

ELECTRIC TRANSMISSION 101: Markets, ISO/RTOs and Grid Planning/Operations

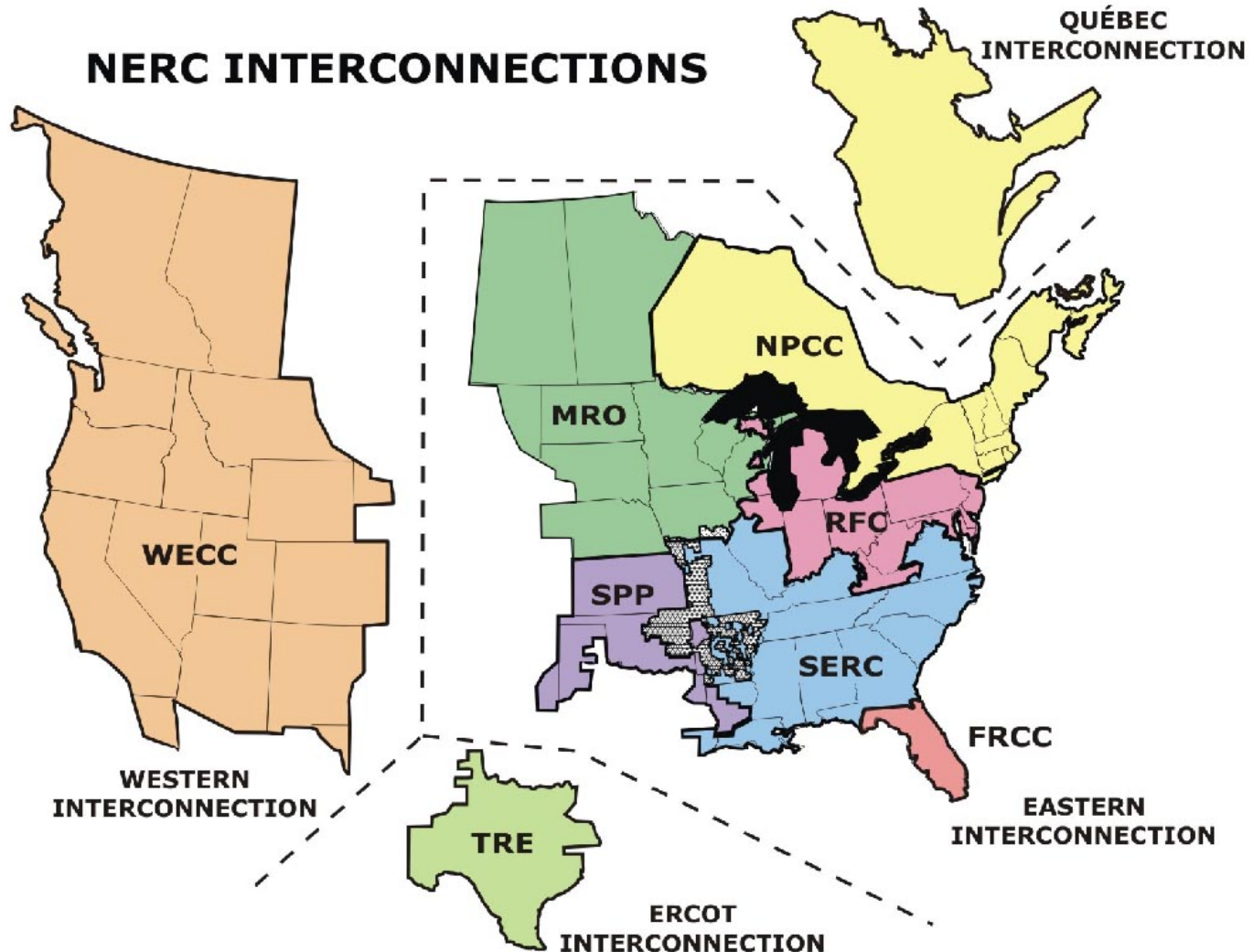
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Organized Markets

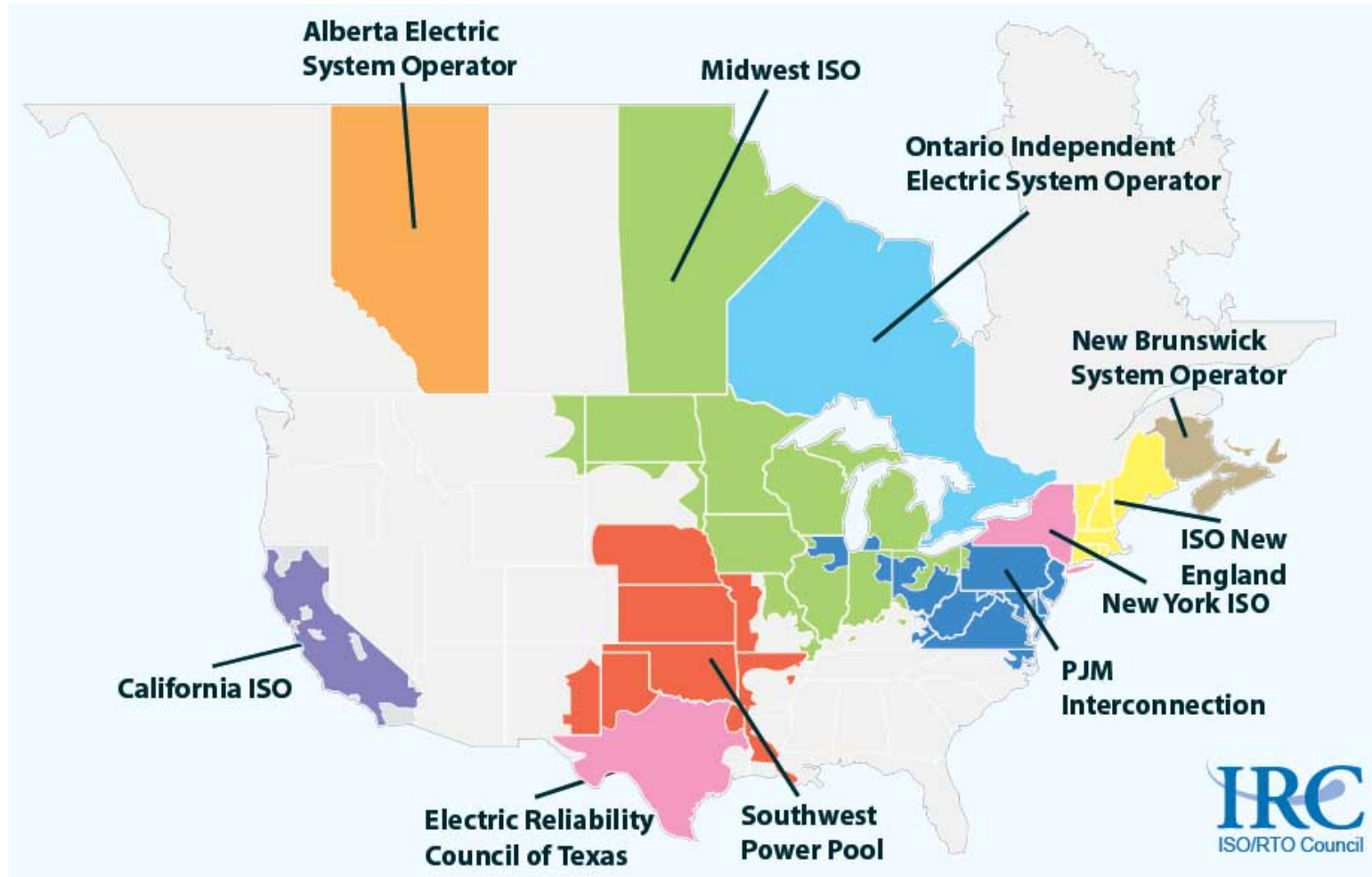


- Organized markets are managed by regional oversight entities called Regional Transmission Organizations and Independent System Operators, created by regional stakeholders in response to FERC's Orders 2000 and 888 respectively, to:
 - Facilitate competition among wholesale suppliers
 - Provide non-discriminatory access to transmission by scheduling and monitoring the use of transmission
 - Perform planning and operations of the grid to ensure reliability
 - Manage the interconnection of new resources, e.g., generation, loads...
 - Oversee competitive energy markets to guard against market power and manipulation
 - Provide greater transparency of transactions on the system
- Some are confined to a single state, while some cross multiple states (The terms ISO and RTO often used interchangeably)

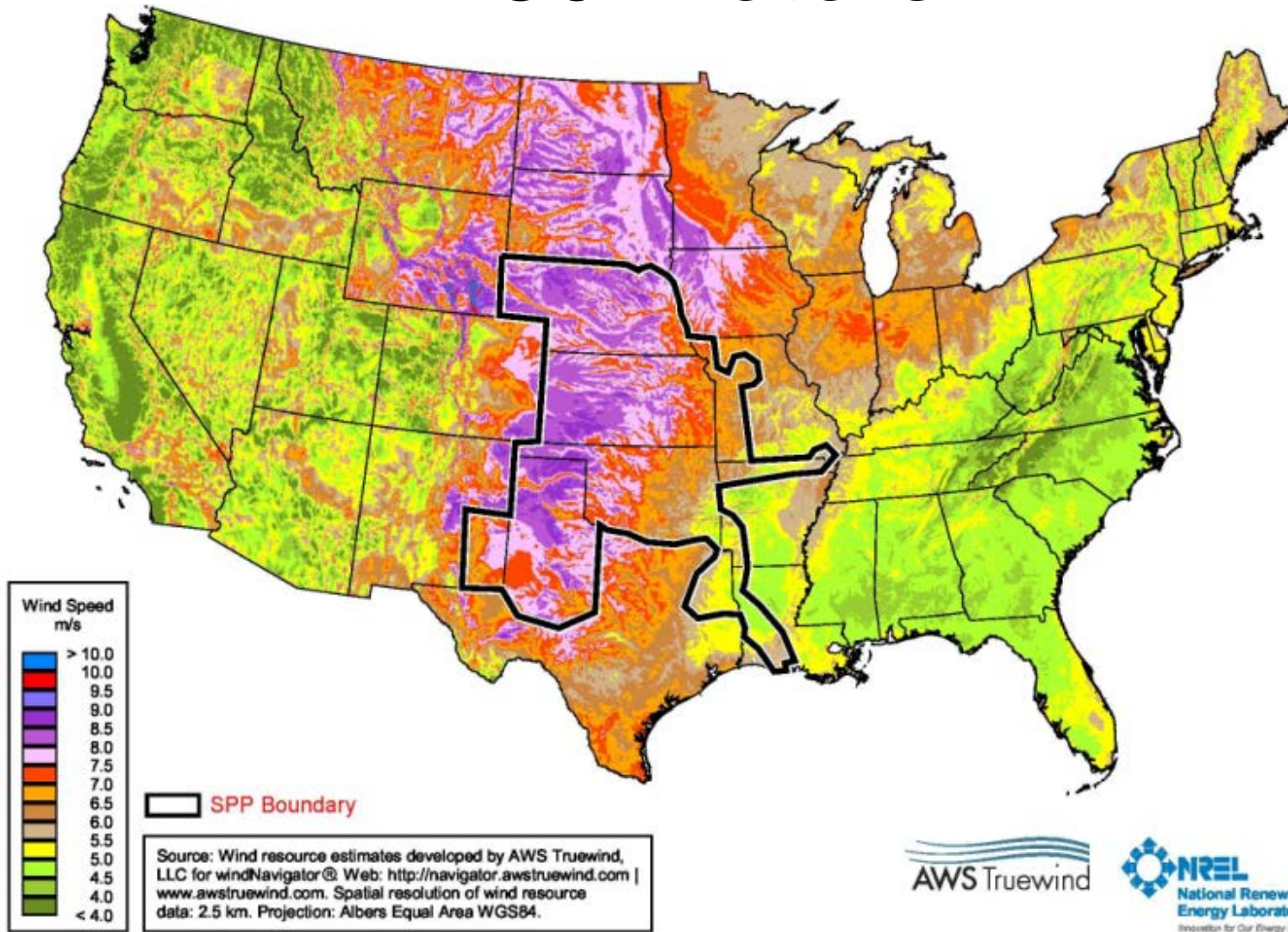
3 Interconnections / 8 NERC Regions



ISO / RTO Map



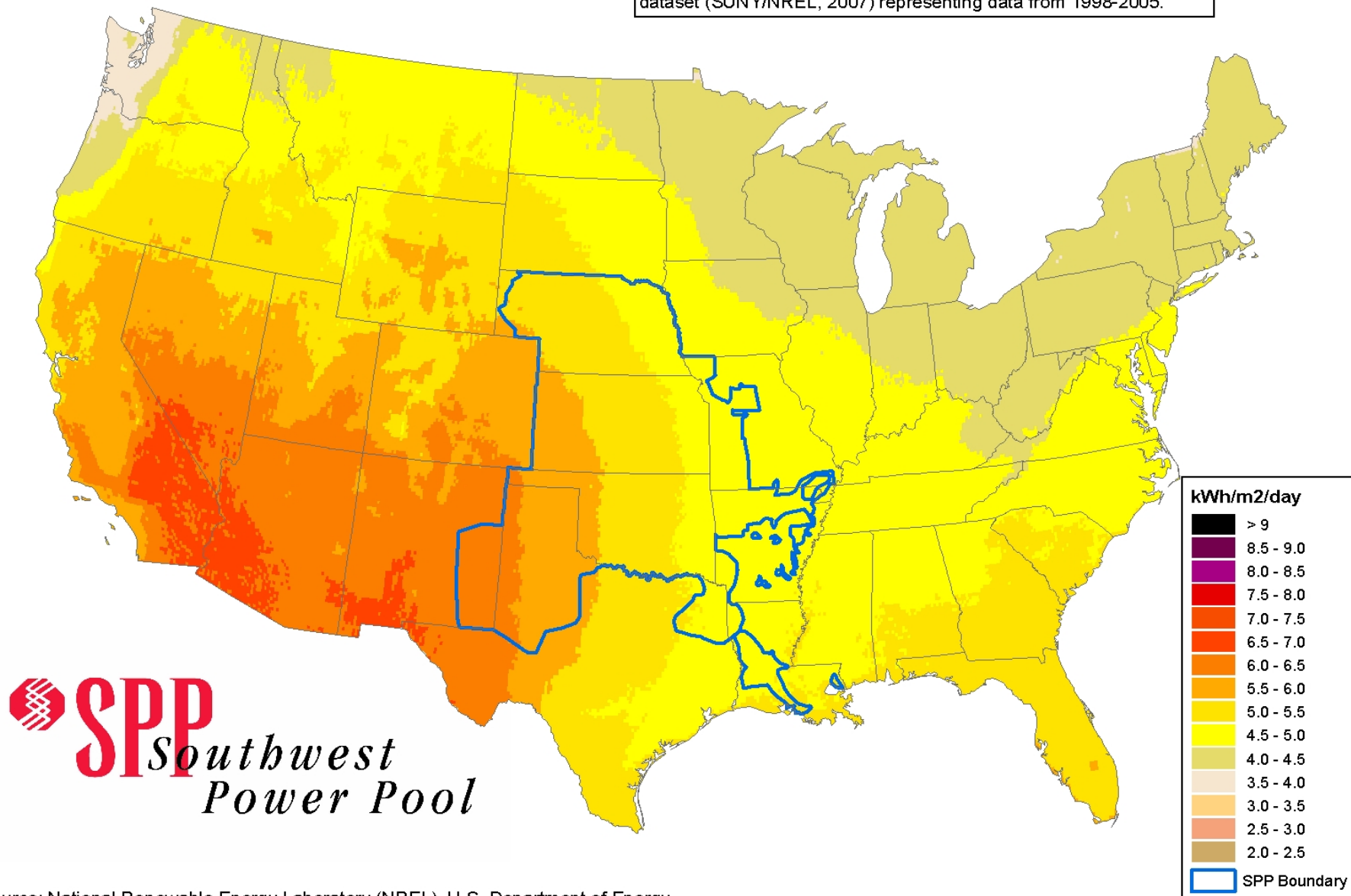
Annual Average Wind Speed - 80 meters



PV Solar Radiation (Flat Plate, Facing South, Latitude Tilt)

Annual

This data represents annual average solar resource potential for 48 Contiguous United States and Hawaii, in High Resolution. The data for Hawaii and the 48 contiguous states is a 10 km, satellite modeled dataset (SUNY/NREL, 2007) representing data from 1998-2005.



Regional Transmission Organizations Independent System Operators



- No standard market design for every ISO/RTO
- Manage and provide a central clearing house for transactions (transmission and generation) versus bilateral markets with parties working directly to establish terms and conditions
- Includes allocation of transmission rights, day ahead and spot market purchases
- Participants still negotiate bilateral arrangements as appropriate for business needs
- Provides more efficient grid management
- Participation is officially voluntary though FERC provides incentives to encourage membership

Regional Grid Enlargement in Bilateral Market Areas



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- Outside RTOs and ISO, there are many types of transmission owners, only some regulated by FERC.
 - FERC regulates only wholesale transmission by “public utilities.”
 - One-third of U.S. transmission is not owned by public utilities nor subject to full FERC wholesale regulation.
 - States regulate most transmission for retail power sales.
 - Transmission not fully regulated by FERC includes transmission owned by public power (governments), by most cooperatives, and by most of the utilities in Texas.
 - Outside RTOs and ISO, FERC’s ability to promote coordinated enlargement of the interconnected grid is weaker than in RTOs and ISOs because its policies to do not apply to all the owners of the interconnected system.

FERC Authorities and Rules



- **Transmission Reliability**
 - FERC implemented EPAct 2005 authority over transmission reliability.
 - The new authority is to protect existing grid but not to order additions.

- **Regional Transmission Planning**
 - Planning needs to be regional to get some new resources to distant markets and improve grid operations to lower customer costs.
 - FERC requires regional planning by the transmission owners and operators it regulates.

Regional Planning Process



RTO/ISO planning encompasses the regional footprint; stakeholders can provide input and advocate positions throughout the process

Project is submitted to RTO/ISO for modeling to evaluate the impact on the regional system, including costs and benefits



If the data shows the project is beneficial based on the RTO/ISO's established criteria, it is approved



Approved projects are eligible for cost recovery according to the RTO/ISOs methodology



Projects may proceed outside the planning process but no cost recovery through RTO/ISO will be available

Regional Planning is Expanding



- As a result of FERC Order 1000, regional planning and related cost allocation is expanding beyond ISO/RTOs to include other regions
- Certainty regarding cost allocation and cost recovery of transmission investments are critical for grid expansion
 - As you would expect, cost allocation is very challenging given complex and highly interconnected nature of the bulk power system and existing regulatory frameworks, not considering merchant transmission developments and opportunities which can transcend regions

Bilateral vs. Organized Markets



- Bilateral contract – a buyer and seller negotiate directly and sign a two-party contract to trade electric power.
- Outside the RTOs/ISO—mainly the Southeast, the upper Great Plains, and the West outside of California, wholesale power trades occur through bilateral contracts.
- Areas outside RTOs and ISOs are often called “bilateral market” areas.
- In the RTOs and ISOs, there are both bilateral markets and “organized” markets that pool all sellers and buyers.
- In the RTOs, FERC’s oversight of transmission is stronger because all transmission owners follow the RTO’s or ISO’s transmission policies approved by the Commission.

Some Obstacles To Carrying Out Regional Transmission Plans



- **Cost allocation**
 - A major obstacle to carrying out a regional plan is deciding “Who pays?” for it.
- **Transmission Siting**
 - Local transmission siting can be another obstacle to realizing a regional transmission plan.
 - EPAct 2005 gave FERC “backstop” siting authority in DOE designated areas.
- **Interregional Planning is next frontier**
 - DOE funded efforts for each interconnection
 - FERC Order 1000 is providing guidance and direction