' Association)

## Why is the West Different?

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- Load diversity
  - Large portion of west is WAPA service territory (remote, low load density)
  - Northwest U.S. is Bonneville Power Administration territory (remote, low load density, large hydro generation sources)
  - Highest load density in California
    - Very edge of system
    - ~1/3 of load
    - Only established RTO in western U.S.

## How Does Planning Happen?

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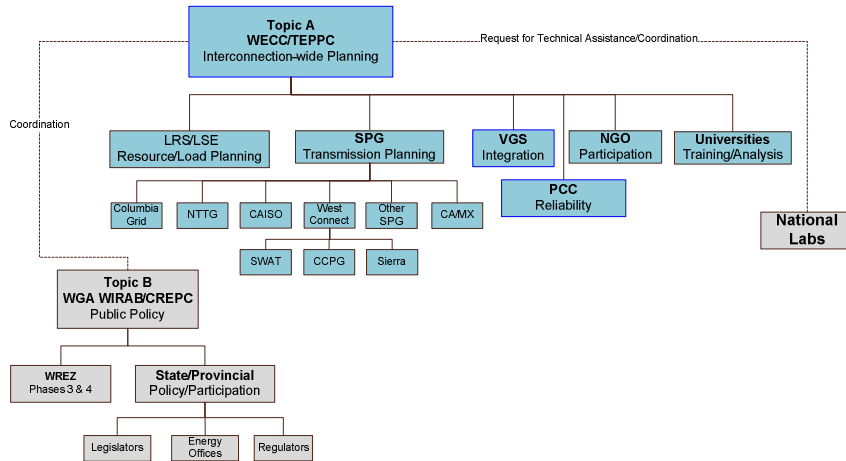
- State laws, mandates
- Agreements between states (Governor-driven)
- Multi-utility projects
- Highly coordinated system of geographic planning groups
- Western Electric Coordinating Council (WECC)
- Interconnection-wide planning (DOE-funded)

## RTEP Regional Transmission Expansion Planning (Western Interconnection Planning)

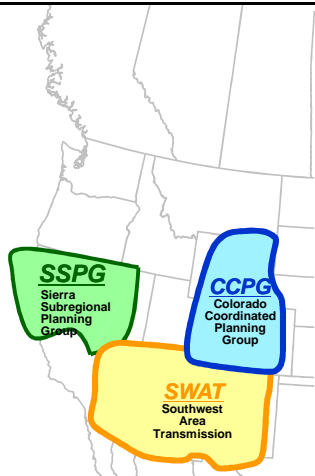
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- ARRA-funded via a \$14.5M DOE Grant to WECC
  - Corresponding \$12.0M Grant to WGA
- Activities managed by Transmission Expansion Planning Policy Committee (TEPPC)
- WECC's proposal available at the RTEP website
  - [www.wecc.biz](http://www.wecc.biz)

## RTEP: Activities Funded In Part By the DOE (ARRA) Grant



## WestConnect



- Group of western transmission-owning companies
- Focused on assessment of market needs
  - Wholesale electricity market
  - Maintaining efficient transmission system to meet customer needs
- Coordination with other regional efforts

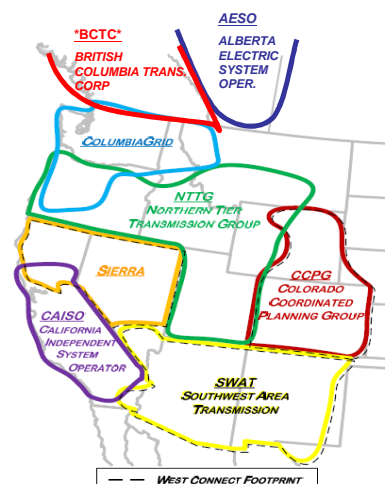
<http://www.westconnect.com>

## TEPPC Transmission Expansion Planning Policy Committee

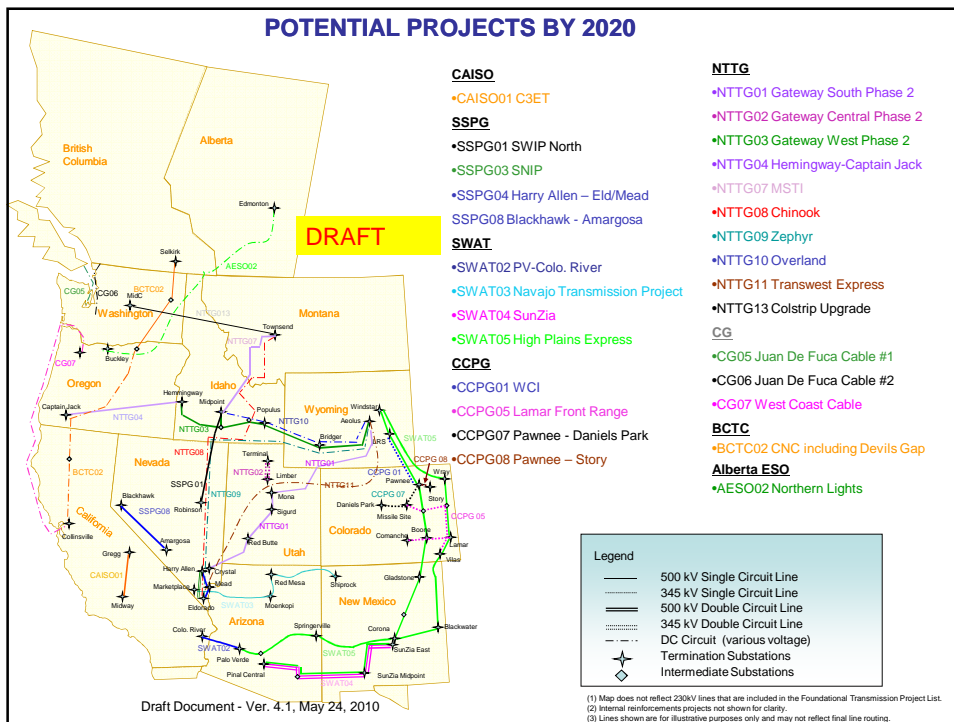
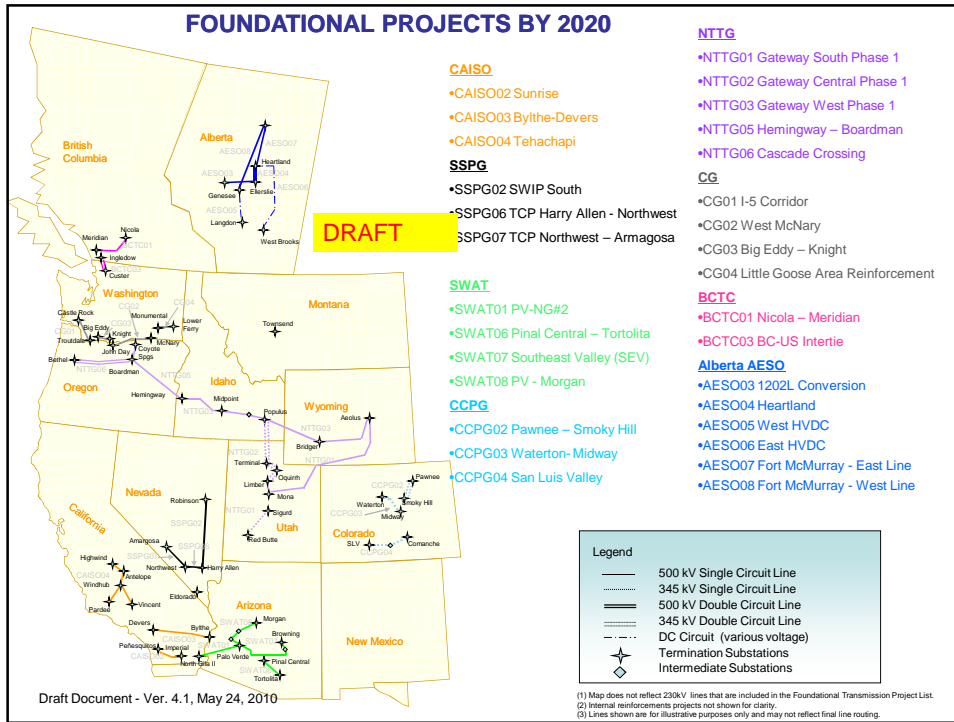
- TEPPC's analyses and studies focus on studies with Interconnection-wide implications
  - Reliability, Cost, Emissions
- TEPPC's role does **not** include
  - Detailed project-specific studies
  - Advocating projects
  - Identifying potential “winners” and “losers”
  - Siting and cost allocation
- Provides governance over the RTEP project

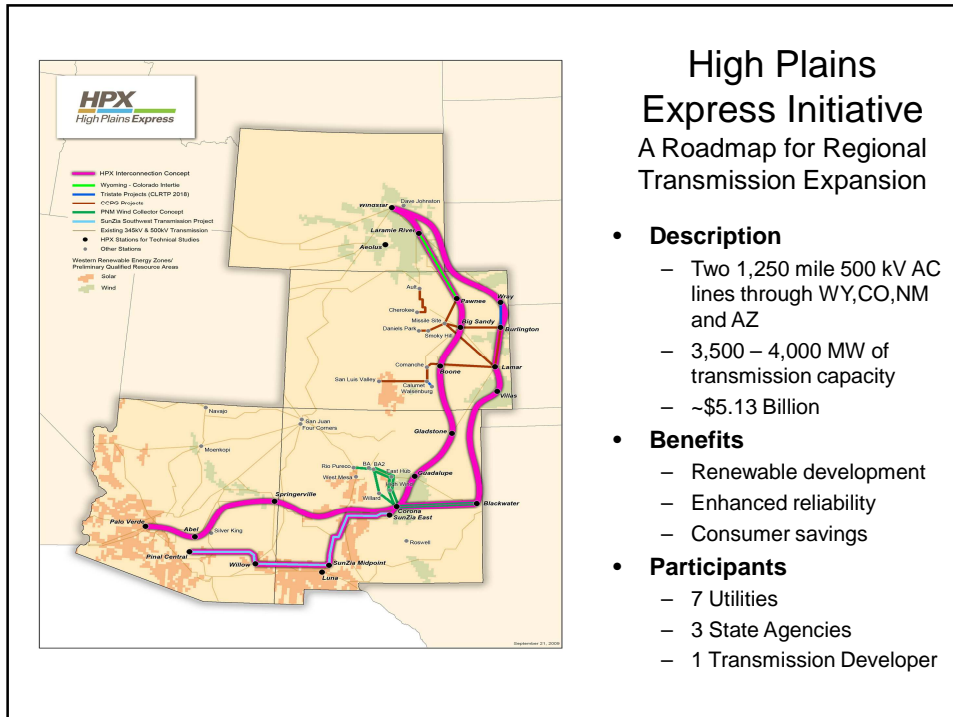
## Subregional Transmission Planning Groups (SPG) Coordination Group (SCG)

- Collaboration between SPGs, formalized
  - **Approved charter**
  - **Ad-hoc group**
- Provide TEPPC a Foundation Transmission Project List
  - **Starting point for TEPPC 10-year plan**
- Provide TEPPC Potential Transmission Project List
  - **WECC can utilize to integrate resources and mitigate congestion**



\* BCTC is not a WECC TEPPC designated SPG. BCTC is actively involved in regional transmission planning process and is a SCG member

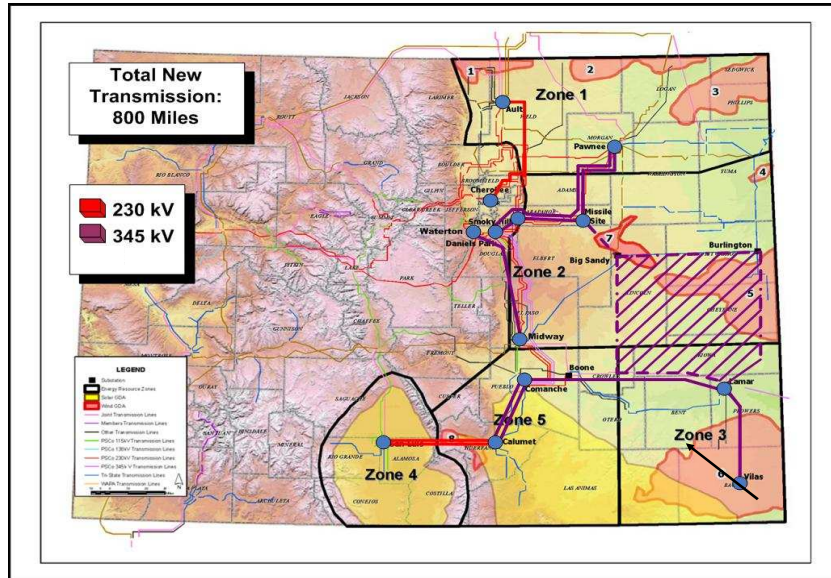




## Colorado Senate Bill 07-100

- Upon recommendations by the 2006 Transmission Task Force on Reliable Electricity Infrastructure, the 66th General Assembly passed Senate Bill 07-100. Under SB 07-100, PSCo must meet the following requirements:
  - **Designate “Energy Resource Zones (ERZ)”**
  - **Develop plans for the construction or expansion of transmission facilities necessary to deliver electric power consistent with the timing of the development of beneficial energy resources located in or near such zones**
  - **Consider how transmission can be provided to encourage local ownership of renewable energy facilities**
  - **Submit proposed plans, designations, and applications for certificates of public convenience and necessity to the commission for simultaneous review**

## Current SB-100 Transmission Plan



<http://www.sb100transmission.com>



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**William White**  
Energy Future Coalition

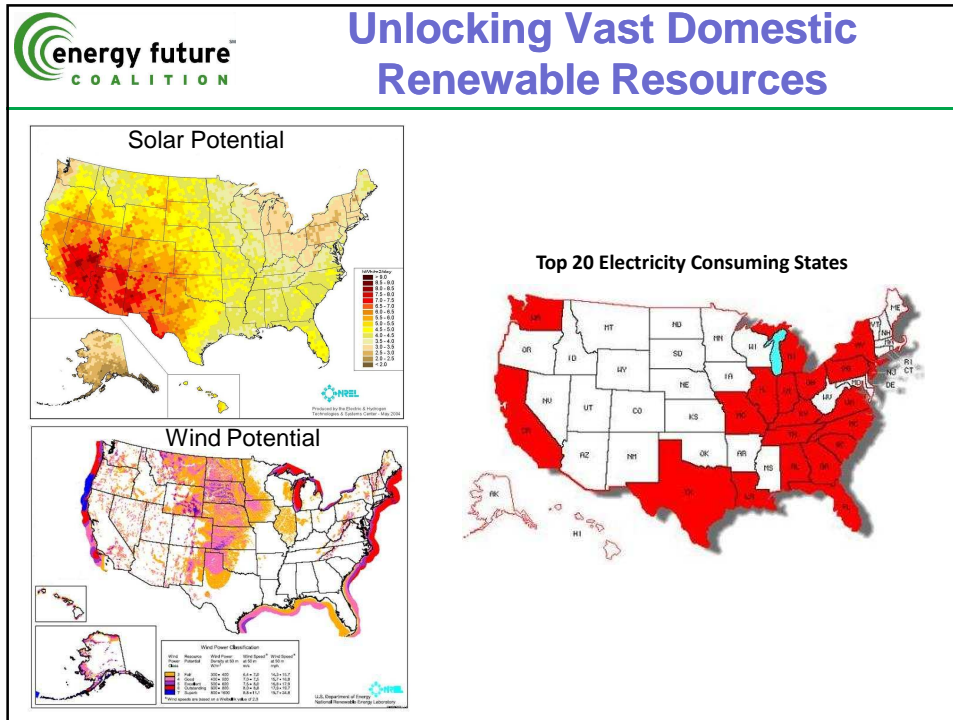
**Transmission Planning Reform:  
Essential Policy for the Clean  
Energy Economy**



**National Clean Energy Transmission  
Initiative**

- ❖ Began a series of stakeholder advisory meetings in September 2008.
- ❖ Released a [vision statement](#) in 2009 and legislative plan for a National Clean Energy Smart Grid – supported by more than 60 organizations, including renewable energy developers, environmental organizations, labor unions, and utilities.

<http://cleanenergytransmission.org/>



**energy future™**  
COALITION

## Transmission Planning is the Key

- **Science-based greenhouse gas emissions reduction targets – 80% by 2050 – imply profound changes across our entire energy system.**
- **Low-carbon electricity will be needed to power our homes, businesses, and an increasing portion of our vehicle fleet.**
- **The system we have today for planning, paying for, and building transmission lines cannot respond to a challenge of this magnitude.**
- **Building transmission infrastructure to connect abundant domestic renewable resources to population centers will:**
  - Create jobs in a thriving domestic clean energy industry
  - Enhance national energy security, and
  - Cost-effectively reduce greenhouse gas emissions and other pollution



## Renewable Energy Needs Transmission

### DOE's Eastern Wind Integration and Transmission Study (EWITS) January, 2010:

- What changes to the grid in the eastern US would be needed to deliver 20-30% of energy from wind?
- All scenarios – land-based wind in the Midwest, offshore wind in the East, and combinations of wind power resources – require transmission infrastructure upgrades for which planning should start immediately.
- In all scenarios studied, the cost of aggressively expanding the existing transmission grid was less than 15% of total costs.
- Wind energy development is a highly cost-effective way to reduce carbon emissions.



## What's Wrong with Transmission Planning?

- Scale is too small.
  - Scope is too narrow.
  - Limited participation and transparency:
    - Undermines public support for urgently needed facilities
    - Inhibits competition in transmission and generation, and
    - Hurts electricity consumers by artificially limiting choices
  - Plans are not implemented.
- ⚠ **Bad transmission planning disproportionately impacts renewable resources because they are:**
- location constrained
  - concentrated in remote areas, and
  - most economic when balanced over large areas.



## How can transmission planning be improved?

- **Increase the Scale** – require planners to coordinate and explore more efficient interstate and inter-regional solutions – consistent with national goals.
- **Broaden the Scope** – explicitly plan for public policy goals – such as emissions reduction targets and renewable energy standards – in addition to reliability and cost.
- **Open the Process** – to incorporate stakeholder input, increase competition and consumer choice, and consider the full range of alternatives: energy efficiency, distributed generation, demand response, and smart grid upgrades.
- **Link Planning to Implementation Authority** – cost allocation and siting.



Thank you.

Contact:  
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David Gardiner & Associates  
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**Admiral John Nathman**  
U.S. Navy (ret.)

**A National Security  
Perspective on the Grid Planning**



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**Johannes Pfeifenberger**  
The Brattle Group

**Transmission Planning: Overarching  
Challenges to Regional Expansion**

## Major Challenges to Regional Transmission Planning

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- Transmission planning and cost allocation works reasonably well for “traditional” transmission projects (i.e., single utility and reliability projects):
  - Current level of investment 4-5 times higher than in 1990s
  - Significant new transmission under construction and planned
- Cost allocation now is the major barrier for multi-state, multi-purpose projects, including “overlays” to integrate renewables:
  - Transmission developers need to know from whom they will recover costs before they can plan projects
  - Transmission customers and state commissions need to know what costs they will bear (and why) before they agree to plans
  - Few regions have cost allocation frameworks for such projects

## Major Challenges to Regional Transmission Planning

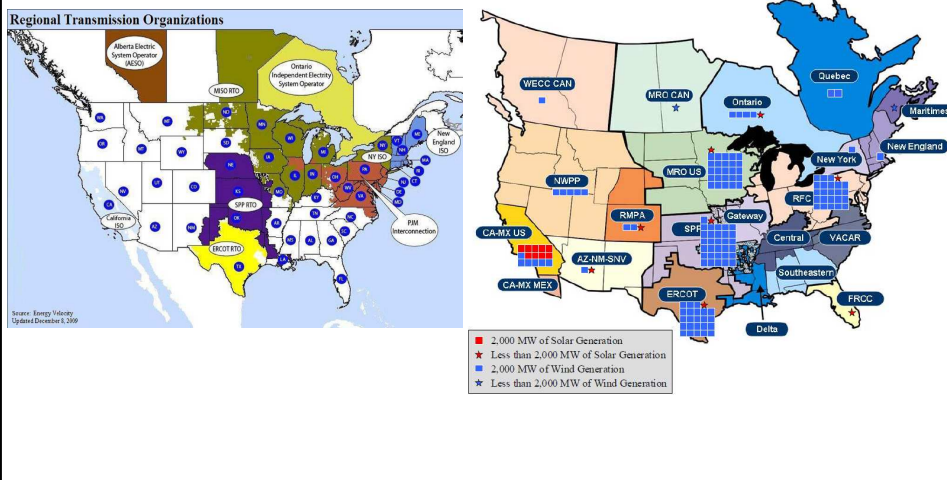
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- In addition, within most multi-state RTO/ISOs, planning parameters are too narrowly defined:
  - Leaves out important but difficult-to-quantify benefits (e.g., economic development, reliability, fuel diversity, energy security, competition)
  - Leaves out consideration of achieving policy goals at lower costs (e.g., renewable energy development, climate)
  - Insufficient coordination with neighboring regions
- Exactly calculating benefits for beneficiaries (e.g., “beneficiary-pays” frameworks) is not pragmatic:
  - Benefits too broad in scope, wide-spread geographically, diverse in their effects on individual market participants, and changing over course of several decades
  - Many important benefits likely be judged only qualitatively
  - Incentives to understate individual benefits (to reduce cost allocations) undermines perceived overall project benefits

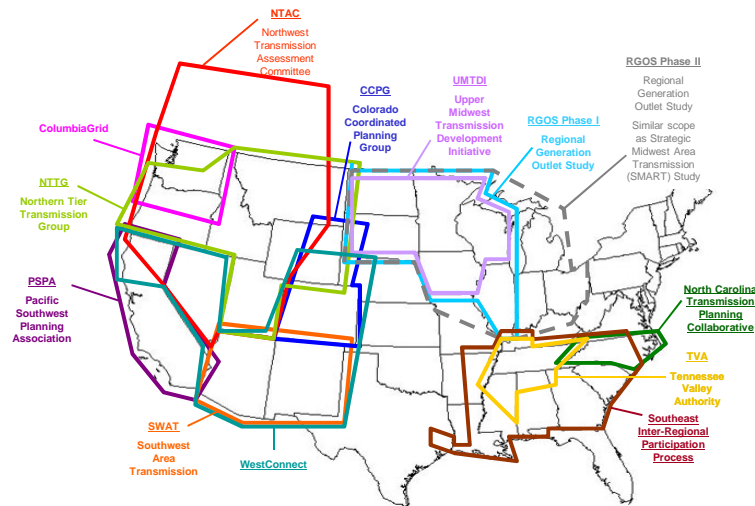
## Major Challenges to Regional Transmission Planning

- State involvement necessary to set regional priorities and achieve meaningful commitment to regional transmission plans and cost allocations
  - In single-state ISOs (CA and TX), transmission planning objectives are already aligned with state policy goals
  - Recently, as within the Southwest Power Pool (SPP), states are integral part of pro-active efforts to improve regional planning and resolve cost allocation
- Success more likely in modestly-sized regions that are sufficiently uniform (e.g., SPP)
- Promising FERC initiatives, but federal backstop for planning and cost allocation may be needed to achieve viable and timely regional cooperation and commitment

## Comparison: Service Areas of Regional Transmission Organization and NERC Reliability Regions



## Selected Regional Transmission Planning Groups and Non-RTO-level Regional Planning Efforts



## Additional Reading

- Fox-Penner, Pfeifenberger, Hou, "For Grid Expansion, Think 'Subregionally,'" *The Energy Daily*, June 8, 2010.
- Fox-Penner, "Smart Power: Climate Change, the Smart Grid, and the Future of Electric Utilities," Island Press, 2010.
- Pfeifenberger, Chang, Hou, Madjarov, "Job and Economic Benefits of Transmission and Wind Generation Investments in the SPP Region," *The Brattle Group, Inc.*, March 2010.
- Pfeifenberger, Fox-Penner, Hou, "Comments from The Brattle Group Principals Peter Fox-Penner and Johannes Pfeifenberger and Associate Delphine Hou," filed at the U.S. Federal Energy Regulatory Commission for Transmission Planning Processes Under Order No. 890 – Notice of Request for Comments (Docket AD09-8).
- Pfeifenberger, Fox-Penner, Hou, "Transmission Investment Needs and Cost Allocation: New Challenges and Models," The Brattle Group, Inc., presented to FERC Staff, Washington, DC, December 1, 2009.
- Fox-Penner, Pfeifenberger, "The Anchor-Tenant Model – And Some of the Chickens and Eggs," *The Electricity Journal* Guest Editorial, Volume 22, Issue 6, July 2009.
- Pfeifenberger, "Assessing the Benefits of Transmission Investments," presented at the Working Group for Investment in Reliable and Economic Electric Systems (WIRES) meeting, Washington, DC, February 14, 2008.
- Pfeifenberger, Direct Testimony on behalf of American Transmission Company re: Transmission Cost-Benefit Analysis Before the Public Service Commission of Wisconsin, Docket 137-CE-149, January 17, 2008.
- Pfeifenberger, Newell, "Evaluating the Economic Benefits of Transmission Investments," EUCI's Cost-Effective Transmission Technology Conference, Nashville, TN, May 3, 2007.
- Pfeifenberger, Testimony on behalf of Southern California Edison Company re: economic impacts of the proposed Devers-Palo Verde No. 2 transmission line, before the Arizona Power Plant and Transmission Line Siting Committee, Docket No. L-00000A-06-0295-00130, Case No. 130, September and October, 2006.