

An Overview of Current Initiatives to Expand Transmission Infrastructure to Accommodate Utility Interconnection and Integration of Wind Power

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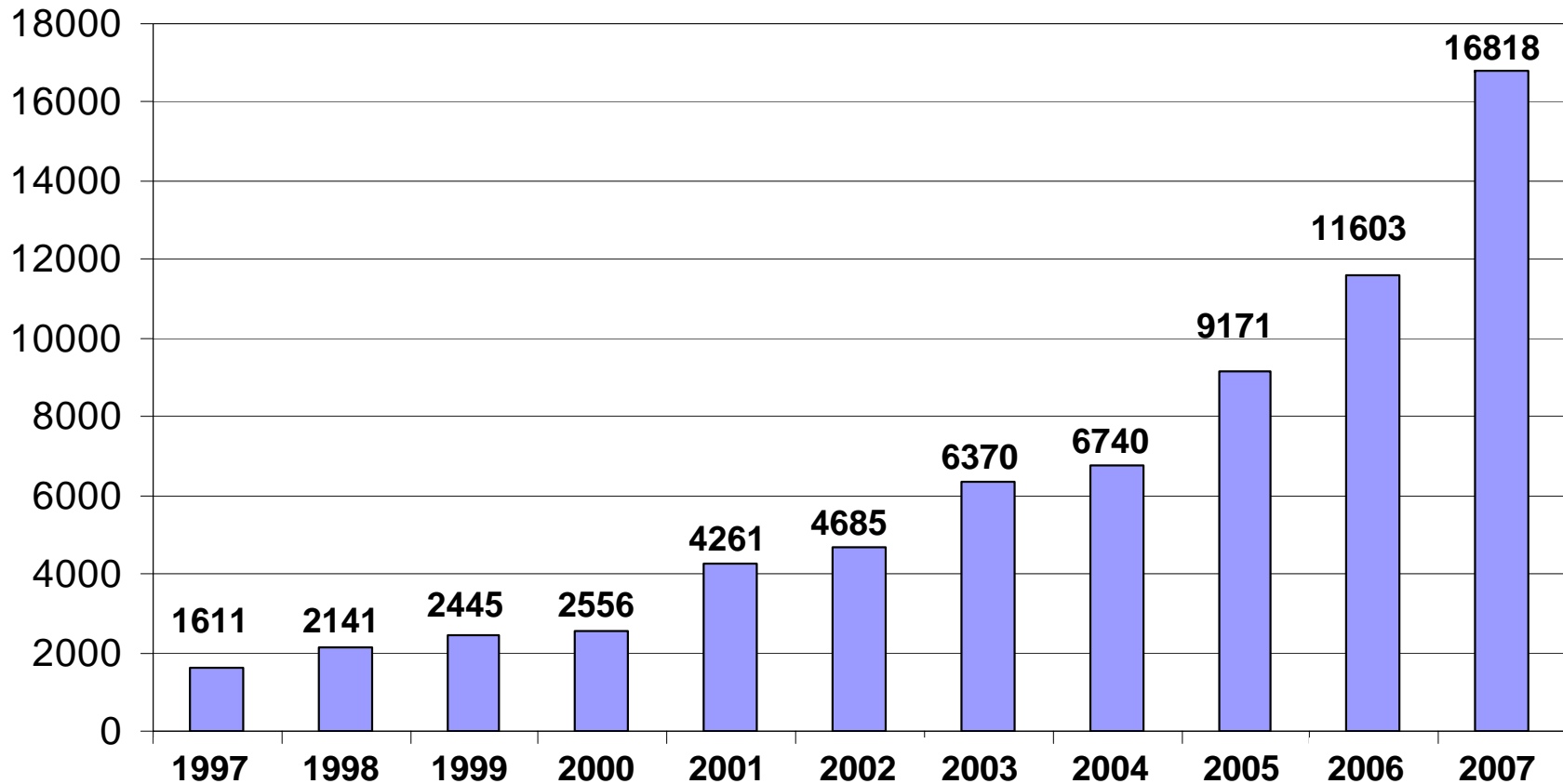
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Wind Power: A Fast-Growing Generation Source

- ◆ 5,244 MW of capacity installed in 2007, bringing total capacity in US to 16,818 MW
- ◆ Wind industry exploring ability to realize vision set forth by President Bush of meeting 20% of requirement for electric energy
- ◆ Tremendous amount of wind generation project development, driven by expiration of PTC at end of 2008
- ◆ As with all growth, fostering a series of challenges, both policy and technical

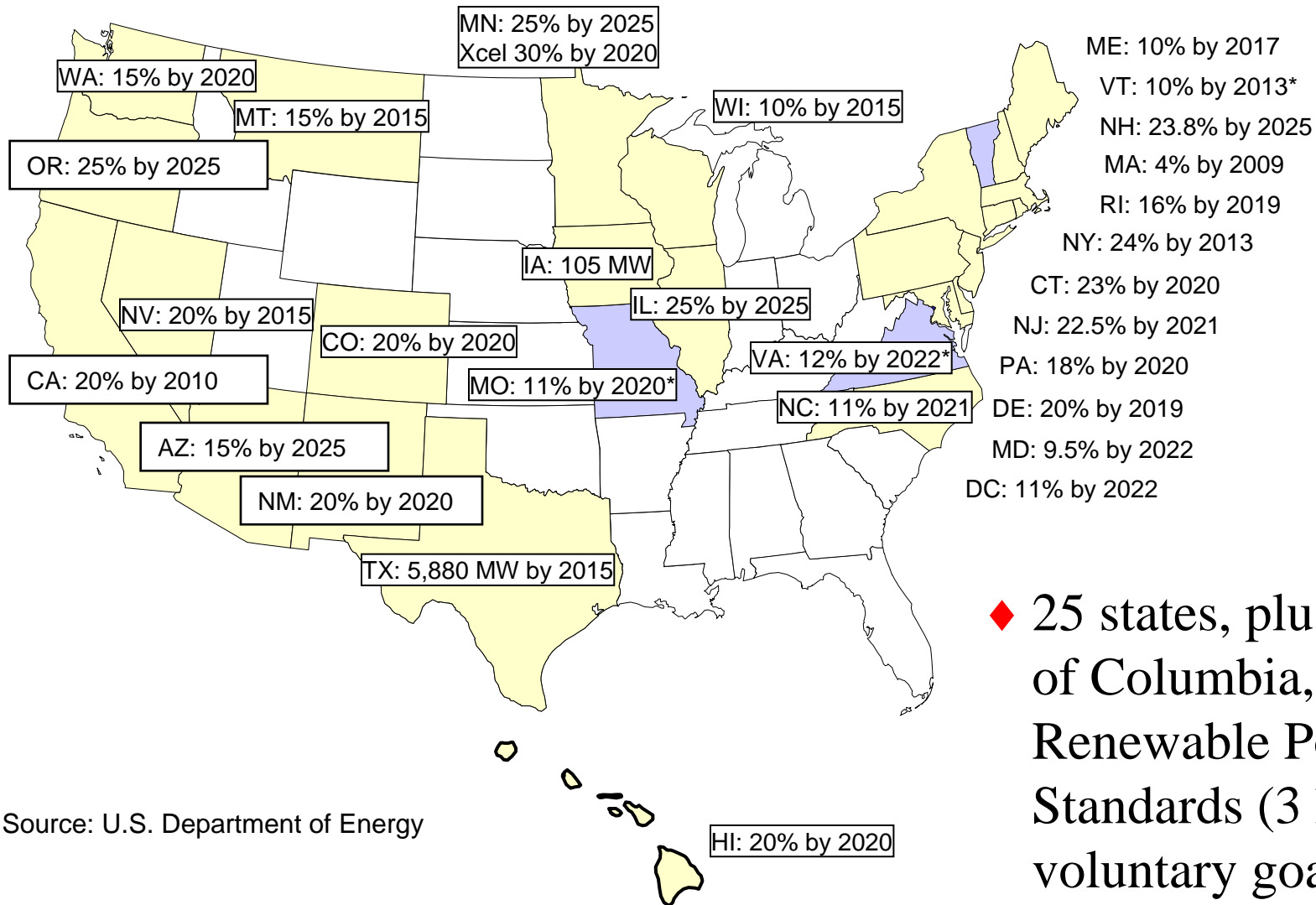
Wind Power is Booming

Growth of Wind Energy in the United States



Source: AWEA

What's A Big Driver for this Expansion?

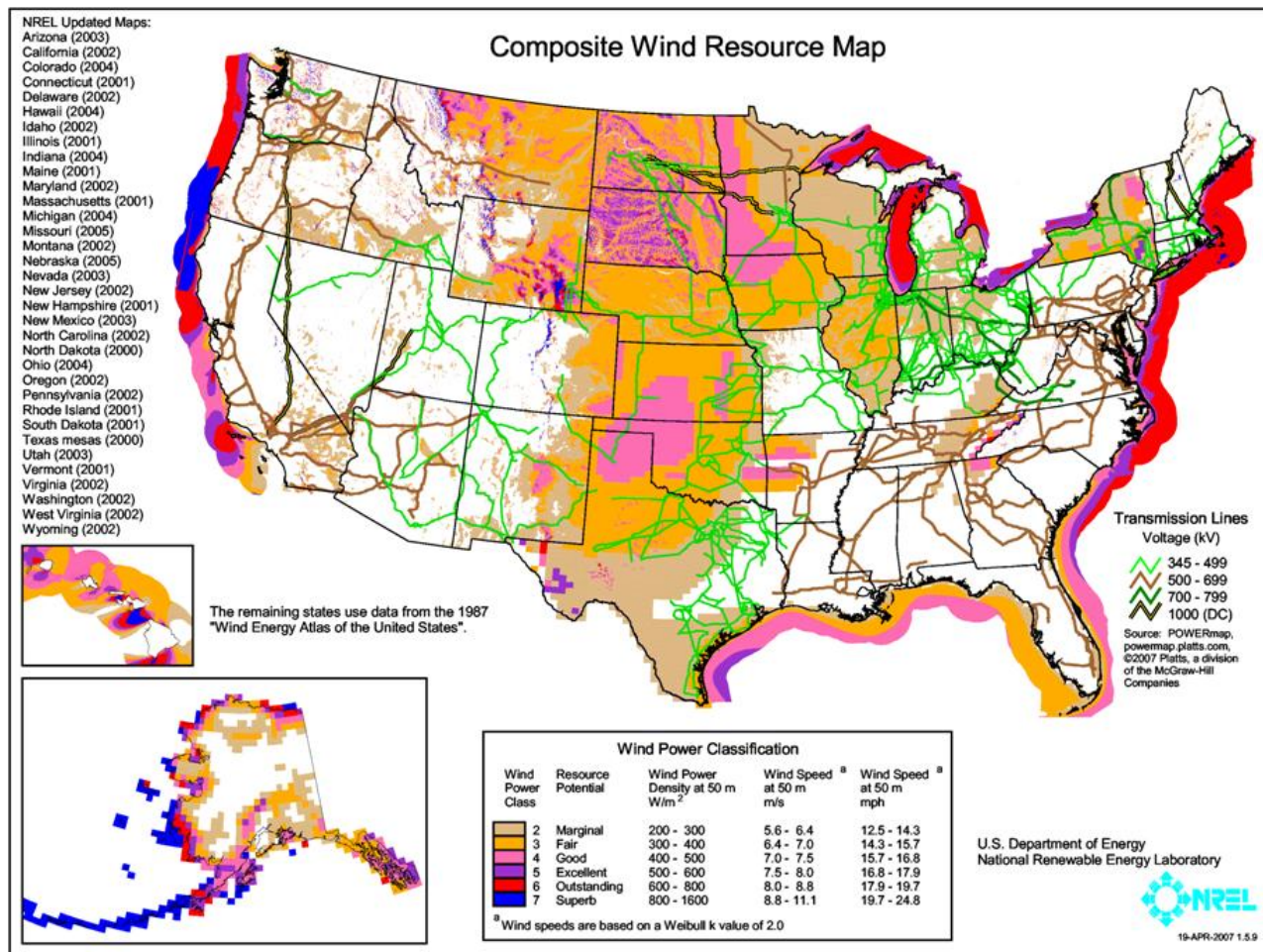


Source: U.S. Department of Energy

◆ 25 states, plus District of Columbia, have Renewable Portfolio Standards (3 have voluntary goals)

Major Hurdle to Making Wind Power Work

Transmission is lacking where the best wind resource is located



Source: NREL

Key Questions on Expanding Transmission

- ◆ Cost
 - Investment of \$60 billion over next 20 years for 19,000 miles of line to deliver 200-400 GW
 - Current transmission investment \$7 billion/yr and growing
- ◆ Financing – who pays and how are costs recovered – in essence, do ratepayers pay or does the generation project developer? Do you pay up front or as you go?
- ◆ Siting considerations
 - Multi-state jurisdiction approval on major lines
 - Complicated process with state regulatory approval, environmental impact analysis, and perhaps even Federal approval
 - Local opposition – “Not In My Back Yard”

It's About More Than Wind

- ◆ A lot of what is underway needs to be done anyway
- ◆ Some initiatives have a primary focus on bringing fossil-fueled electricity into load centers
- ◆ Bottom line is that the existing infrastructure has insufficient capacity, is aging and congested, and there are reliability considerations in all of this
- ◆ It also hampers growth of efficient electricity markets

Key Initiatives/Trends Related to Wind and Transmission

- ◆ National Interest Electric Transmission Corridors
- ◆ FERC Order 890
- ◆ California “Third Path” Mechanism for Financing Transmission For Renewables
- ◆ Texas/Colorado/Western/National CREZ
- ◆ State Infrastructure Agencies and Multi-State Transmission Development Efforts
- ◆ Planning Efforts by RTOs
- ◆ Emergence of Independent Transcos

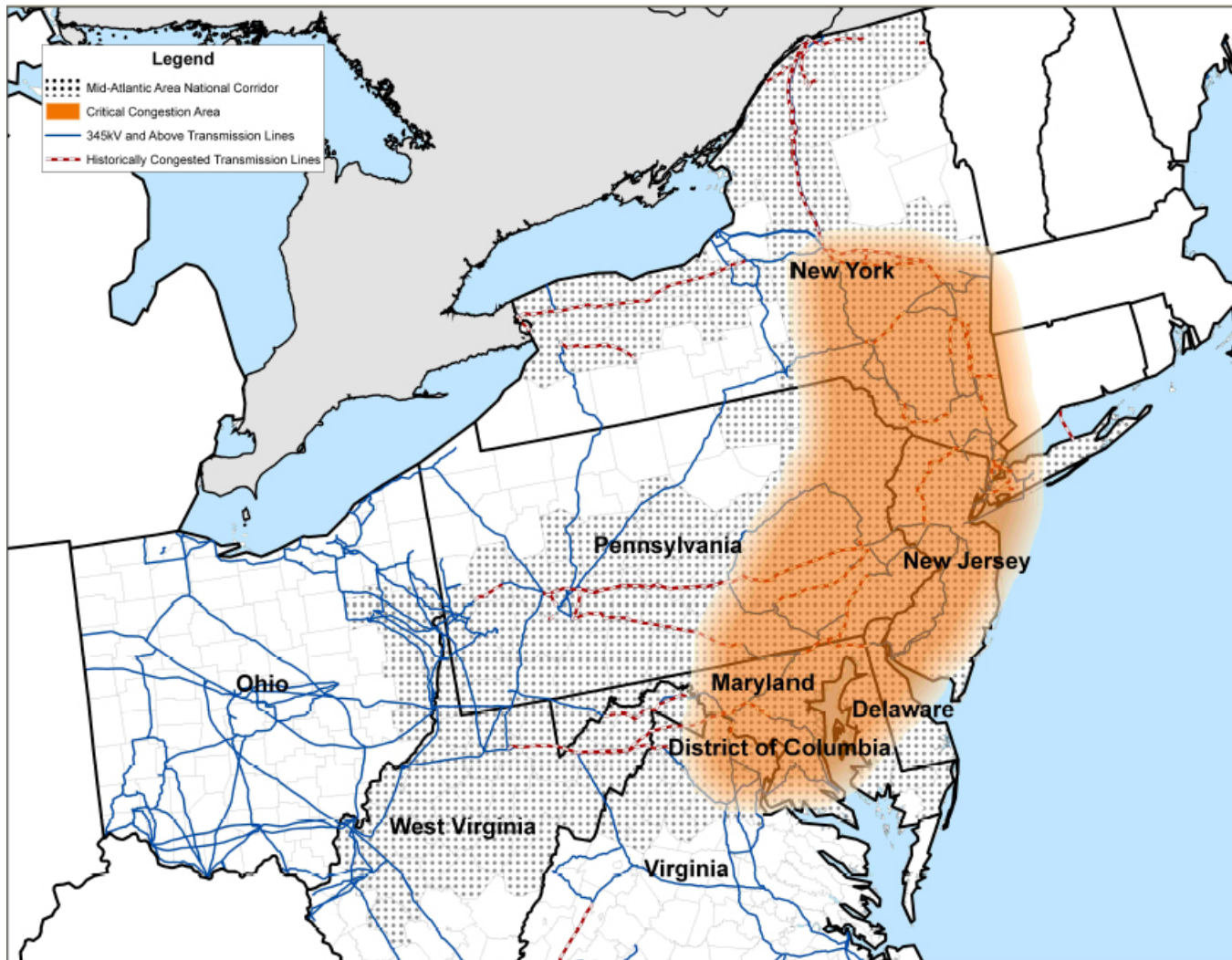
National Interest Electric Transmission Corridors

- ◆ EPAct 2005 authorized DOE to designate appropriate areas as National Corridors
- ◆ Areas determined where transmission congestion exists or could exist
- ◆ Under certain conditions, FERC would have authority to approve siting and construction of transmission facilities within Corridor

National Interest Electric Transmission Corridors (cont.)

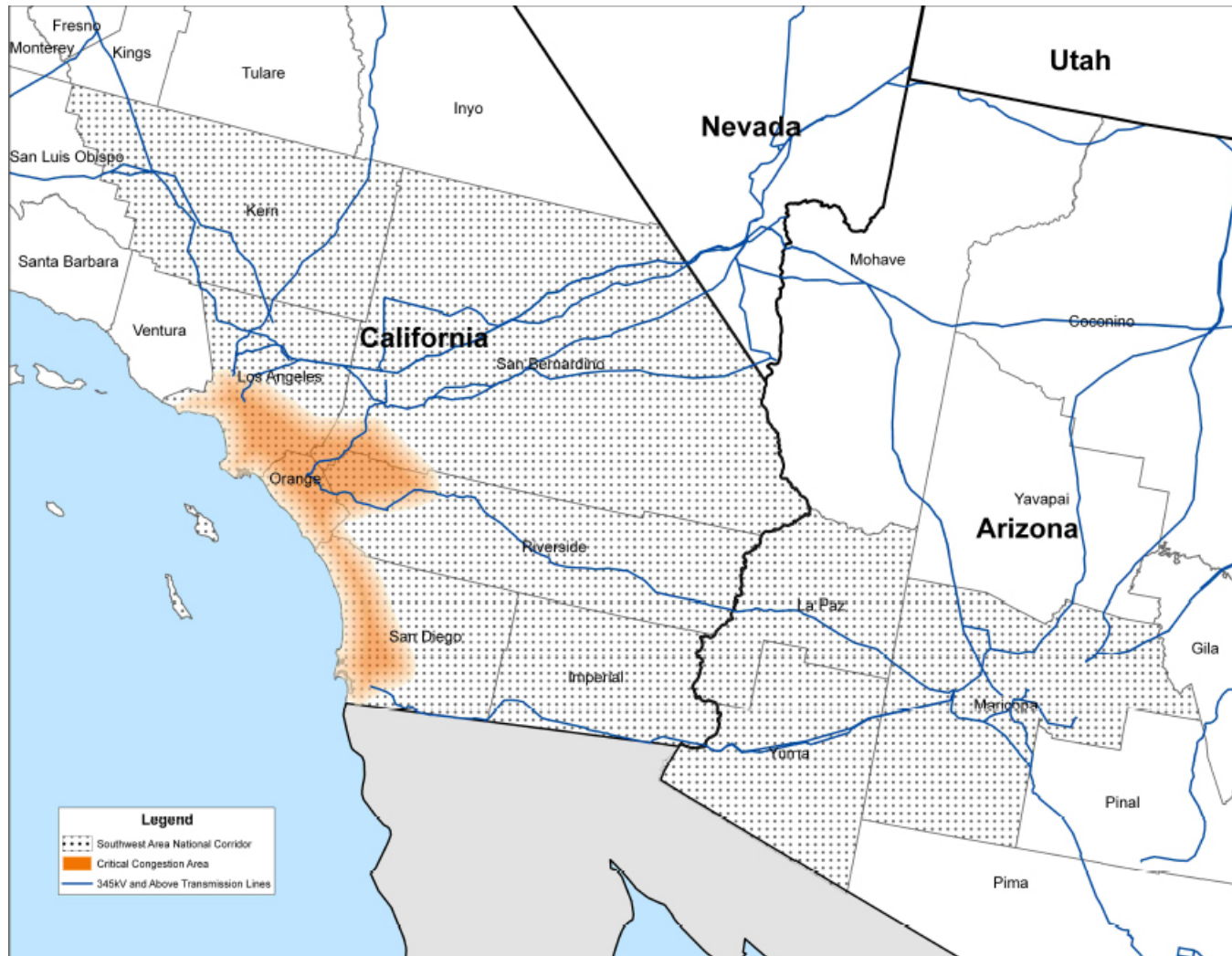
- ◆ Under EPCA 05, FERC will have jurisdiction if
 - State authority over project is limited/non-applicable
 - Project does not serve end-use customers in state
 - State has withheld approval of project for over a year
- ◆ Corridor designation will not
 - Determine how congestion is resolved
 - Propose, direct, or order a course of action
 - Endorse a particular transmission project
 - Circumvent existing federal environmental requirements
- ◆ Two Corridors have been designated

Mid-Atlantic Area National Interest Electric Transmission Corridor



Source: DOE

Southwest Area National Interest Electric Transmission Corridor



Source: DOE

Corridor Status

- ◆ Much opposition to Corridors
- ◆ DOE indicated in December that it would hold a rehearing on the designations
- ◆ This month, a number of environmental groups sued DOE to halt designation process, claiming it violates Federal environmental laws
- ◆ What will come of this? Stay tuned

FERC Order 890

In February 2007, FERC amended its pro forma Open Access Transmission Tariff and regulations. It affirmed these reforms in December. Highlights include

- ◆ Greater consistency and transparency in calculation of Available Transfer Capability
- ◆ Open, coordinated, and transparent planning on local and regional levels
- ◆ Reform of energy and generator imbalance penalties
- ◆ Adoption of a “conditional firm” component to long-term point-to-point service and reform of existing requirements for redispatch
- ◆ Reform of rollover rights
- ◆ Clarification of provisions in the tariff
- ◆ Increased transparency and customer access to information

Order applies to all public utility transmission providers. The impacts on planning are significant. More to come...

California's Transmission Conundrum

California's got a little problem...

- ◆ Renewable Portfolio Standard of 20% by 2010, 33% by 2020
- ◆ Global Warming Solutions Act of 2006 caps GHG emissions in state at 1990 levels in 2020
- ◆ The best wind resource is in the California Tehachapi Area, which has developable wind resource of 5,000 MW and additional 10,000 MW east of it
- ◆ Not enough transmission to get that power out
- ◆ How does one pay for it?

Solving That Conundrum

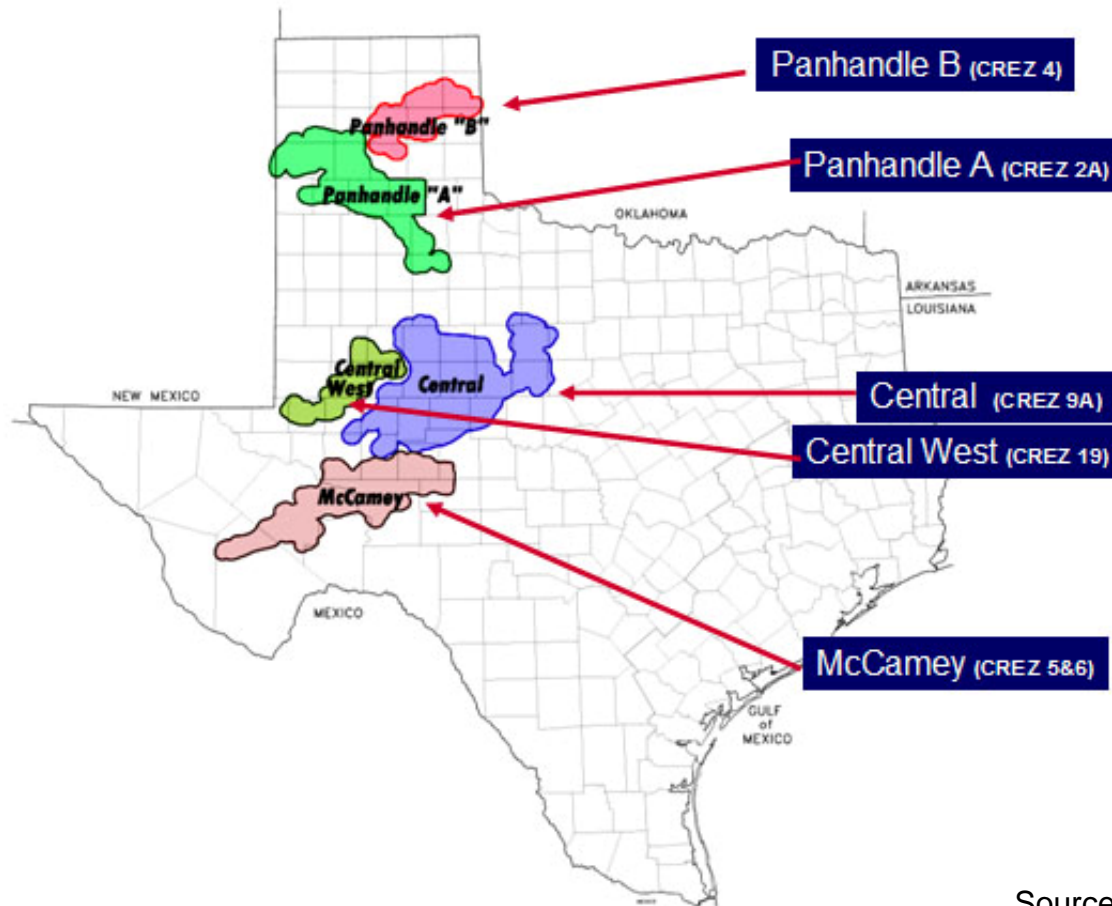
- ◆ California moving to address financing question
 - CAISO filed petition for declaratory order with FERC in January 2007 with respect to building transmission to *Location Constrained Resources*
 - FERC unanimously issued order approving petition in April 2007
 - FERC ruling allows up-front funding of line by SCE, immediate cost recovery, and pro rata fees from generators
 - CAISO approved the detailed tariff to be filed with FERC
 - Summer 2007, SCE submits application for permit to construct transmission line to unlock 4,500 MW of renewable capacity
 - Summer 2009, SCE plans to begin construction
 - Winter 2013, project to be completed at cost of \$1.8B
- ◆ California agencies, utilities launch Renewable Energy Transmission Initiative – will work to place infrastructure to move electricity from renewable generation in remote areas to load centers

CREZ: A Texas Model

Texas has instituted an innovative approach to building transmission to connect renewables

- ◆ TX Senate Bill 20, in 2005, set ambitious RPS goal of 5,000 MW by 2015, designation of CREZ, and construction of needed transmission
- ◆ PUCT held hearings in July 2006 to select CREZ to be developed
- ◆ ERCOT transmission planning study underway for 10,000-26,000 MW
- ◆ Interim Final Order issued on Oct. 2 for up to 22,800 MW

Where the CREZs Are



Source: ERCOT

Texas CREZ – Where Things Stand

- ◆ Final Order expected early this year with operation in 2012
- ◆ Once Certificate of Convenience and Necessity (CCN) is issued, transmission cost is socialized

This has led to a number of companies and organizations forming partnerships/ventures to build merchant transmission for the CREZs. Electric Transmission Texas, a venture between AEP and MidAmerican Energy is a prominent example

The CREZ Concept has Caught On...

- ◆ Colorado has implemented similar CREZ process
 - Xcel Energy/PSCo has proposed 3 zones so far
- ◆ CRETI to also utilize CREZ methodology
- ◆ Senate Majority Leader Harry Reid filed bill to require the President to designate national renewable energy zones, with Federal PMAs having backstop authority to construct transmission
- ◆ Discussions underway regarding designation of Renewable Energy Zones in West

State-Level Transmission Expansion Initiatives

A number of states, many of which are seeking to become exporters of electricity, have established state offices or quasi-governmental organizations to facilitate and fund transmission development. Participants include

- ◆ Wyoming Infrastructure Authority
- ◆ Colorado Clean Energy Development Authority
- ◆ New Mexico Renewable Energy Transmission Authority
- ◆ Kansas Electric Transmission Authority
- ◆ Idaho Energy Resources Authority
- ◆ South Dakota Energy Infrastructure Authority

In addition, Montana established an Energy Infrastructure Promotion and Development Division in its Commerce Dept.

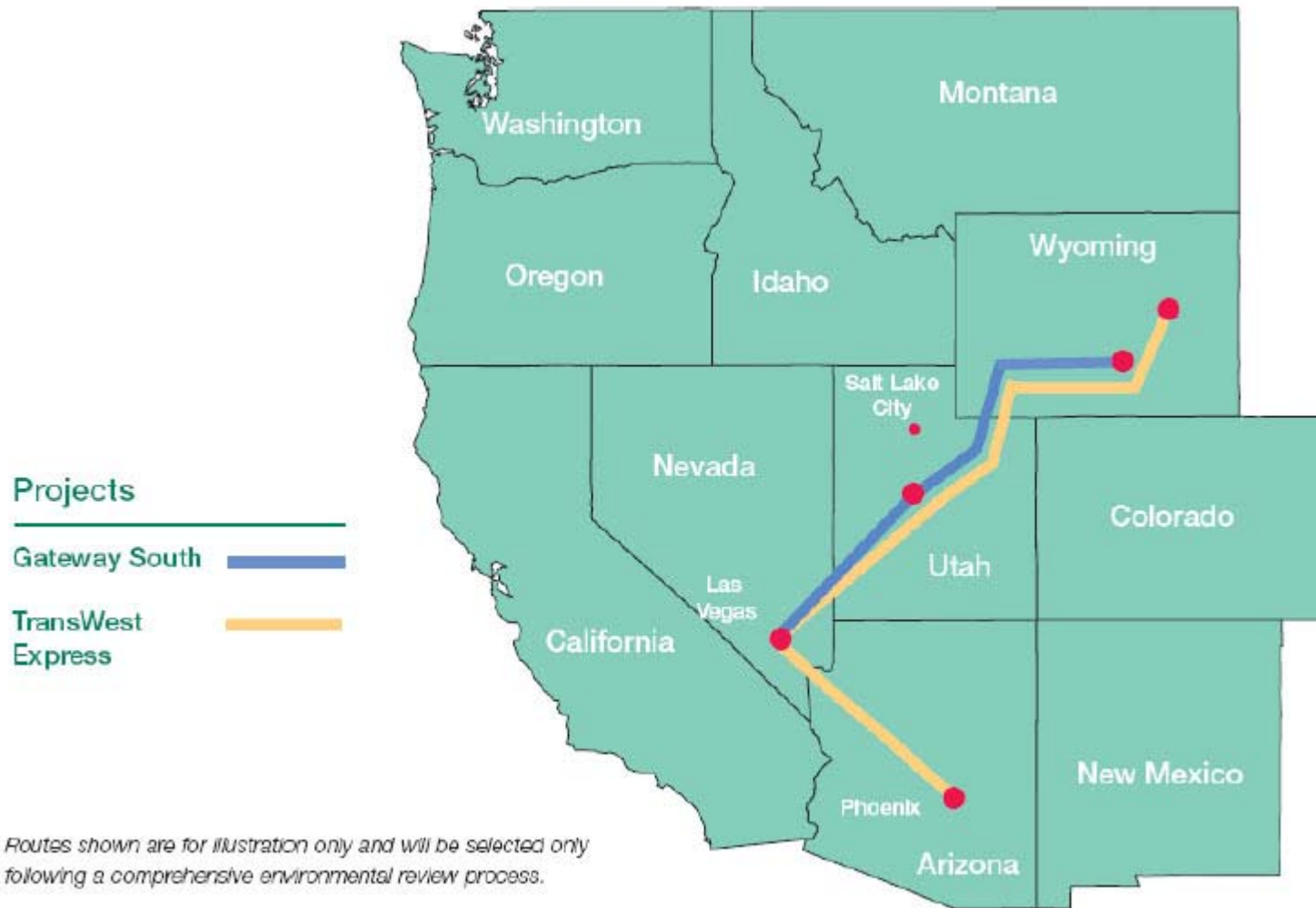
Multi-State Transmission Development Initiatives

A number of utilities, predominantly in the West, are partnering together to plan, develop, and build high-capacity transmission projects. Notable examples include:

- ◆ TOT-3 Wyoming/Colorado InterTie – 345 kV line
- ◆ Wyoming-West Project – 345 kV or 500 kV line
- ◆ TransWest Express – 500 or 765 kV line
- ◆ Gateway South – 500 kV line
- ◆ High Plains Express – 345 or 500 kV line

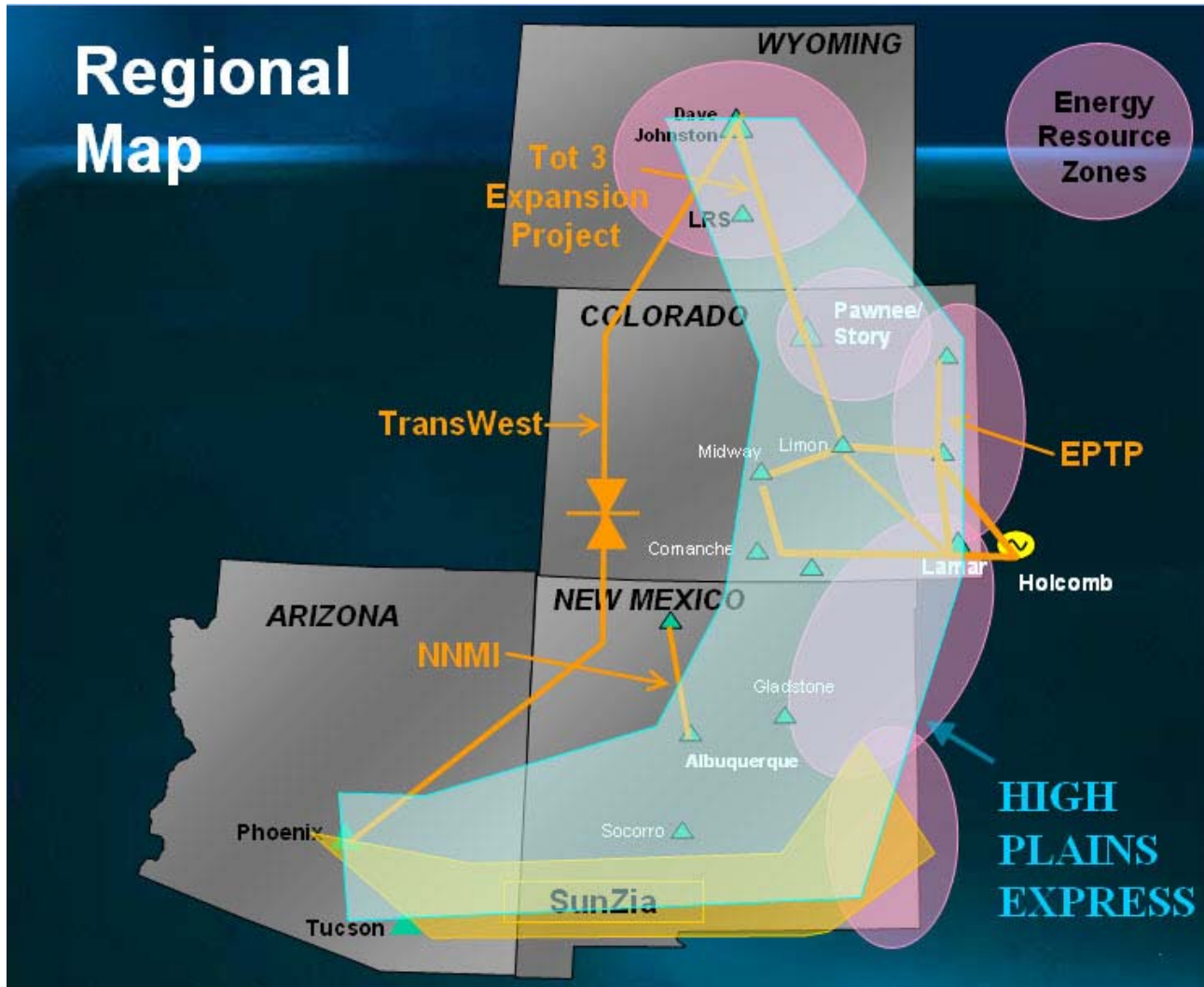
These lines are largely intended to transport electricity produced from fossil generation as well as wind generation

TransWest Express and Gateway South



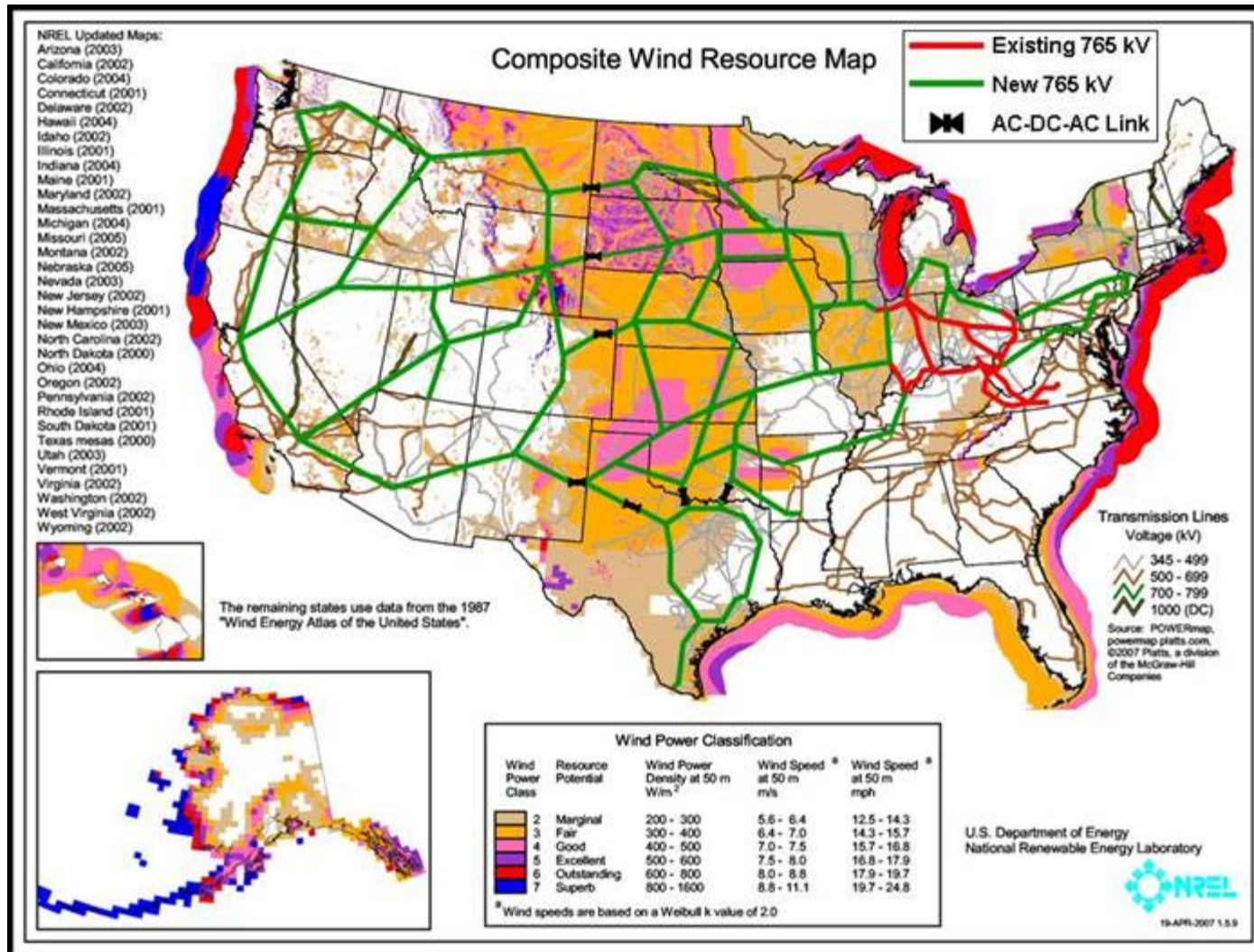
Source: Arizona Public Service

Footprint for High Plains Express



Source: New Mexico Renewable Energy Transmission Authority

Conceptual EHV Transmission Overlay

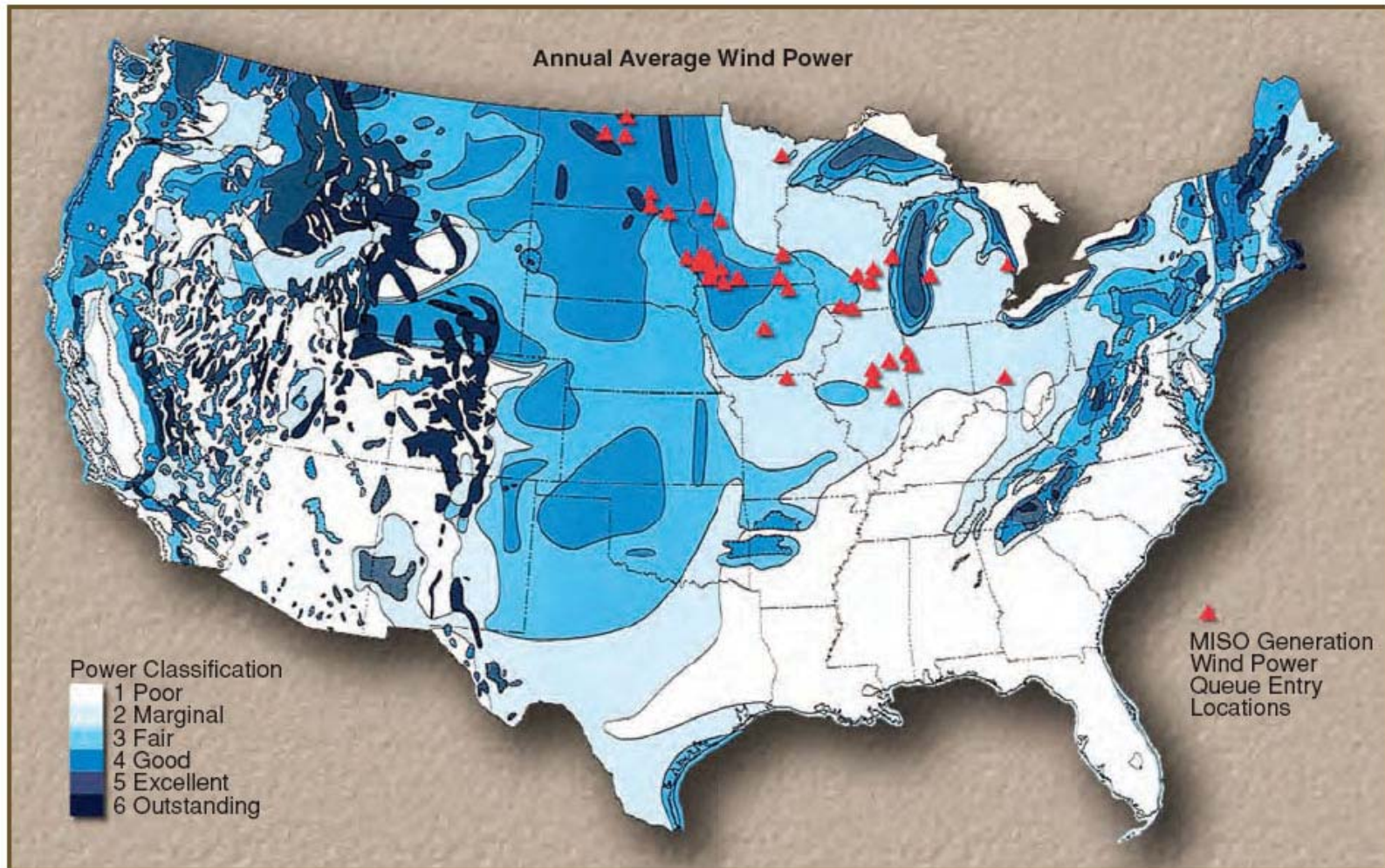


Source: NREL

What's Going on With Other ISOs

- ◆ Midwest ISO – recently approved MTEP 07 and suggesting groundbreaking approach to transmission planning for renewables
 - “Open Season” generation interconnection
 - Regionally planned interconnection projects – for location constrained generation
- ◆ MISO has suggested moving from a traditional approach to transmission planning (reliability assurance being the target) to ensuring optimal value of expansion (accommodating renewables)

Why MISO is Significant for Renewables



Source: *IEEE Power & Energy Magazine* – November/December 2007

What's Going On with Other ISOs (cont.)

- ◆ Southwest Power Pool – working to facilitate wind development in the Central and Southern Plains, along with renewables goals in KS and OK. Now undertaking EHV initiative – 20 year blueprint to shape transmission planning. Study underway with results to be released Q1 2008
- ◆ SPP also proposed the X Plan, a 345 kV reinforcement effort
- ◆ SPP working with MISO, PJM, and TVA on Joint Transmission Planning

What's Going On with Other ISOs (cont.)

- ◆ Other ISOs are actively working to build or optimize infrastructure to accommodate wind.
- ◆ It's not just an American effort, but a Canadian one as well.

To learn more about what ISOs are doing to accommodate renewables, download the report *Increasing Renewable Resources: How ISOs and RTOs Are Helping Meet This Public Policy Objective* at <http://www.isorto.org>

The Rise of Independent Transcos

There are companies that own or lease transmission facilities, unlike the ISOs, they are for-profit entities. Two primary players are

- ◆ American Transmission Company
- ◆ ITC Holdings – has several affiliates
 - ITCTransmission – operating in Michigan
 - Michigan Electric Transmission Company
 - ITC Great Plains – Kansas, Oklahoma
 - ITC Midwest (transmission formerly owned by Alliant Energy)
 - ITC Grid Development – investing in infrastructure development

There is Some Serious Investment in Transmission Going On

- ◆ AEP and MidAmerican have formed Electric Transmission America to identify and invest in high-voltage transmission projects (345-kilovolt or higher) located in North America
- ◆ EEI reported that its member utilities plan to invest \$38.1 billion in transmission projects through 2007 to 2010
- ◆ Much as wind has become a hot topic, so has transmission

Key Things to Follow

- ◆ What happens with the National Interest Electric Transmission Corridors
- ◆ Implementation and Compliance with FERC Order 890
- ◆ Development and implementation of financing mechanisms for transmission for renewables
- ◆ Implementation of CREZ in TX, CO, CA, US?
- ◆ What is going on within state and local govts
- ◆ What is going on in the private sector

For More Info, Visit These Sites

UWIG - www.uwig.org

NWCC - www.nationalwind.org

AWEA - www.awea.org

DOE - www1.eere.energy.gov/windandhydro/

ISO/RTO Council - www.isorto.org

EEI - <http://www.eei.org>

These slides, and the manuscript will be available on the UWIG web site

Thank You

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