



# Wind and Solar Projects Interconnection Issues **How do we Plug In?**

Transmission Summit  
Sweetwater, Texas  
January 15, 2010

*By:*

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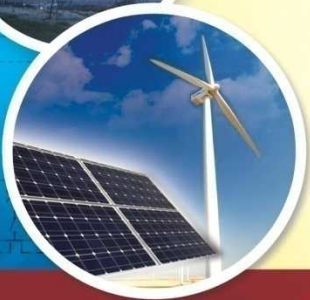
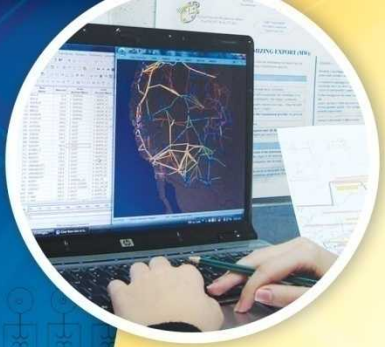
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Partner & Director, Int'l IGM

# Overview

- Generation Interconnection Queue
- Wind Penetration Levels
- Transmission Constraints
- Near-term Market Competition
- Interconnection Process Reform
- Strategy to Plug In
- **Solar & Wind**
- Change Gears

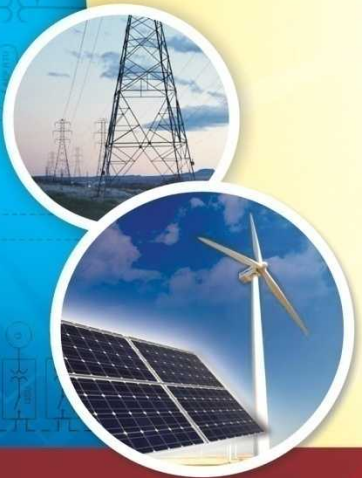
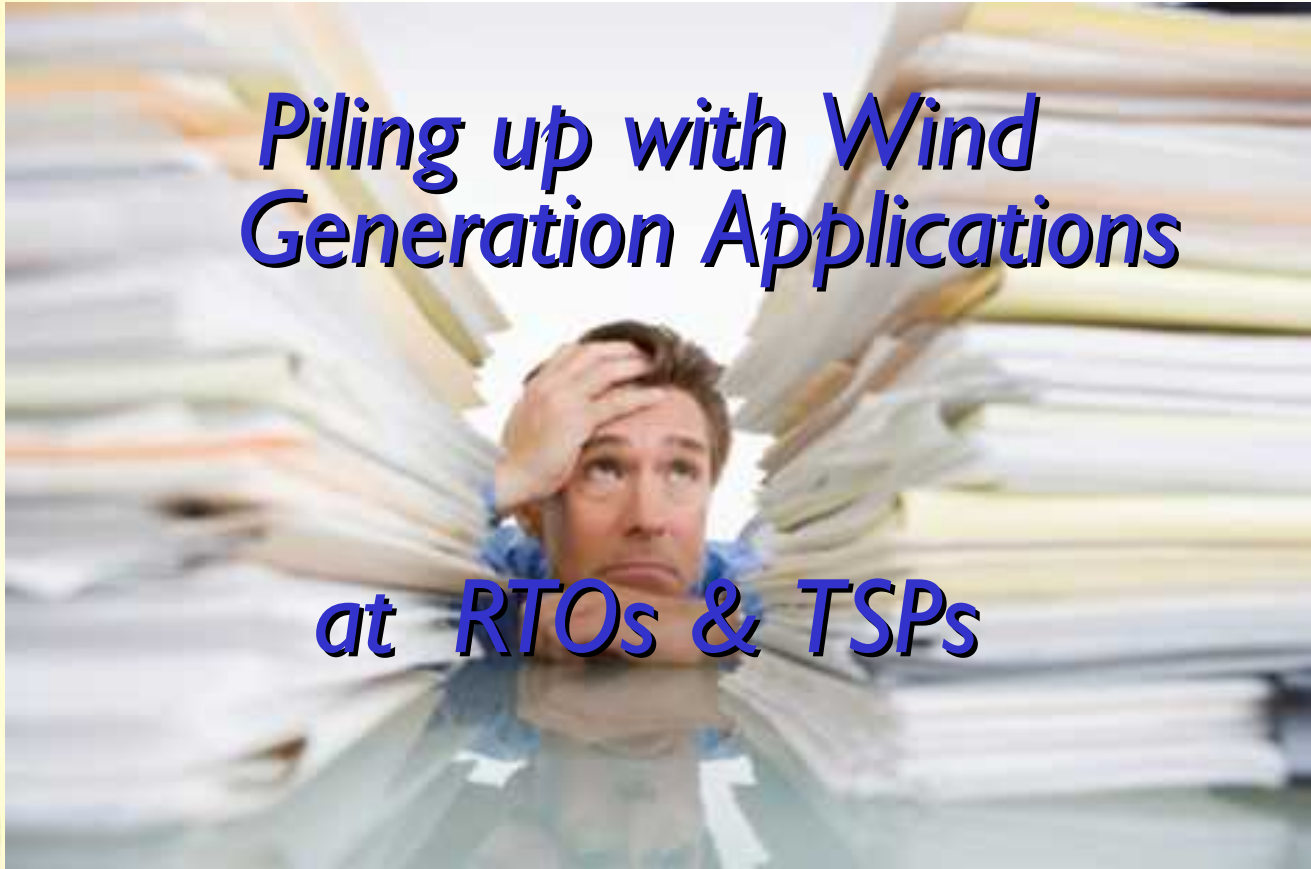


# Generation Interconnection Queue

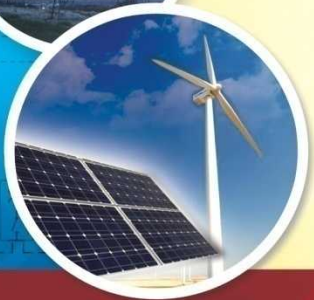
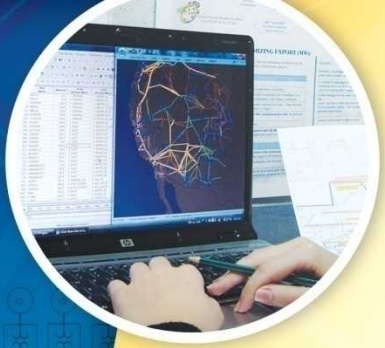


*Piling up with Wind  
Generation Applications*

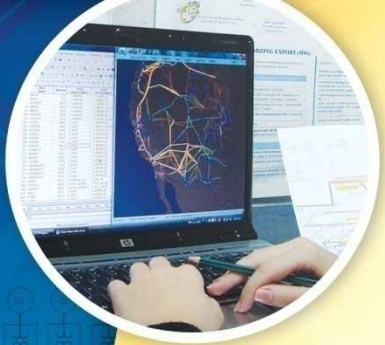
*at RTOs & TSPs*



# Wind Penetration Levels



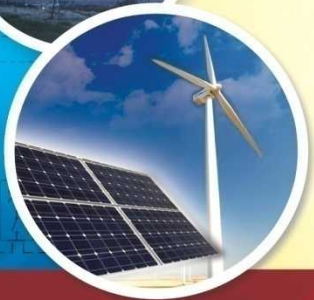
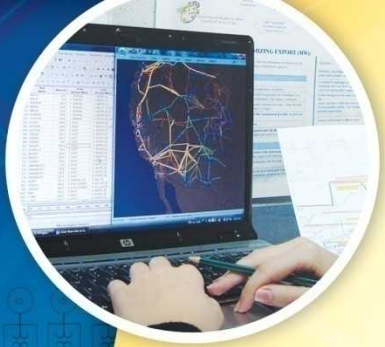
# Wind Penetration Levels COMPARE

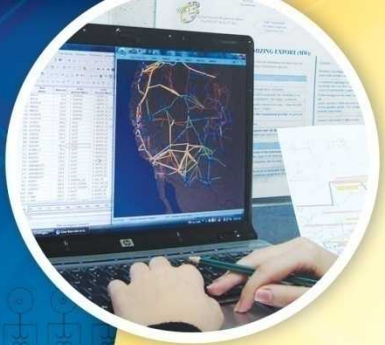


- Denmark is presently at **20%**
- China has a target of installing  $>150$  GW of wind power by 2020, which requires 11.5 GW of new wind capacity each year from 2009 onwards. In 2008, China increased its Wind installed capacity to 12.2 GW, according to the Global Wind Energy Council

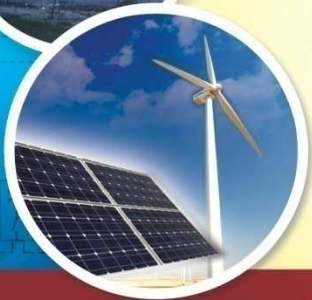
Presently, China's total generation capacity is at 860 GW

# Wind Penetration Levels

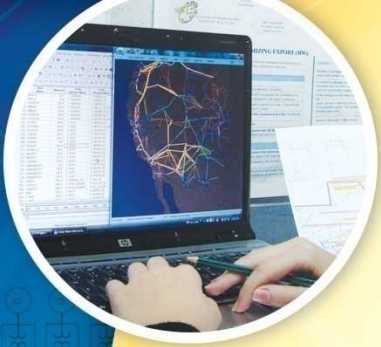




*So why do we have a problem?*



# Why are we constrained?

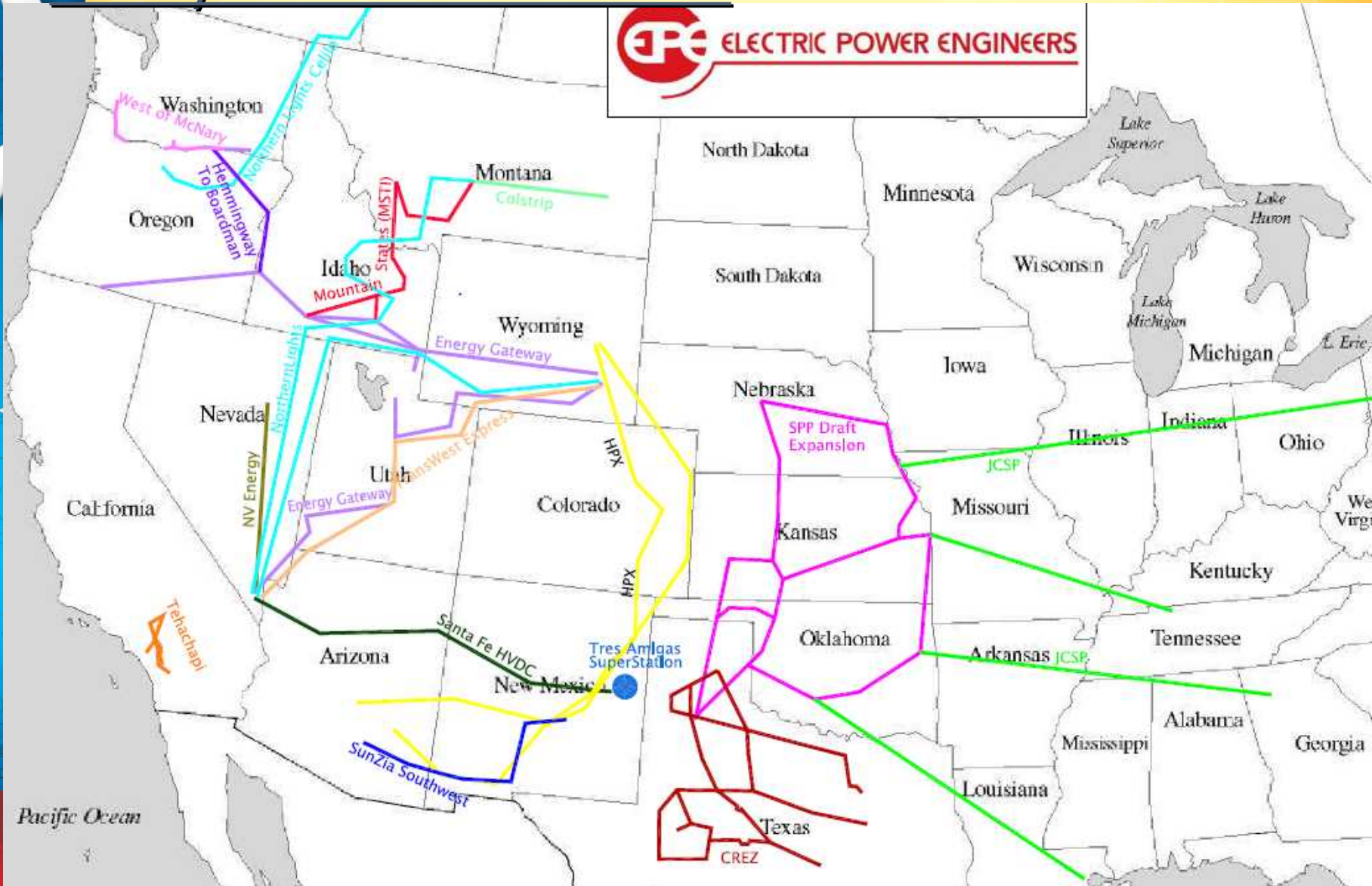


- **Must establish Larger Interconnected Energy Markets**

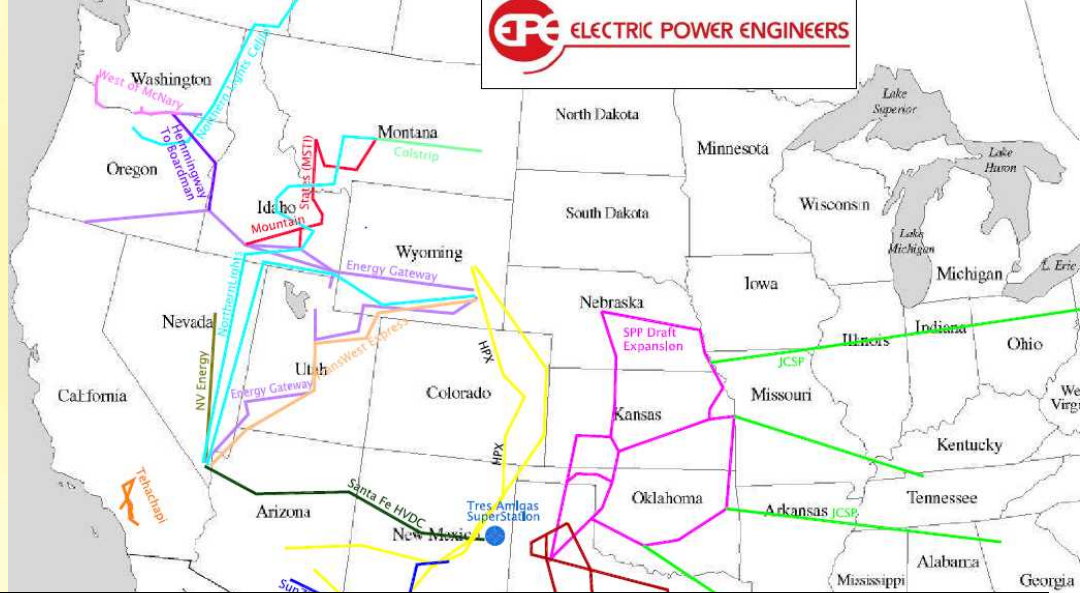


# Transmission Constraints

## Country-wide Transmission Plans



# Transmission Constraints

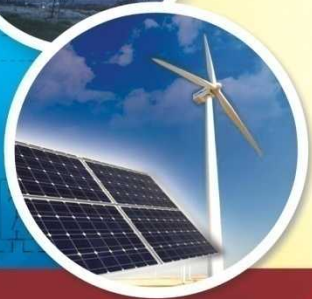
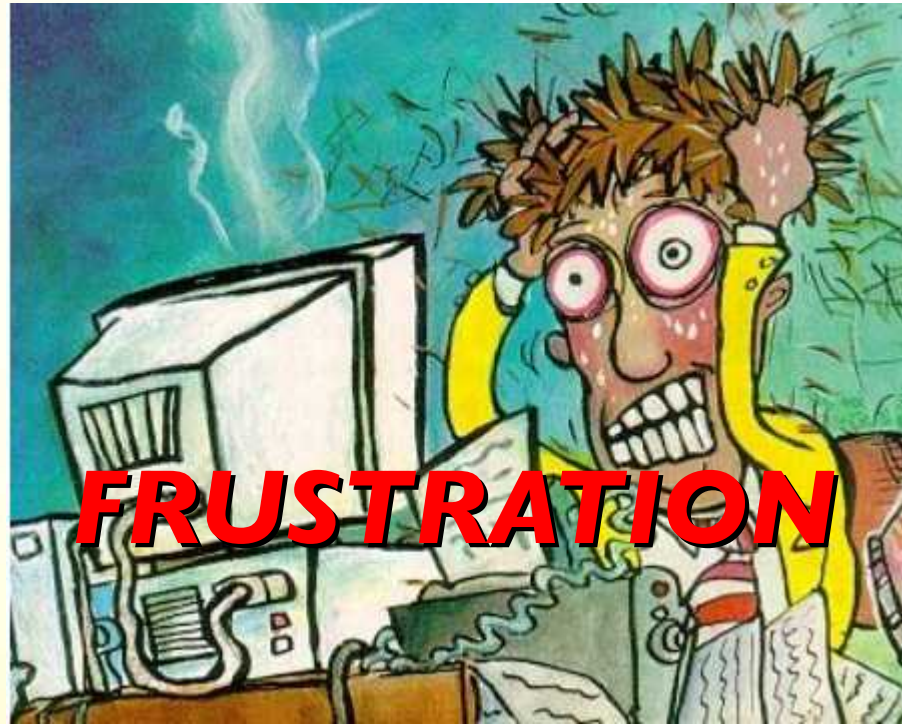
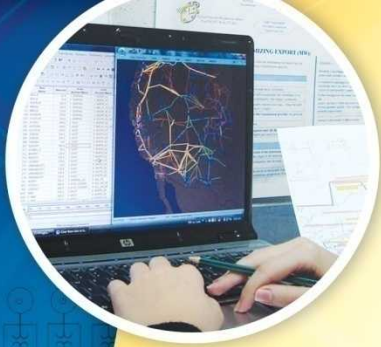


Project Name	Transmission Owner/Manager
Colstrip Transmission Upgrade	Northwest Energy
Energy Gateway	Pacificorp
Hemmingway to Boardman	Idaho Power Company
Mountain States (MSTI)	Northwest Energy
Northern Lights	TransCanada - Chinook Power Transmission
TransWest Express	The Anschutz Corp&Arizona PS &National Grid
West of McNary Gen. Integ.	Bonneville Power (BPA)
NV Energy	Nevada Power Company
HPX Expansion	Xcel Energy
Santa Fe HVDC	Integrated Transmission Solutions
Sunzia Southwest	Southwestern Power Group
CREZ	ERCOT
SPP Draft Expansion	SPP
Joint Coordinated System Plan (JCSP)	Eastern Wind Integration and Transmission Study (EWITS)
Tehachapi Renewable Transmission Project (TRTP)	Southern California Edison
Tres Amigas	Tres Amigas LLC

# Near-term / Market Competition



# Interconnection Process Reform



# Interconnection Process Reform



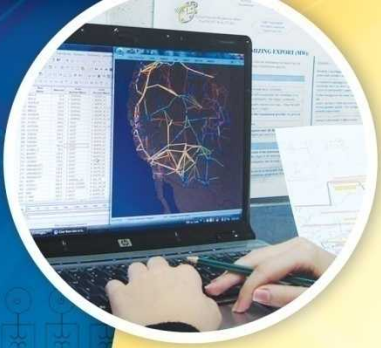
# Interconnection Process Reform

TO ...

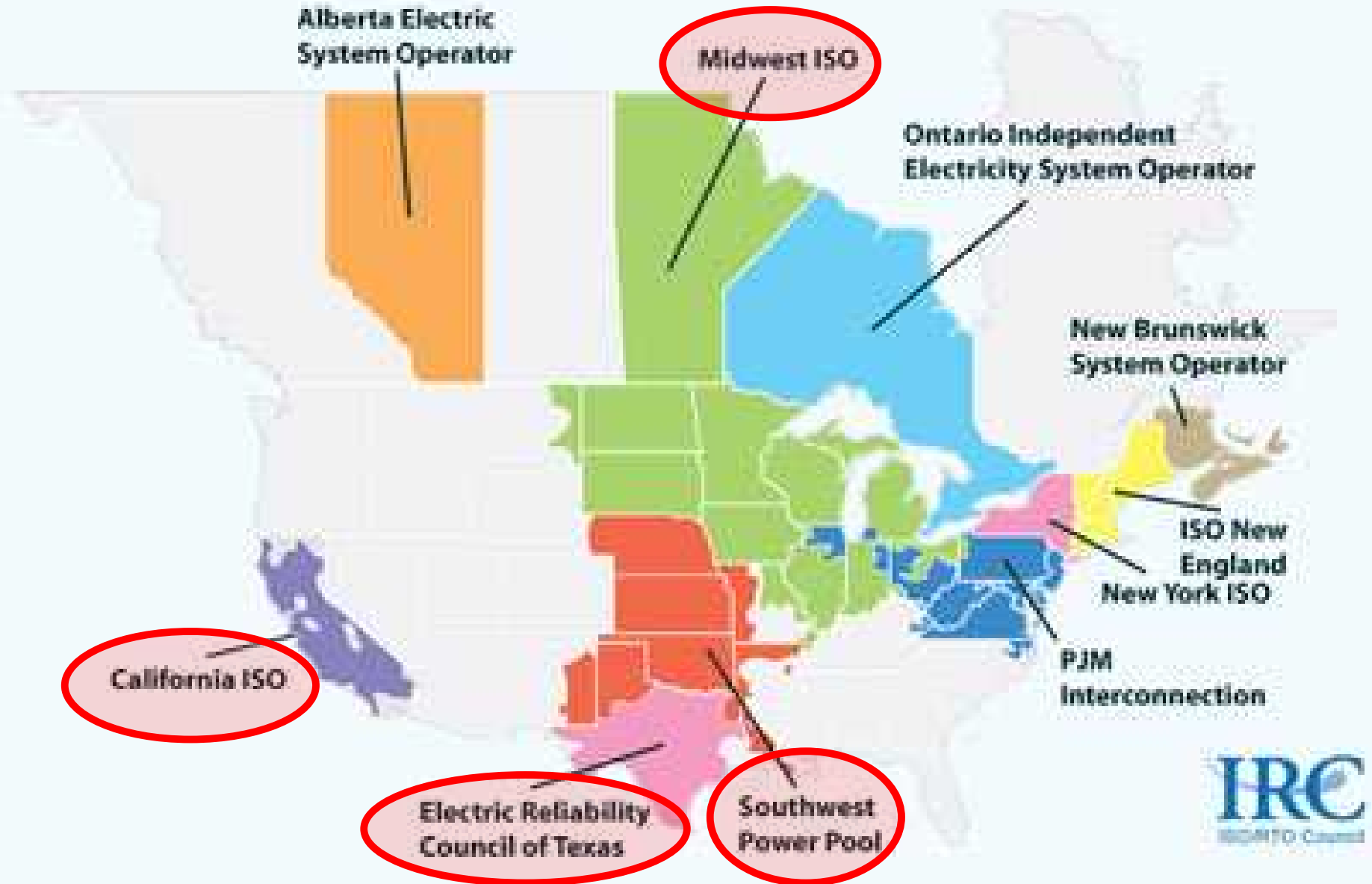
- Large deposits on initial application and studies
  - PPA / turbine supply requirements
  - Long duration Aggregate studies



# Strategy to Plug-in



# Strategy to Plug-in



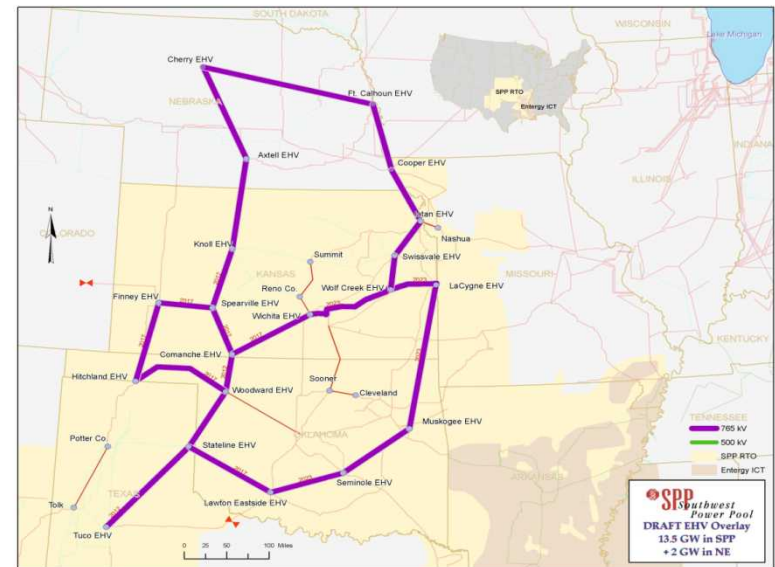
# Strategy to Plug-in

## SPP:

- Join Aggregate Studies. Could take minimum 4 years to interconnect
- Large Amounts of deposits and proof of readiness at Definitive Stage

Strike a PPA with a utility that will undertake the studies/ network resource

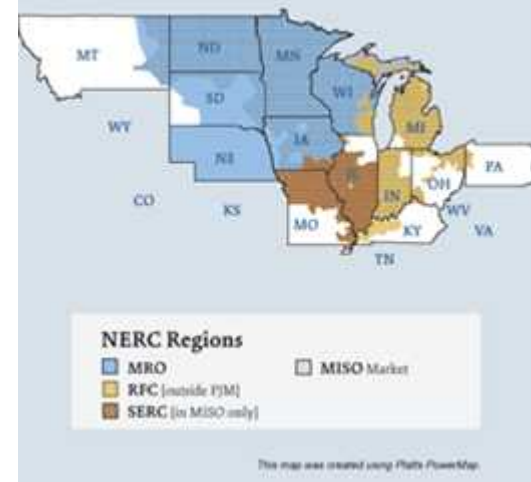
*Take into account planned upgrades, in particular priority projects in SPP*



# Strategy to Plug-in

## MISO:

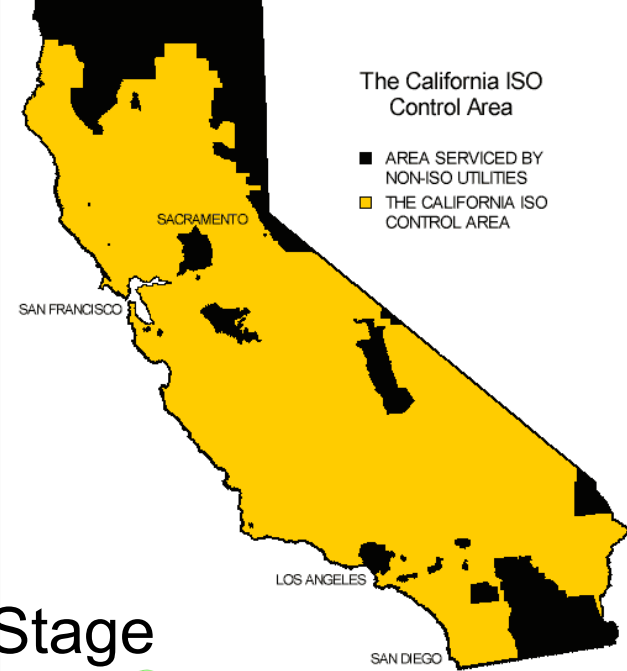
- Replaced “first-come, first-served with “first ready’ approach
- Take advantage of fast tracking of interconnection request that does not require additional network upgrades
- Congested Areas go into Clusters
- Must provide proof of turbine supply or PPA or financial commitment at definitive process stage



# Strategy to Plug-in

## CALISO:

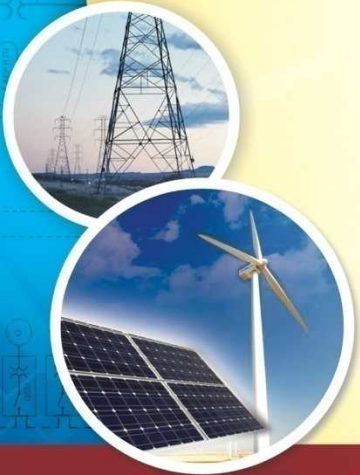
- Bypasses Feasibility Study Stage
- \$250,000 application Fee
- Cluster Studies



# Strategy to Plug-in



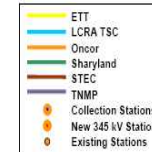
## ERCOT:



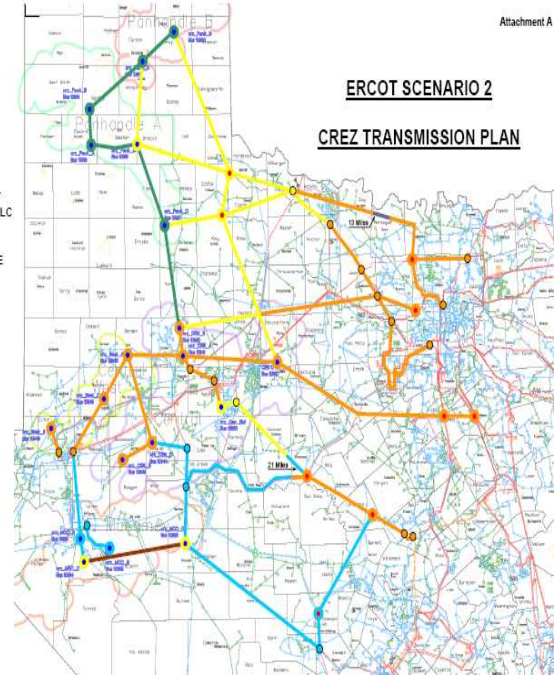
**Docket 35665**

### JOINT CREZ TRANSMISSION PLAN

ELECTRIC TRANSMISSION TEXAS LLC  
LCRA TRANSMISSION SERVICES CORP.  
ONCOR ELECTRIC DELIVERY COMPANY LLC  
SHARYLAND UTILITIES LP  
SOUTH TEXAS ELECTRIC COOPERATIVE  
TEXAS-NEW MEXICO POWER CO.

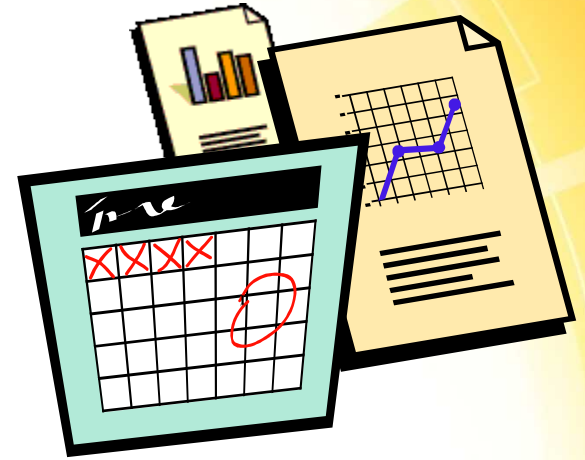


09-12-08  50 Miles

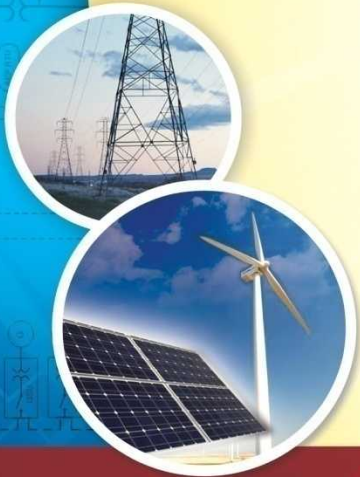


# Strategy to Plug-in

**ERCOT:**



- PPA competition Now, low prices for Wind  
Need:
  - Good financial analysis
  - LMP Analysis and understanding of the Nodal Market
  - Transmission Congestion and Curtailment analysis

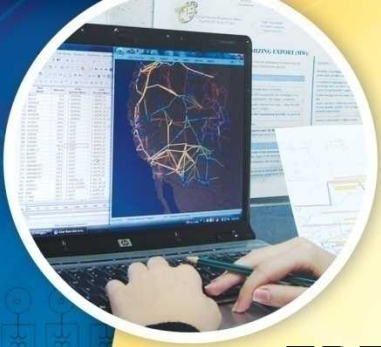




# Solar & Wind



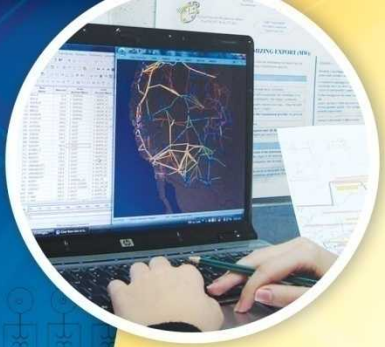
# Solar Projects Rising



- EPE consulting to more than 30 solar farm inquiries in 2009
- Only two projects in 2008 ...
- Technology and Price matured
- Rapid deployment
- Daytime peak power matches utility load profile
- Easier permitting

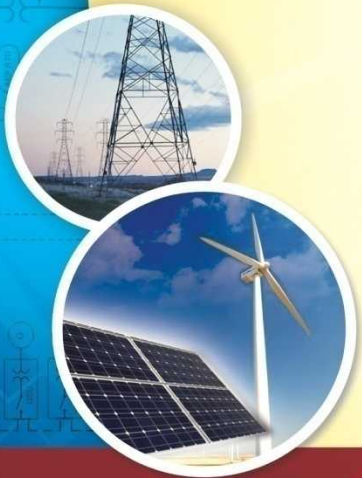


# Solar & Wind & Congestion



Transmission congestion facing wind.

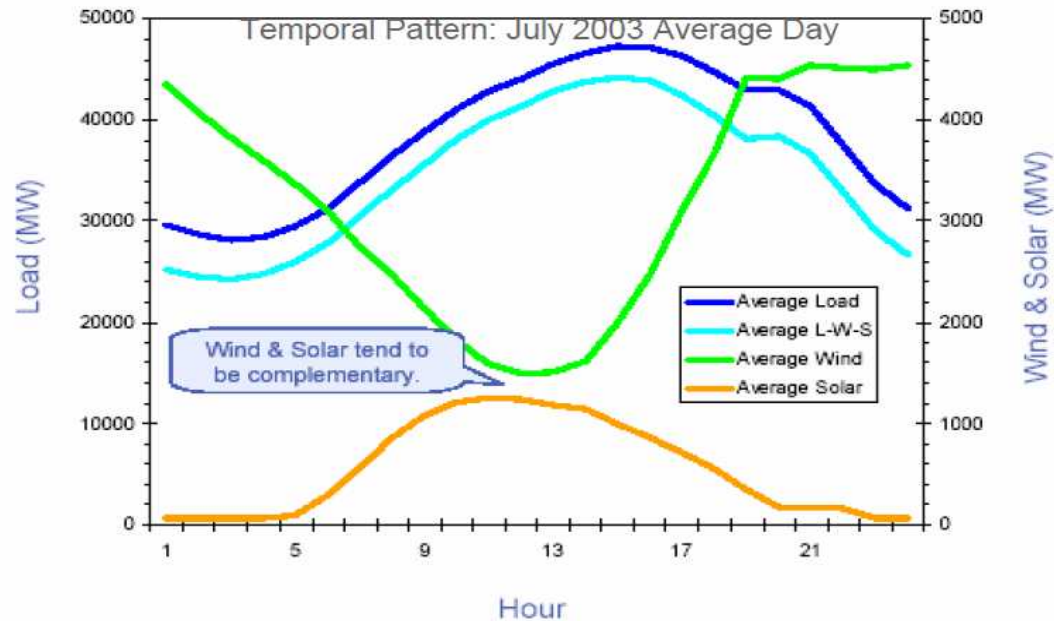
=> Fill in the blanks with Solar?



# Solar & Wind

## Solar fills in for Wind

Portfolio Fit : Higher capacity factors increase project attractiveness up to a certain extent only.



Utilities have more options available to balance the net short positions, usually, at a lower cost.

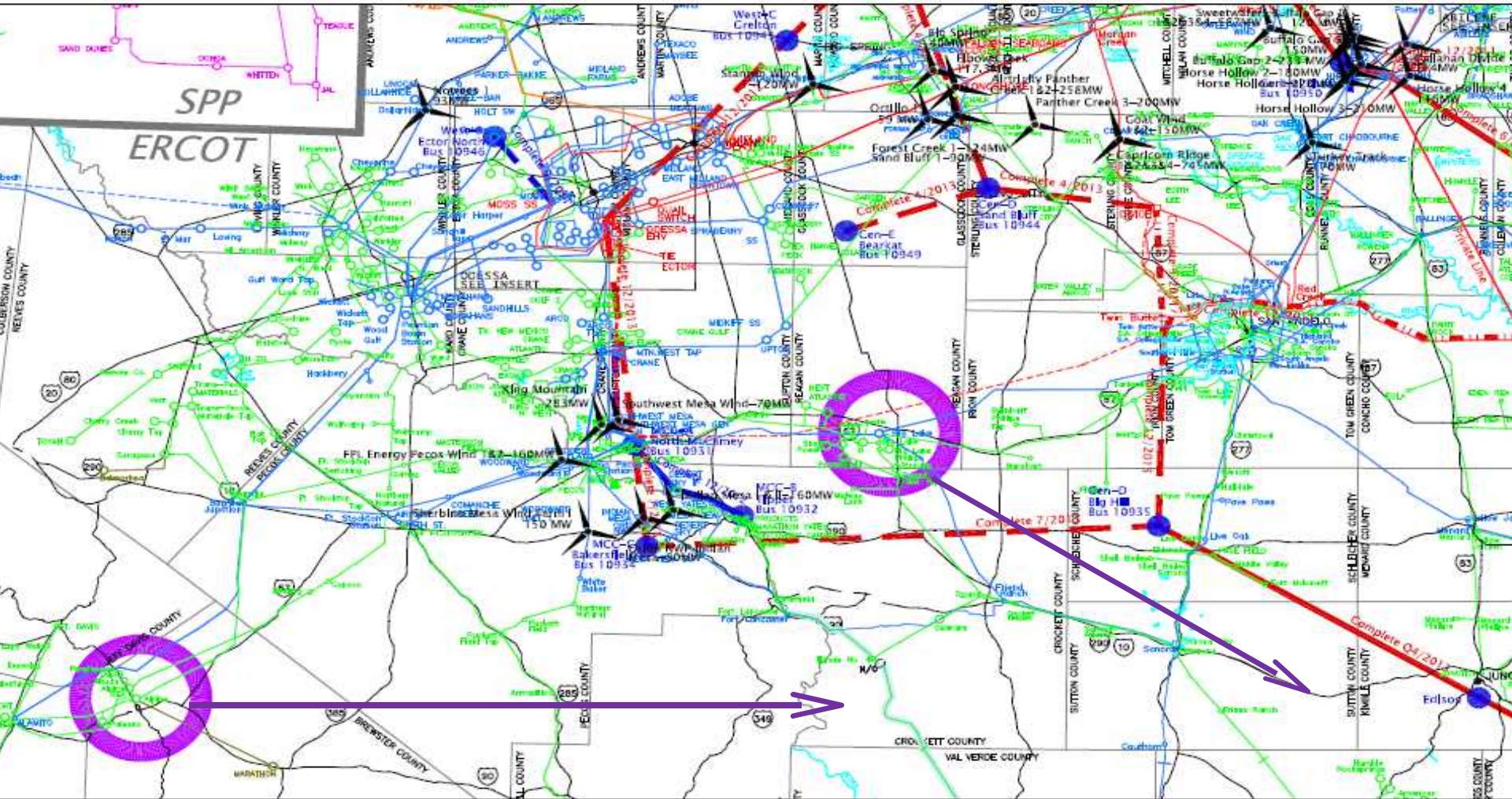
Reference: PG&E



Source: CEC PIER-funded study by GE Energy, July 2006

# Solar vs. Wind

## Less Transmission Constraints for Solar





S&W

## PSEG Solar Source Projects totaling 29.2 MW to be completed by end of 2010.

### Solar at New Jersey

(September 23, 2009 – Newark, NJ) - PSEG Solar Source today completed the acquisition from juwi solar Inc., of two utility-scale solar projects to be located in **Florida** and **Ohio**

## Abengoa Solar to build the first Solar

Denver, August 27, 2009 – has been selected by Xcel Colorado's largest electric to build a demonstration parabolizing concentrating solar power (CSP) plant near Grand Junction, Colorado.

### New York Times

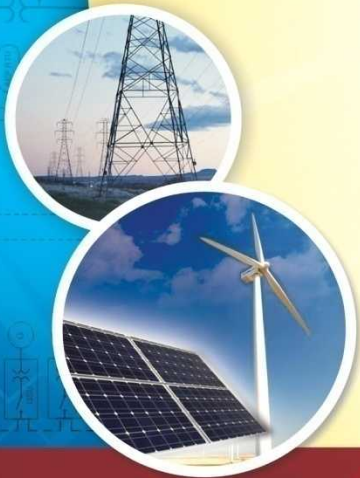
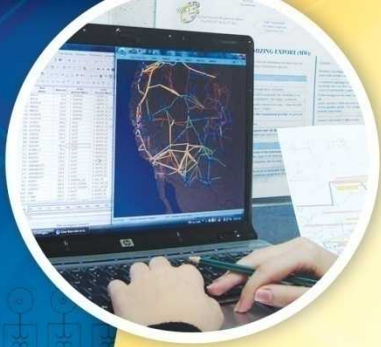
## Gemini Solar to Build Big in Austin

**Gemini Solar Development** scored its first deal this week, and it's for one of the largest solar photovoltaic plants in the country — a **30-megawatt plant in Austin, Texas** that's expected to go online by the end of 2010. The unanimous approval of the project by the Austin City Council serves as a clear sign that Gemini's future is a bright one.

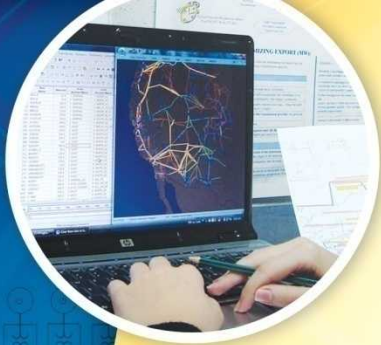
# Solar & Wind

## *New Challenges to Developers*

- More difficult to find transmission, than it is to find a good resource
  - ❖ Transmission screening comes first
  - ❖ Understanding Impact of proposed /new Transmission on Export Capacity
  - ❖ How to interconnect to and reserve capacity on new lines



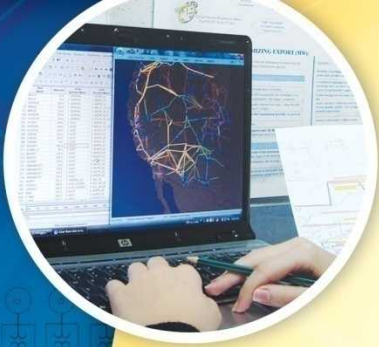
# Wind & Solar



## ...Additional Challenges to Wind developers

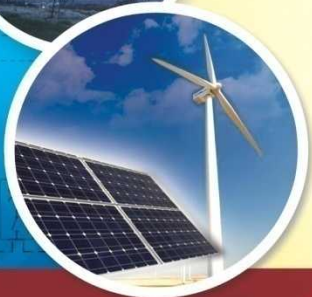
- Extensive Congestion and Curtailment analysis has become necessary in order to evaluate & project energy curtailment for financial analysis
- Nodal price analysis





*Time to:*

*Change Gears*

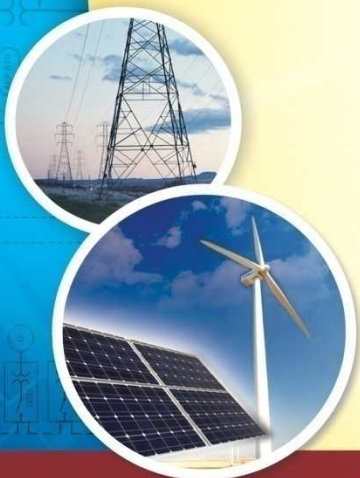


# Change Gears

Wind Developers need transmission  
**Think out of the b**



- Get involved with transmission projects
- Know who is planning what and when
- Learn who may build the line
- Introduce your project to transmission developers
- Fund/participate in planning transmission projects



# QUESTIONS



**Hala Ballouz, President**

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