Americans for a Clean Energy Grid

Regional Transmission Webinar Series

West

Who we are and what we do:

We support policies that modernize the nation's electric power network and unlock clean energy and economic opportunities across the country. We believe that the backbone of a clean electricity system and a strong economy is a resilient and reliable transmission grid. Smart state and federal policies that improve the way the grid is developed, planned, and paid for will help it become a more robust, reliable, and secure network that supports expansion of renewable energy, competitive power markets, energy efficiency, and lower costs for consumers.

Regional Transmission Summits

- Oregon (Pacific Northwest) 2010
- Iowa (Midwest) 2010
- Kansas (Heartland) 2011
- Massachusetts (New England) 2012
- Ohio (PJM-Interconnection) 2012
- Nashville (Southeast) 2012
- Denver (Rocky Mountain) 2013
- Minnesota (Great Plains) 2013
- More to come

Regional Transmission Webinar Series

- Pacific Northwest *(Concluded)*
- Midwest *(Concluded)*
- Heartland – *(Concluded)*
- New England – *(Concluded)*
- PJM – *(Concluded)*
- Southeast – *(Concluded)*
- Rocky Mountain – Today
- Great Plains - *(To Be Determined)*
- National - *(To Be Determined)*
  - *Stay tuned for exact dates and times*

Renewable Energy and Transmission Siting: Current Trends

What is NRDC?

NRDC uses law, science and the support of 1.3 million members and online activists to protect the planet's wildlife and wild places and to ensure a safe and healthy environment for all living things.

http://www.nrdc.org

Program Outline

- Key Concepts
- Lay of the Land
- Trends and Developments
- Planning tools and resources

The Grid we have today will not be the grid of the future.

- "Most people who don't see this high renewables future possible are thinking about the current grid and adding in a small amount of renewables. But the grid we want is one where we deploy energy efficiency first, then renewables, and then back them up with storage and back that up with natural gas.“

n Kammen, UC Berkeley

Key Concepts

- Smart From The Start
- Optimize the Grid
- Fully Use Planning
  - O1K
  - WECC
  - EIPC

Lay of the Land

- Accomplished in 2013
  - WECC 10 and 20 yr. Plans
  - Mitigation Cost study
  - WC Key Interest Group
  - WC Governance role, fees
  - CAISO EIM announced
  - NWPP MC launched
  - Progress on NWA in TX. Planning (CAISO/SONGS/WECC)
  - Gov. Sandoval at WGA
  - Media exposure

- Needs continued work
  - EIM Governance
  - NWPP MC tools
  - O1K Planning not started
  - New WECC structure
  - Defend TEPPC
  - NWPP EM behind CAISO
  - QER at DOE
  - FERC approvals and involvement
  - Data access issues
  - State engagement in WC
  - More media exposure for work and solutions

Be "Smart from the Start"

- Consult stakeholders early and involve them in planning, zoning and siting
- Collect and use geospatial information to categorize the risk of resource conflicts
- Avoid land and wildlife conservation conflicts (including national parks and other protected areas) and prioritize development in disturbed areas

Smart from the Start ctd.

- Avoid cultural resource conflicts (historic sites, tribal resources, etc.)
- Identify excellent renewable energy resource values
- Establish, when possible, pre-screened resource zones for development
- Incentivize resource zone development with priority approvals and access to transmission

Smart from the Start ctd.

- Choose renewable energy zones that optimize the use of the grid
- Maximize the use of existing infrastructure
- “Mitigation that matters” (durable and planned conservation improvements at larger scales)
- Where zoning is not feasible (Eastern Interconnection) use siting criteria based on the above principles

Optimize the existing grid infrastructure

- Operational and Management Practices
  - Scheduling, control consolidation, technology, sharing reserves
- Efficient Markets for energy and grid services
- Geographic Diversity and Uncorrelated Variability
- ATC from Coal retirements, proximity to the grid

Optimization

Optimization
= Better utilization of existing system
= smaller footprint
= fewer conflicts
= fewer impacts and faster RE penetration

Revolution in Grid Operations

There is wide recognition that current grid operation is inefficient, wasteful, and prejudiced in favor of traditional baseload generation sources.

Work by NREL, WGA, WECC, Western Grid Group, and consultants like E3, as well as operating changes being required of PMAs by DOE and new rule changes by FERC show the benefits of change can no longer be ignored.

NREL recommendations

In addition to transmission, greater operational flexibility will be needed to support high levels of renewable generation. Means to provide this include the following options, some of which are already emerging in practice:

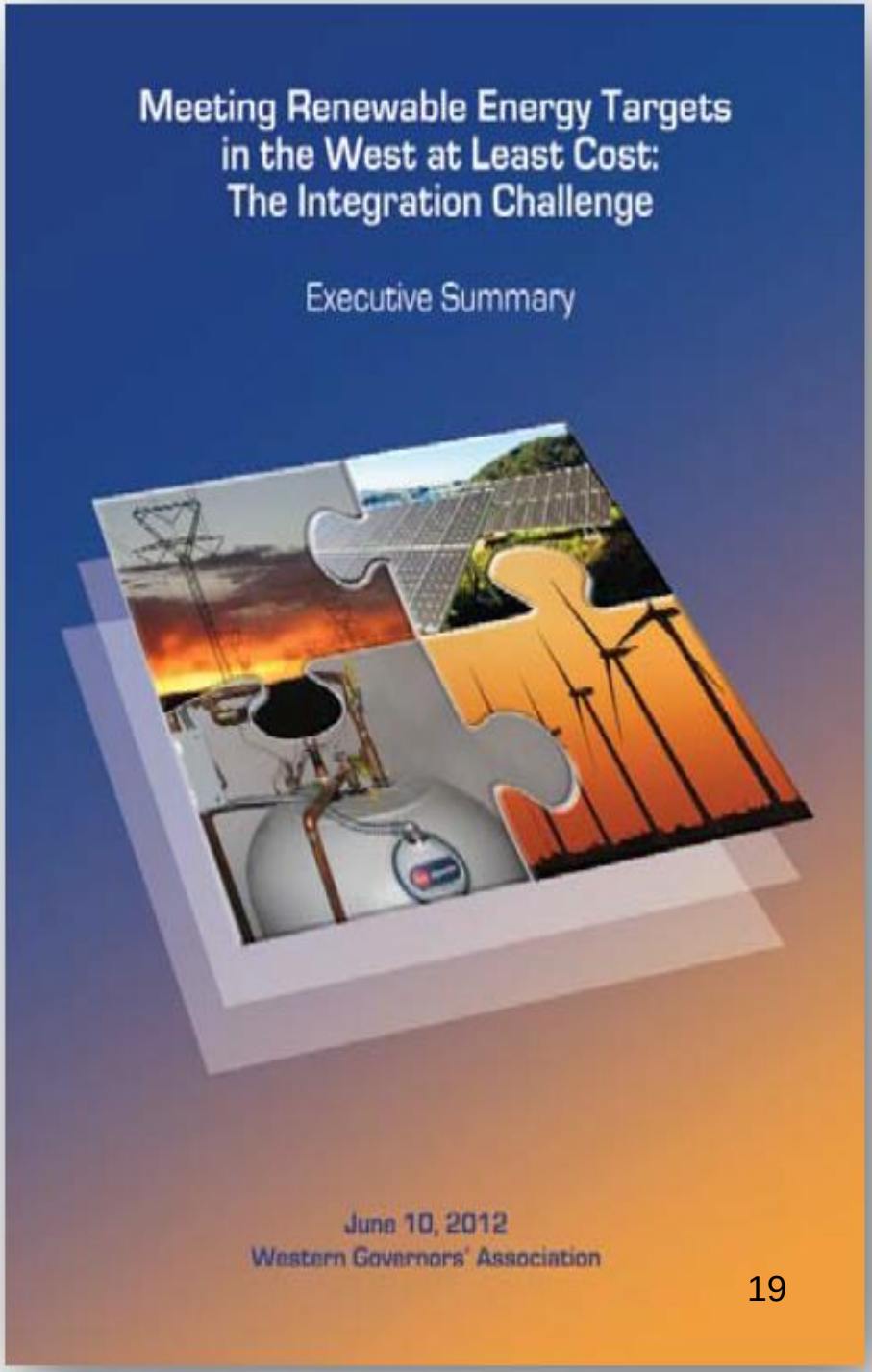
- Enhanced balancing authority cooperation, coordination, or consolidation (as has occurred in Texas, PJM, and MISO)
- More efficient markets with shorter clearing periods, down to 5–10 minutes (as is the case already in MISO, PJM, and other regions)
- New ancillary service markets covering a wider range of needs (e.g., flexibility—faster ramp rates) beyond regulation and reserves markets already operating in much of the United States
- Unit commitment adjustments within the day
- New conventional generation technologies or modifications to existing generators that allow faster ramp rates, lower minimum output levels, quicker start times and shorter minimum-off times

NREL Recommendations, Continued

- Improved wind and solar forecasting—along with efficient use of forecasts (as is now occurring in many regions)
- Increased connectivity among neighboring and distant regions
- Expanded electricity flow across the Eastern, Western, and ERCOT Interconnections
- Increased use of demand response (as is occurring now in PJM, ERCOT, California, and other regions)
- New, manageable electrical loads such as electric vehicle charging
- Increased use of storage options.

WGA Study on Low Cost Integration

1. **Expand sub-hourly dispatch and intra-hour scheduling**
2. **Dynamic Transfers btw. BAAs**
3. **EIM**
4. **Improve forecasting**
5. **Geographic Diversity**
6. **Reserves management**
7. **Retool DR for integration**
8. **Flexible dispatch for existing plants**
9. **Flexibility in new generation**



NRDC

Requirements for integration of renewables

Resources Required for Renewables Integration

Wind Generation

Solar Generation

"Partners in Success"

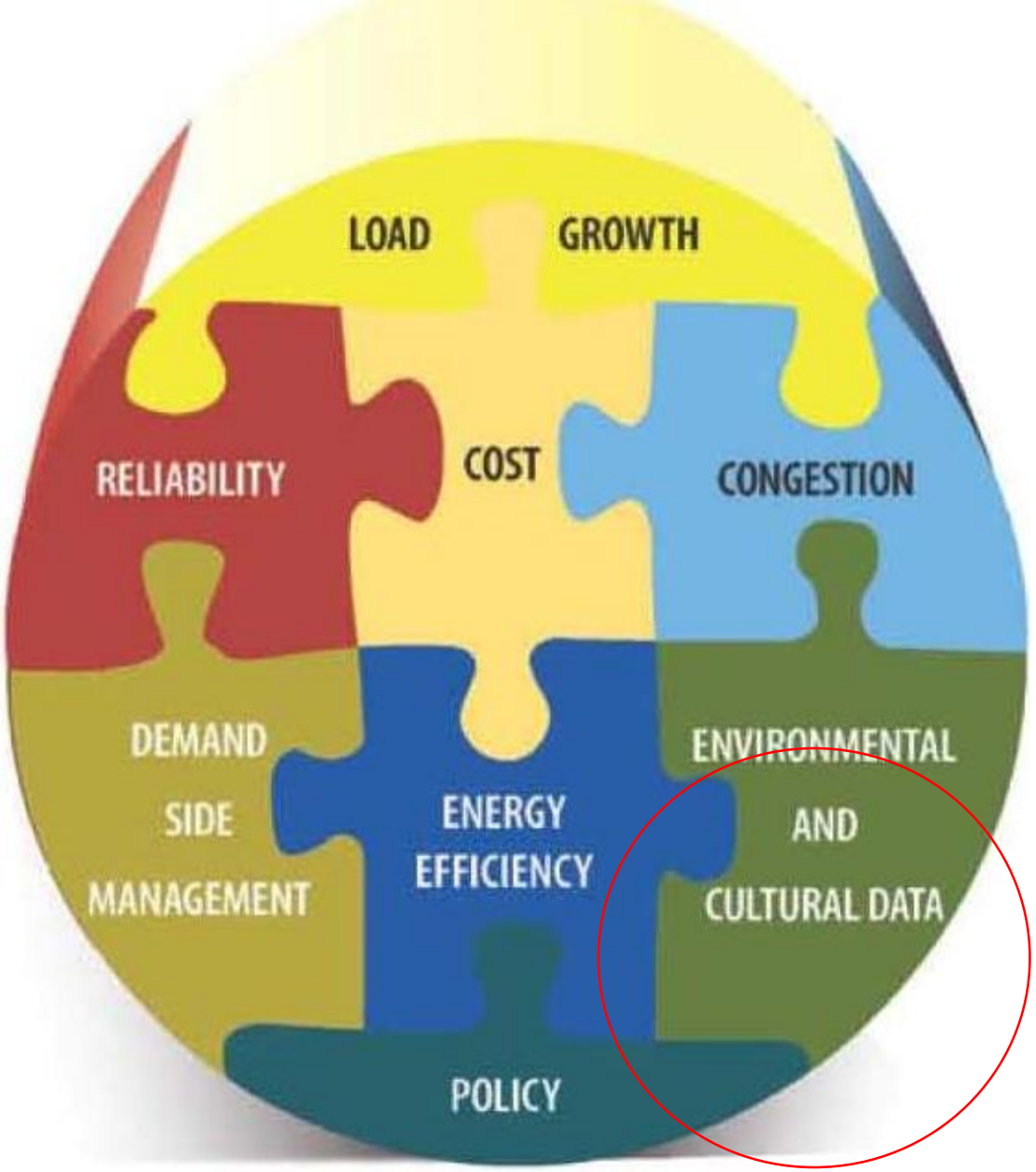
Generation Portfolio	Storage	Demand Response
Quick Start Units	Shift Energy from off-peak to on-peak	Price sensitive load
Fast Ramping	Mitigate Over Generation	Responsive to ISO dispatches
Wider Operating Range (lower P_{min})	Voltage Support	Frequency Responsive
Regulation capability	Regulation capability	Responsive to Wind Generation Production

Hydro

Geo-therma Generati

Fully Use Available Planning Processes

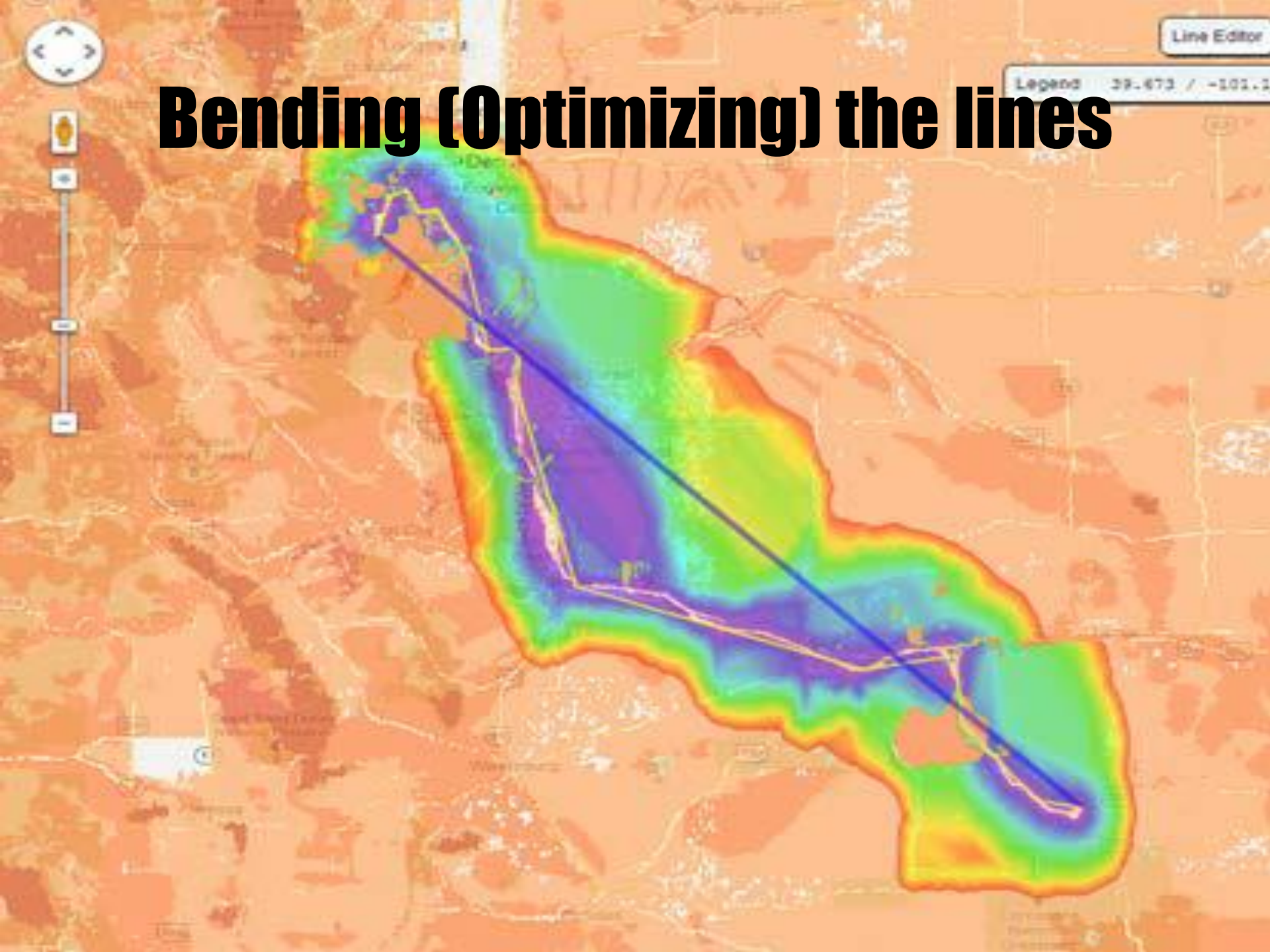
Environmental and Cultural Factors
-
One piece of the regional transmission planning puzzle



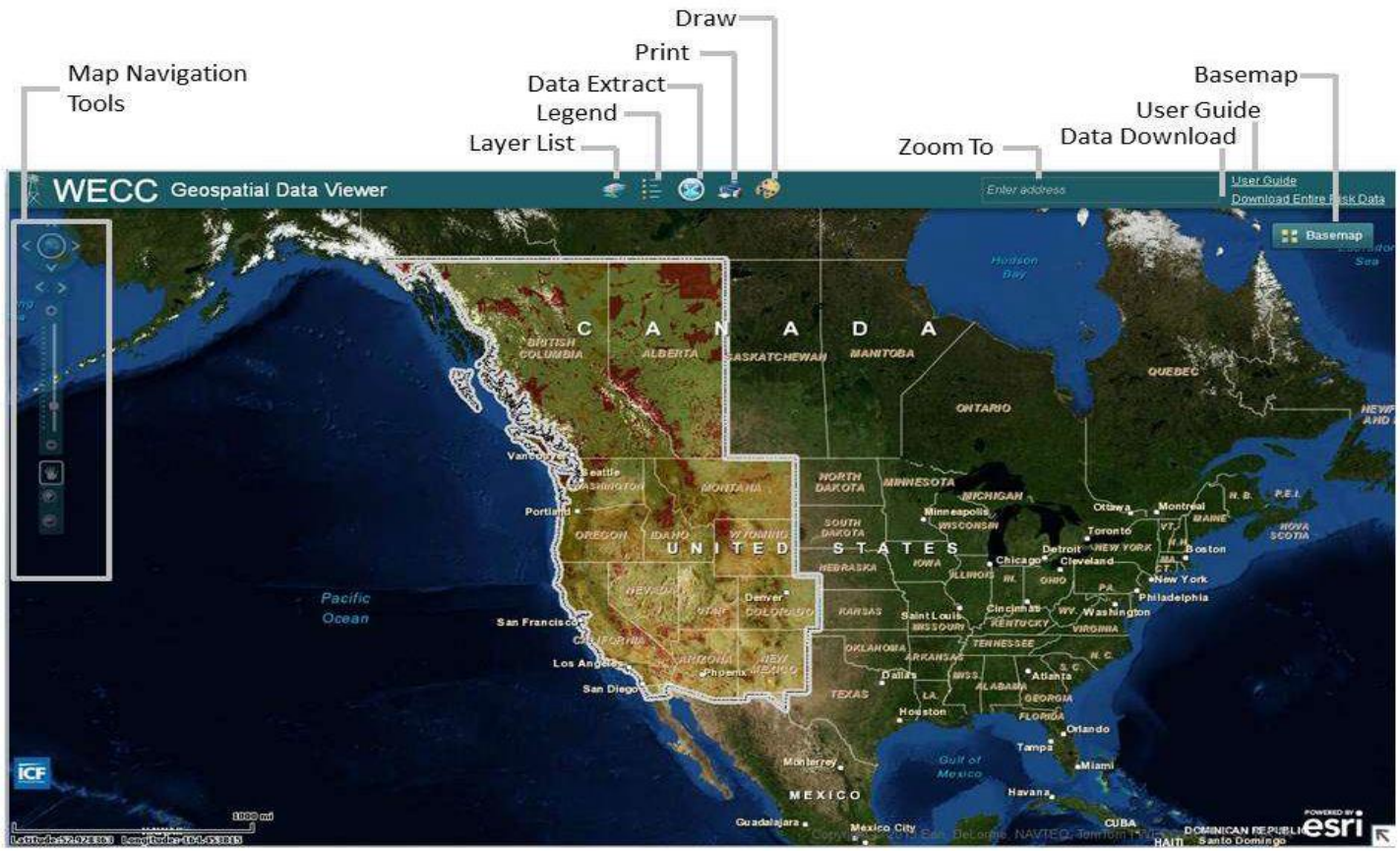
Fully Use Available Planning Processes

- Transmission expansion needed to meet projected load with expected resources;
- Include policy initiatives such as RPS; 111(d)
- Non Wires Options
- Consider Risks of Environmental and cultural resource conflicts
- Include all economic variables such as fuel prices, externalities and emission costs

Bending (Optimizing) the lines

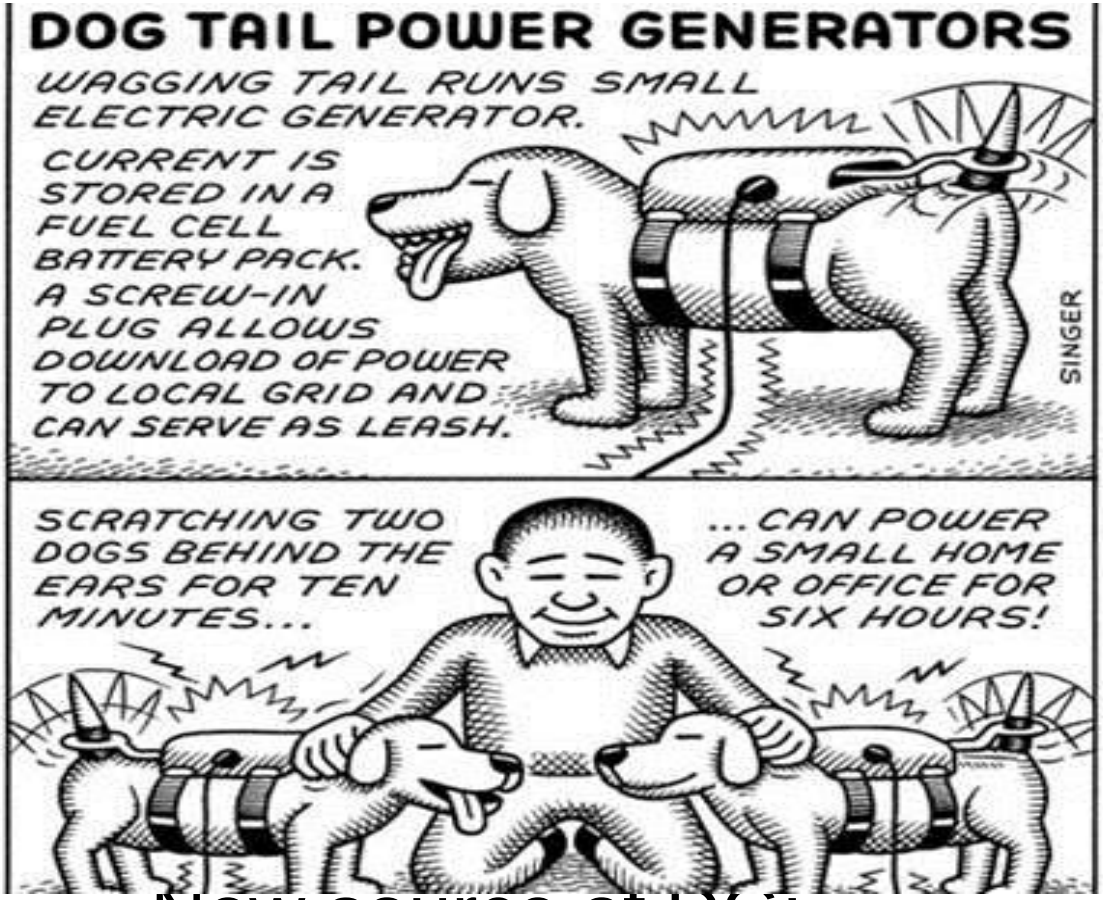


WECC EDTF Data Viewer



Trends and Developments

- Flexibility the new paradigm
- Emphasis on maximizing use of existing grid
  - Cascade Crossing example
- Emphasis on avoiding new ROWs if possible
- Emphasis on operational coordination
  - For reliability as well as for
  - Renewable Integration, Storage
- Emphasis on updating cost, load, and policy assumptions
- Emphasis on efficient market tools
  - CAISO EIM, NWPP MC initiative



New source of DG:

72.9 million US households report having at least one pet. 46.3 million own dogs, 62% of dog owners own only 1 dog. 26% own 2. 7% own 3 and 5% own 4 or more.

For more information:

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Americans for a Clean Energy Grid

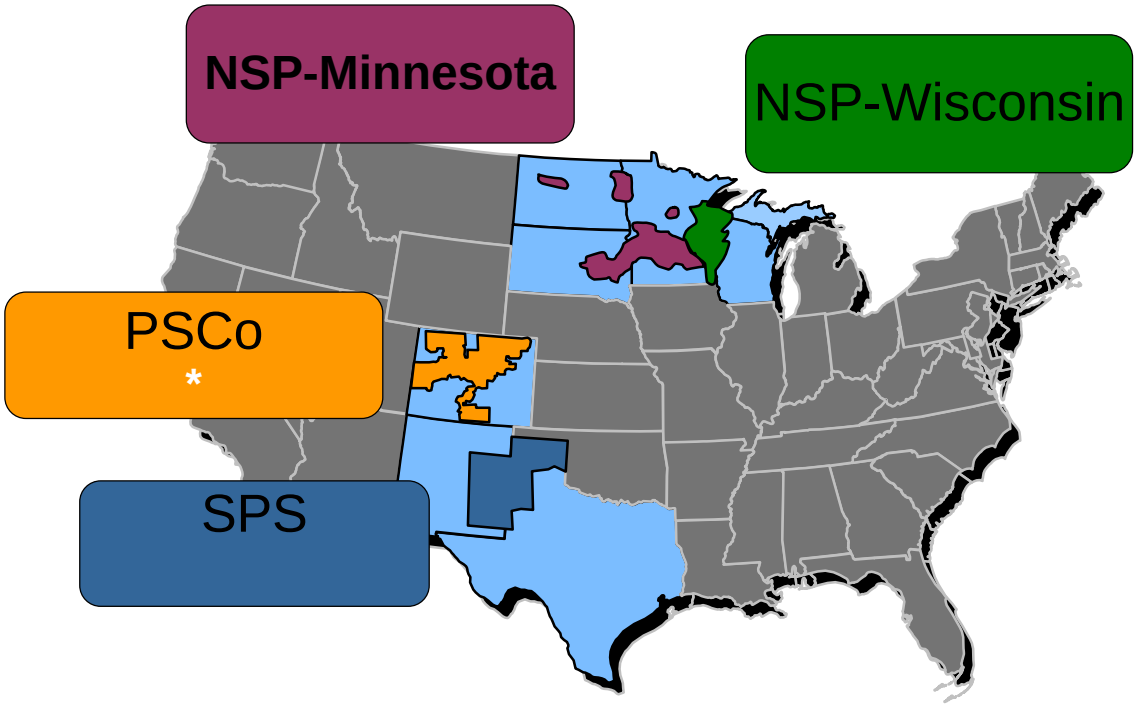
Comments of Stephen Beuning

Xcel Energy, Inc

4/2/14

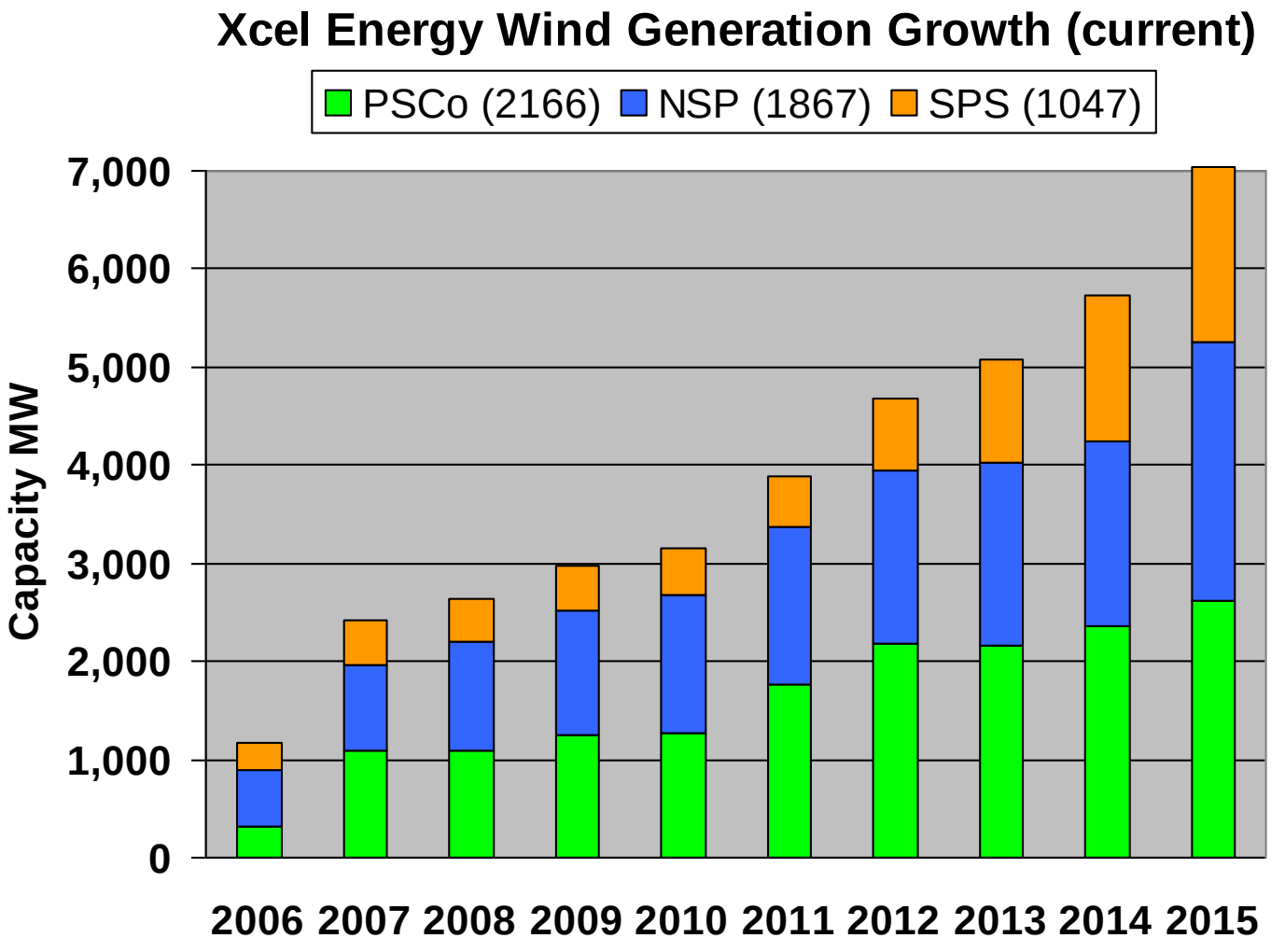
Xcel Energy is dedicated to being an environmental leader

Who We Are…

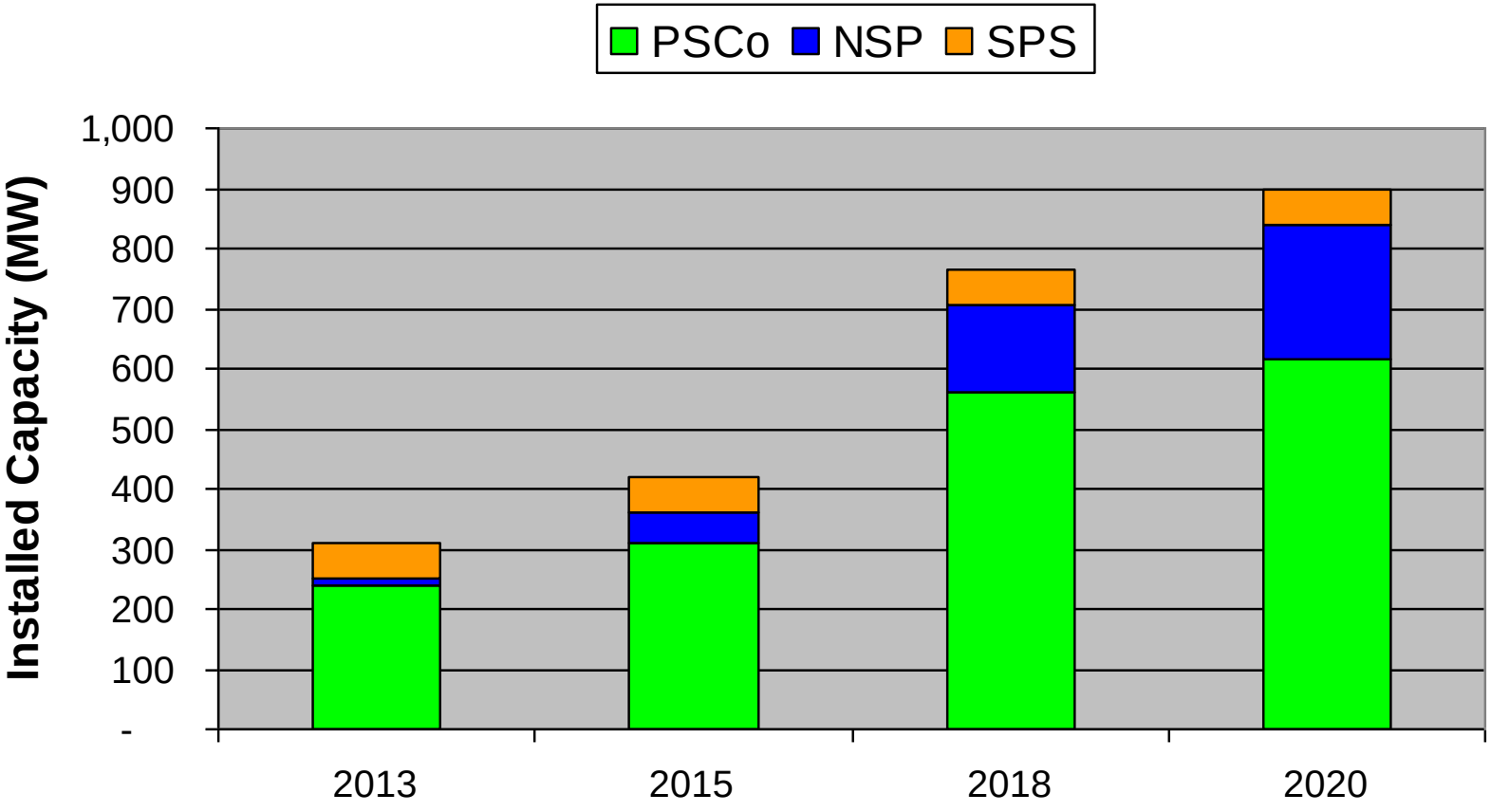


- **26,000+ MWs of generation**
- **Operating in 8 States**
- **No. 1 wind power provider**
  No. 5 solar power provider

<u>Customers</u>
3.4 million electric
1.9 million gas


Xcel Energy Wind Generation Growth (current)
PSCo (2166)
NSP (1867)
SPS (1047)
Capacity MW
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015

Xcel Energy Solar Generation Growth



Focus for Industry Change

- Improved tools & methods
  - Seams Coordination
  - Regional transmission cost allocation
  - Reliability-based Control (RBC) standard
- Western Interconnection:
  - Regional pooled dispatch
  - Improved congestion management
- Eastern Interconnection:
  - Network tariff policy enhancements
  - Regional transmission cost allocation

END

Questions?

Thank you for joining us.

- Please visit our site at www.cleanenergytransmission.org
- Follow us on Twitter @clean_energy_grid
- Join us for future webinars and events, and feel to reach out to us for any transmission-related questions.

Americans for a Clean Energy Grid

energy future COALITION