



Net Environmental Impacts of Transmission Systems in the Midwest



Global WINDPOWER 2004
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Union of Concerned Scientists
Citizens and Scientists for Environmental Solutions

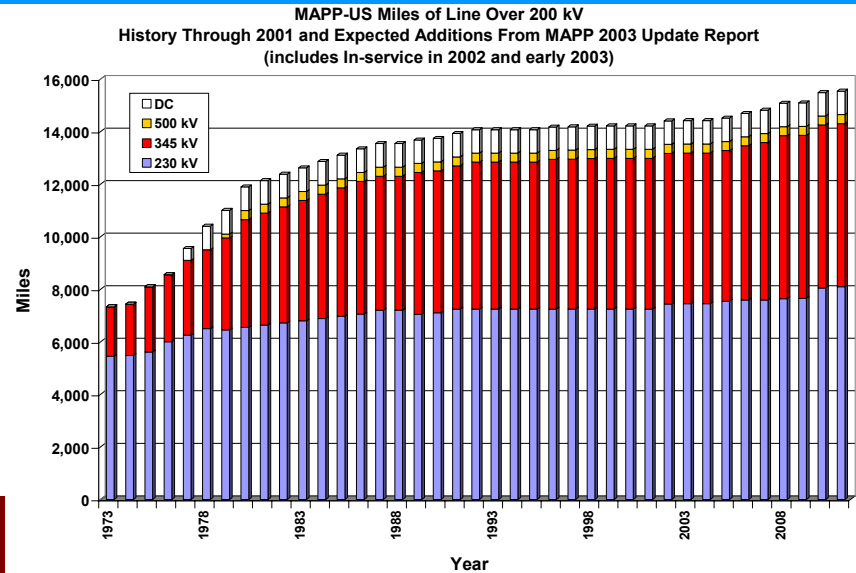
Context

- ❖ No significant new transmission in the upper Midwest in over two decades; load has grown steadily.
- ❖ Midwest states are increasing policy support for renewable energy.

	Wind Power, MW			
	Existing ¹	Total Potential ²	% of State Consumption in 2010 ³	
			5%	10%
Illinois	50	6,980	2,668	5,336
Iowa	471	62,900	827	1,654
Minnesota	563	75,000	1,250	2,499
Nebraska	14	99,100	559	1,118
North Dakota	66	138,400	220	440
South Dakota	44	117,200	187	374
Wisconsin	53	6,440	1,363	2,726
Total	1,261	506,020	7,073	14,147

Notes:

1. Nameplate MW, American Wind Energy Association, January 2004, <http://www.awea.org/>
2. Avg MW (approx. 1/3 of nameplate capacity), *An Assessment of Windy Land Area and Wind Energy Potential*, Pacific Northwest Lab, 1991
3. Wind power nameplate capacity; 35% net annual capacity factor and % consumption based on energy and growth from Energy Information Administration, 2001, http://www.eia.doe.gov/cneaf/electricity/st_profiles/profiles.pdf



- ❖ New market participants such as wind power are transmission dependent.
- ❖ Several large new coal plants are proposed in the region.

Key Issues Include:

- ❖ MISO/MAPP are responsible for regional transmission planning
- ❖ Each state makes decisions on new transmission proposals on several levels including policy, regulatory, and siting/routing.
- ❖ Achieving regional consensus on the policy level prior to undertaking the regulatory and siting proceedings is critical to success.

Criteria for Transmission Expansion

The primary drivers for expansion include reliability, economics, and policies:

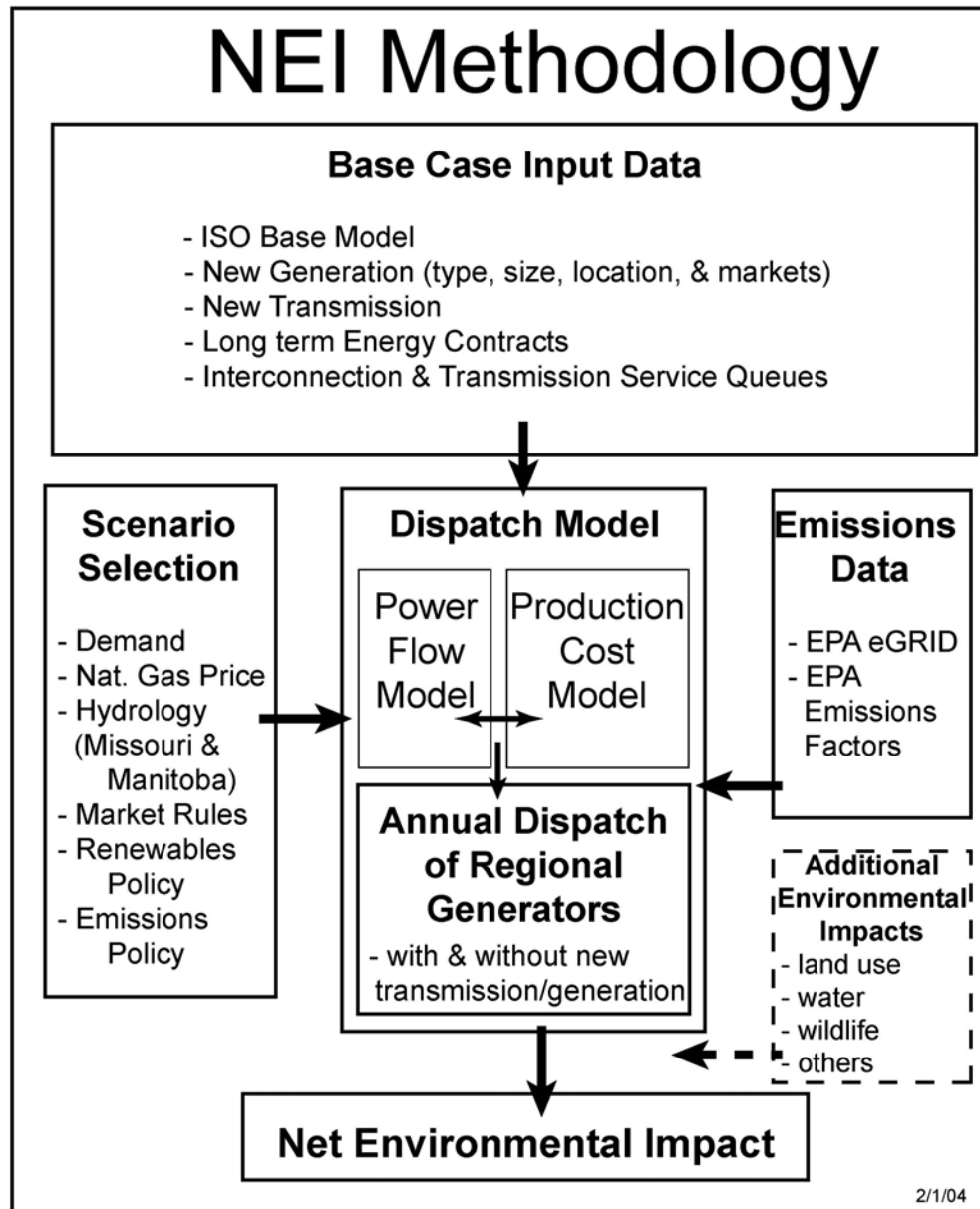
- Reliability criteria for new transmission are well established;
- Economic criteria are under development in many regions including the California ISO, PJM, & the Midwest;
- Policy criteria are needed for evaluating regional environmental impacts.

Objectives

- ❖ Link existing state environmental and transmission siting policies with regional criteria for expansion of the transmission system
- ❖ Develop a methodology for estimating regional net environmental impacts of new transmission expansion
- ❖ Demonstrate the method on a set of exploratory lines in the 2003 Midwest ISO Transmission Expansion Plan



NEI Methodology



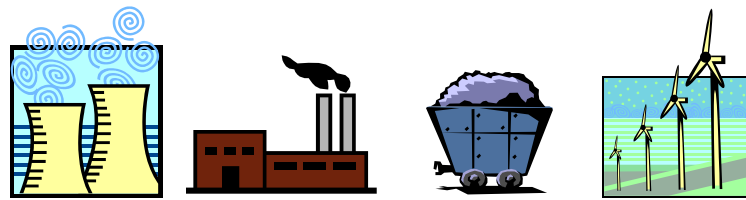
MISO Transmission Expansion Plan (MTEP 03) Objectives

- ❖ Ensure Reliability
- ❖ Identify Commercially Beneficial Expansions

Includes:

- Transmission Owners Local Plans
- Requests for Generation Interconnection & Delivery
- MISO Observed Reliability Needs
- Input from Stakeholders

Generation Scenarios

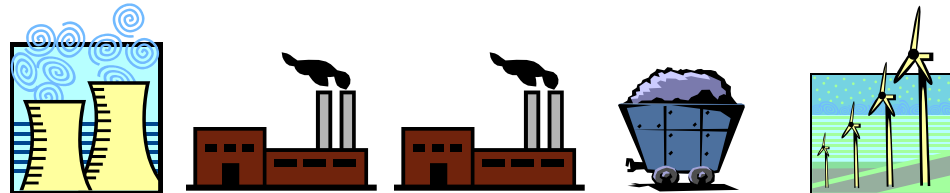


**Base Generation
(Committed)**

Reserve

16%

----- 38,000 MW of Generation from Queues Added -----



**High Gas
(Queue)**

30%



**High Coal
(Coal for Gas)**

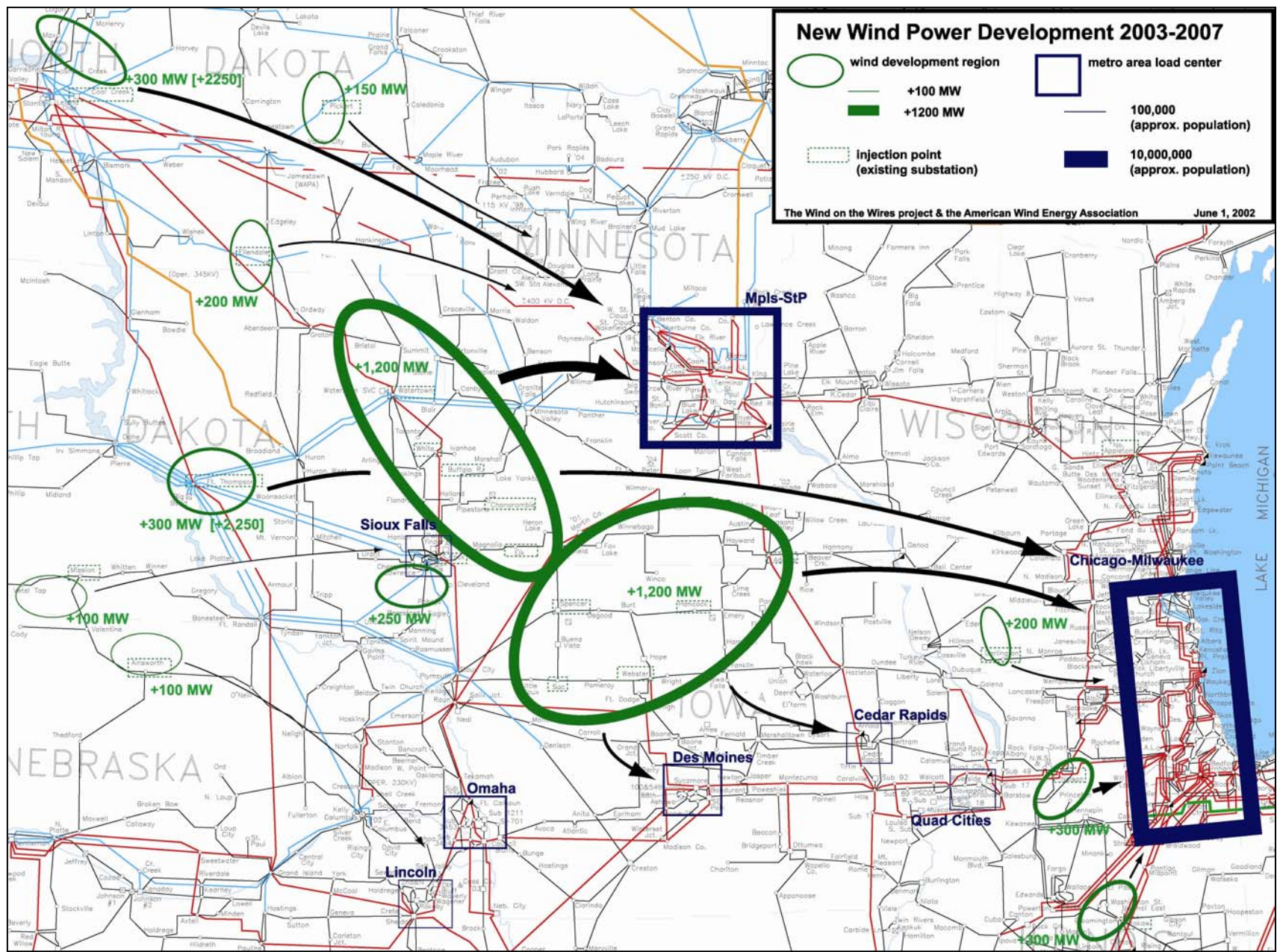
30%



**High Wind
(Queue + Wind)**

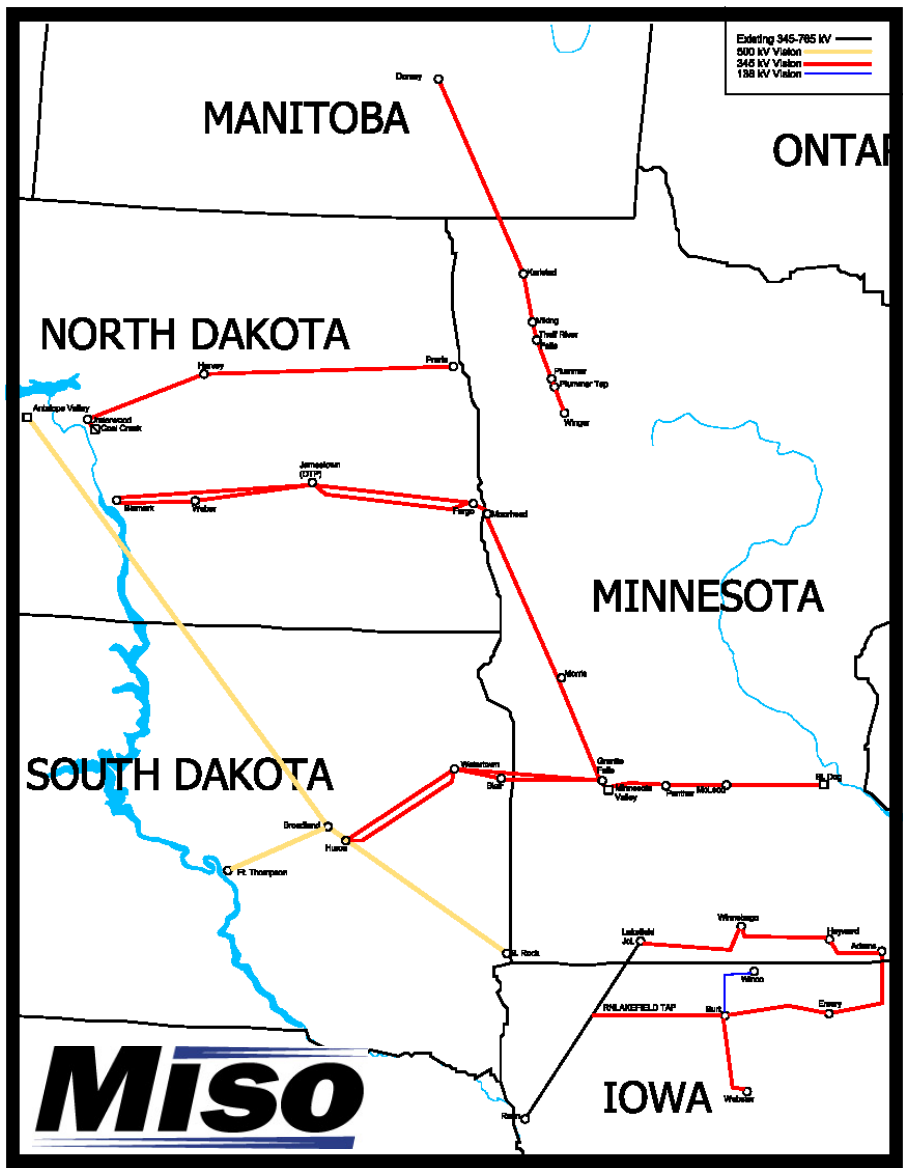
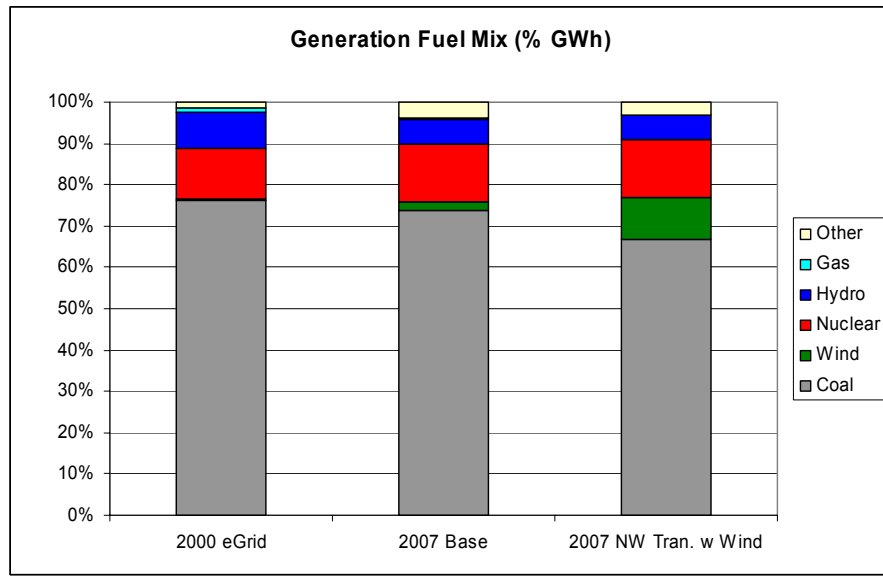
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MISO

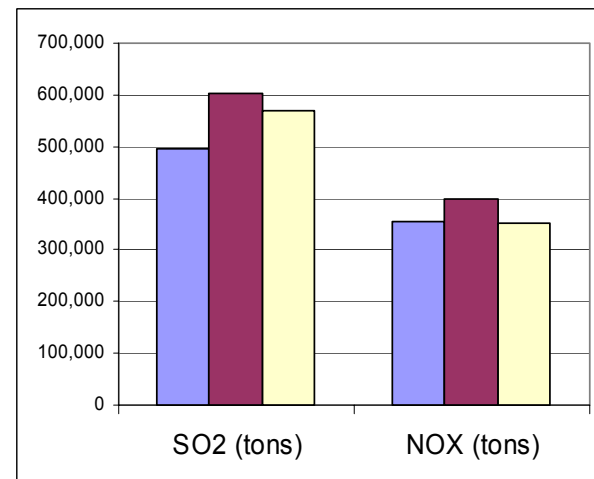
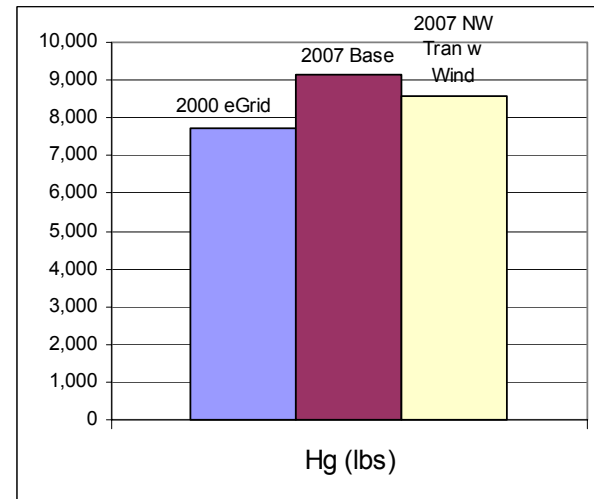
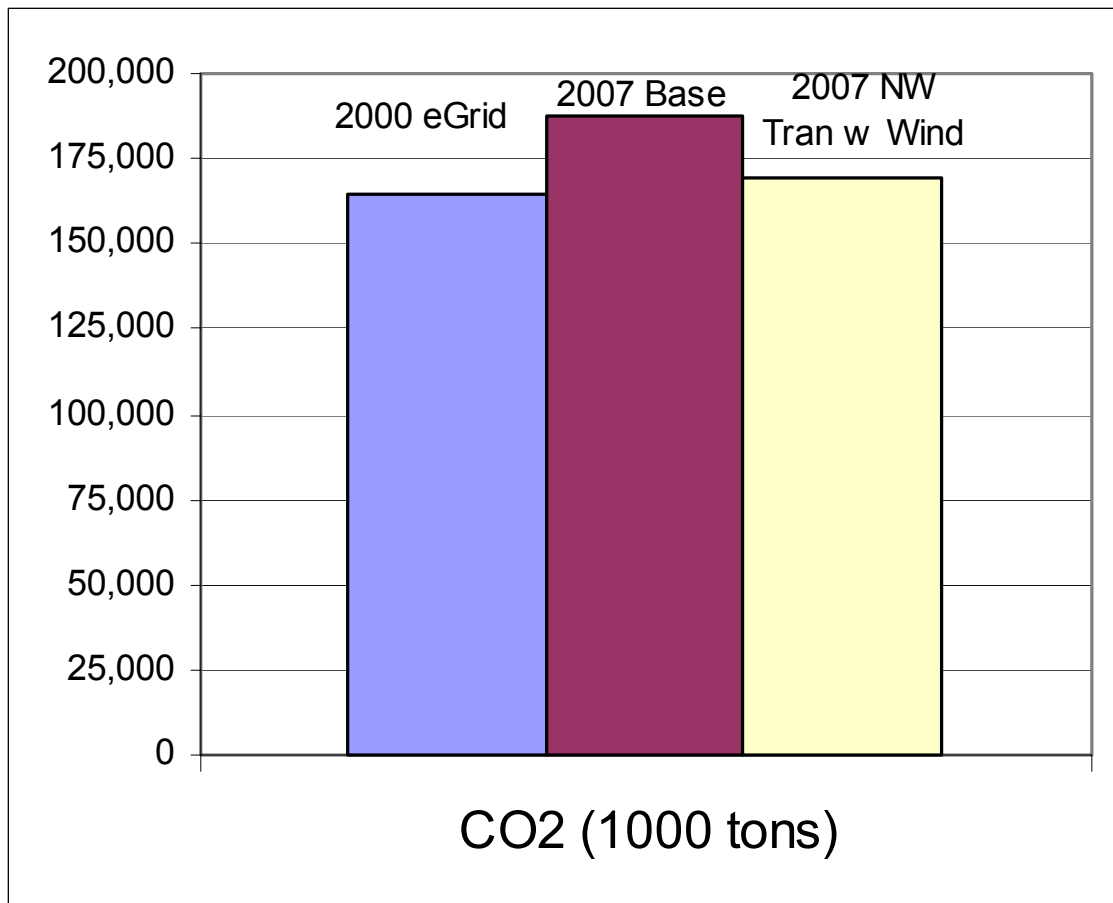


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Case Study: Northwest Exploratory Transmission



Regional Environmental Results



Summary

- ❖ To date, the regional environmental impacts that new transmission lines have on the operation of the electricity grid have not been fully considered
- ❖ Achieving regional consensus on the purpose and use of new transmission is critical for success; requires a clear understanding of the regional environmental impacts
- ❖ The case study illustrates that building new transmission lines to support remote wind power development can result in significant regional emissions reductions
- ❖ This initial approach to estimating net environmental impacts has shortcomings and should be further developed.

