

Renewable Energy Trading: United States-Mexico

John Kondziolka

Problem Statement

Interconnection between the power systems of the United States and Mexico is limited by:

- **a lack of transmission infrastructure,**
- **a frequency differential between the power systems**
- **and variable environmental standards.**

Additionally, as part of the process to achieve cleaner energy along the United States-Mexico border, current use improvements should be analyzed to identify currently operating systems that can be easily improved.

Transmission Limitations

THE TEXAS TRIBUNE

Lack of Transmission Lines Is Restricting Wind Power

By KATE GALBRAITH

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Texas is in the midst of a wind-power boom, and at the heart of it lies a conundrum: While plenty of ranchers are eager to host [wind turbines](#), few want the unsightly high-voltage transmission lines needed to carry the power to distant cities running through their property.

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Callie Richmond for The Texas Tribune

A new line will carry wind-generated power to this electrical substation near Comfort.

The lack of transmission lines — and the relatively low price of natural gas — has thwarted the ambitions of wind-power advocates to expand the use of this alternative energy source in Texas. The oilman [T. Boone Pickens](#), for example, bet heavily on wind a couple of years ago, ordering hundreds of turbines and announcing plans to build the world's largest wind farm in the Panhandle at a cost of up to \$12 billion. He later scaled back, canceling some of the turbine orders, giving up his land lease and saying he was looking elsewhere to build.

To encourage others, the state is moving forward on a contentious project to erect \$5 billion worth of transmission wires to connect the turbines to the cities that need power.

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Transmission Infrastructure

The Binational Obstacle	Solution Proposal
Transmission necessary for any energy trading	Contract for guaranteed purchasers as part of permitting process
Current interconnections generally only for emergency use	Ease of Presidential Permit restrictions
Speculation of transmission lines unprecedented, improbable	Include development of transmission as part of plant proposal
Project must precede transmission, but without transmission no guarantee of sale	National subsidies based on projected savings or revenue

Interconnect and Hz Differential

The Binational Obstacle	Solution Proposal
Mexico-U.S. grids are asynchronous (systems not compatible without proper conditioning)	Need AC – DC – AC conversion to correct
(would lead to unpredictable currents and power flows)	(could use high voltage DC lines, would need governing rules)
Security Level of Western U.S. grid significantly higher than that of Mexico's	Increased Security for Mexico's grid

Environmental Standards

The Binational Obstacle	Solution Proposal
Power plant construction is easier in Mexico due to less-restrictive environmental standards	Establishment of separate environmental standards for the border region (within 100 miles of border)
(Processing is Faster)	More restrictive is preferred, median is more probable
(Projects are Cheaper)	Economically favorable for Mexico is inversely related to politically favorable for US

Current Use Improvements

The Binational Obstacle	Solution Proposal
Water used for cooling drains resources from shared watershed	Dry or hybrid cooling system (marginally less efficient, higher cost)
Pollution from power plants affects health in both countries	Emissions capture, scrubber systems, “best available technology”
Lack of funding (ubiquitous)	Funding: US can utilize international financial transfer programs to pursue own interests in cleaning border region

Case Study: CO Xcel Energy

- **Upgrades as response to Clean Air Legislation**
 - Retires 900 MW of coal generation by 2017
 - Repowers 994 MW of coal with efficient natural gas
 - Retrofits 950 MW with modern emission controls
- **Costs \$1.3 billion over 12 years**
- **Saves \$250 million over complete retrofitting**

Conclusion

This problem presents itself with plausible solutions from an engineering point of view. It will take a lot of work on both sides of each country in order to succeed from different law makers and other companies. Recommended solutions from current research were:

- Guarantee success of transmission prior to construction**
- General upgrade of CFE grid prior to interconnection**
- Border region compromise on environmental standards**

Questions

Contact: John.Kondziolka@asu.edu