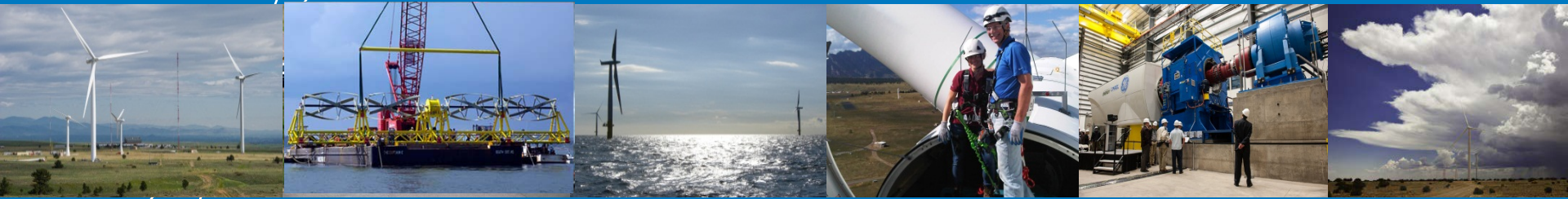


Wind Power Siting: Public Acceptance and Land Use



Suzanne Tegen

WINDEXchange Webinar

June 17, 2015

Overview

- **Current NREL Research**
- **The DOE *Wind Vision*: public acceptance and land use**
- **Why does public acceptance of wind power matter? When does it matter most?**
- **Where is the wind resource best?**
- **Where are the people?**



Research Questions and Method

DOE tasked NREL to depict the wind energy deployment process and to research wind energy deployment considerations. Questions:





- How much money and time do developers spend on competing uses?
- Are there some areas no longer developable due to these siting considerations: radar, public engagement, wildlife (birds and bats)?

NREL:

- Performed in-depth interviews with wind developers and consulting firms
- Aggregated developer data and used it to determine cost adders for model runs and impacts to developable land for GIS-based maps
- Created maps of the U.S. wind resource overlaid with different siting considerations
- Created supply curves based on real data
- Used supply curves as inputs to ReEDS scenario modeling (to 2050)
- Consulted with developers to make sure our conclusions match what they meant to convey
- Is currently finishing an NREL technical report on results.

Costs, Benefits, and Impacts Summary

The Potential of 35% of the Country's Electricity Coming from Wind Energy by 2050

Costs	Benefits		
			
\$149 Billion [3%] savings	GHG: 14% less GHG; \$400 Billion savings	\$ 108 Billion savings; 22,000 lives saved	260 Billion gallons [23%] less consumption





Additional Impacts

				
Energy Diversity	Jobs	Local Revenues	Land Use	Public Acceptance and Wildlife
Electricity prices 20% less sensitive	~ 600,000 gross jobs	\$1.0 Billion/year in land leases \$3.2 Billion/year in tax payments	1.5% area of contiguous US Less than 1/3 area occupied by golf courses in US today	Responsible siting; Optimizing coexistence






The *Wind Vision* Study Scenario results in modest increases in electricity cost in the near- and mid-term (<1% price increase), but in the long term, electricity costs savings of 2% are achieved by 2050.

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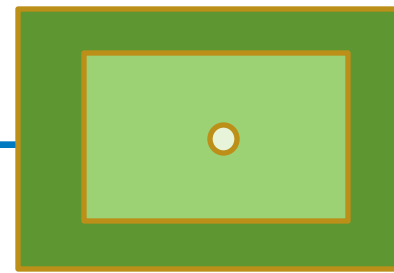
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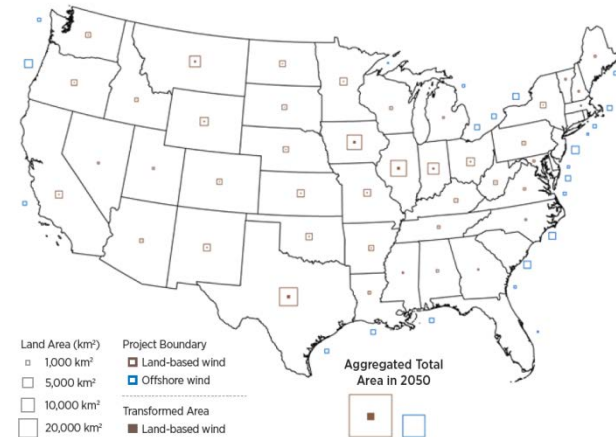
Wind Power and Land Use



How much space do wind farms occupy?

The answer is...it depends.

- Construction access
 - Permanent access roads
 - Environmental monitoring
 - Turbine foundations
 - Entire site perimeter (still available for grazing, farming).
- **Wind Vision Scenario: 0.04% of contiguous U.S. land in 2050.**





Public Engagement and Acceptance: Why Do They Matter?

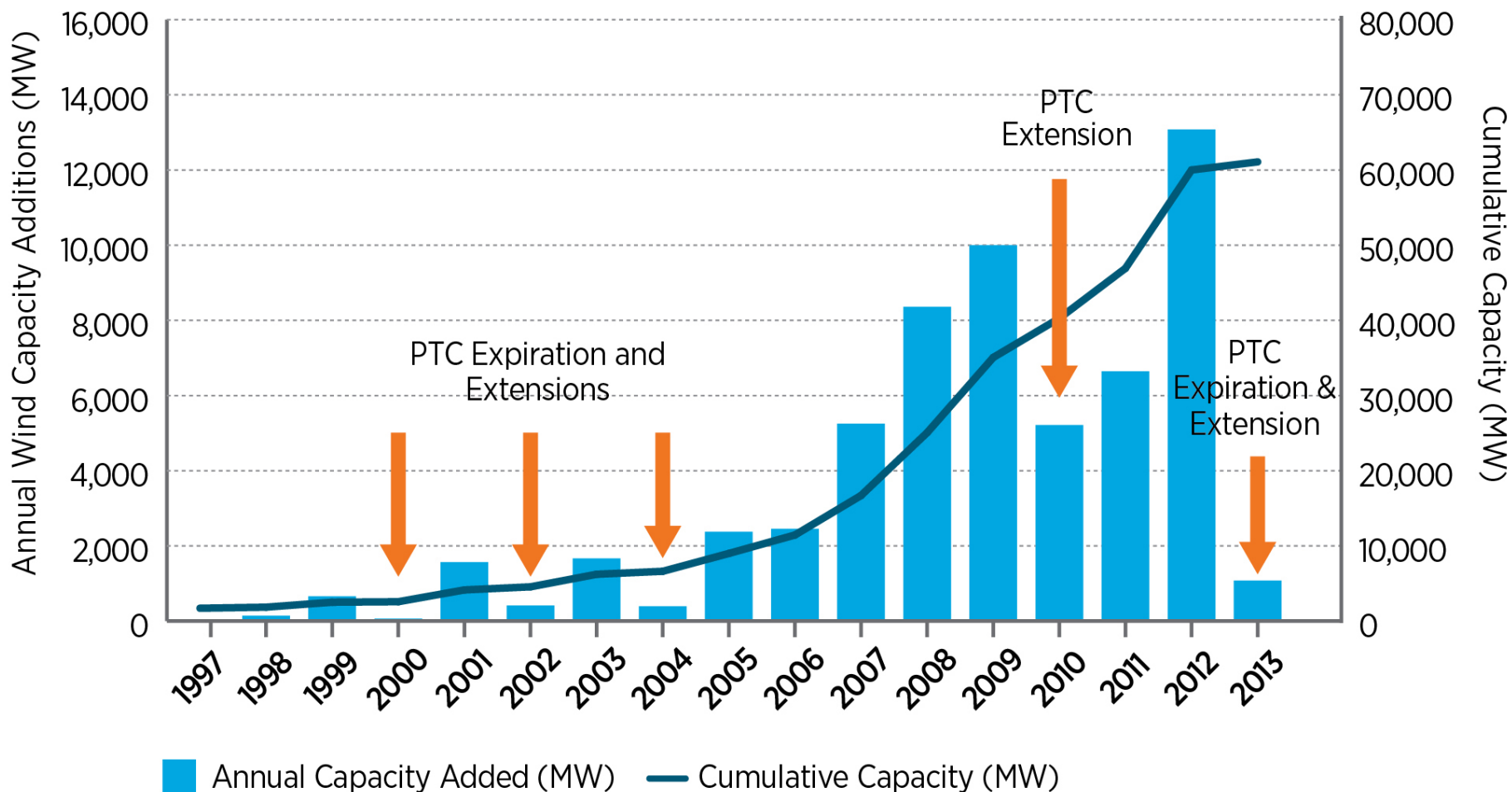
Local Misunderstandings Stop Projects



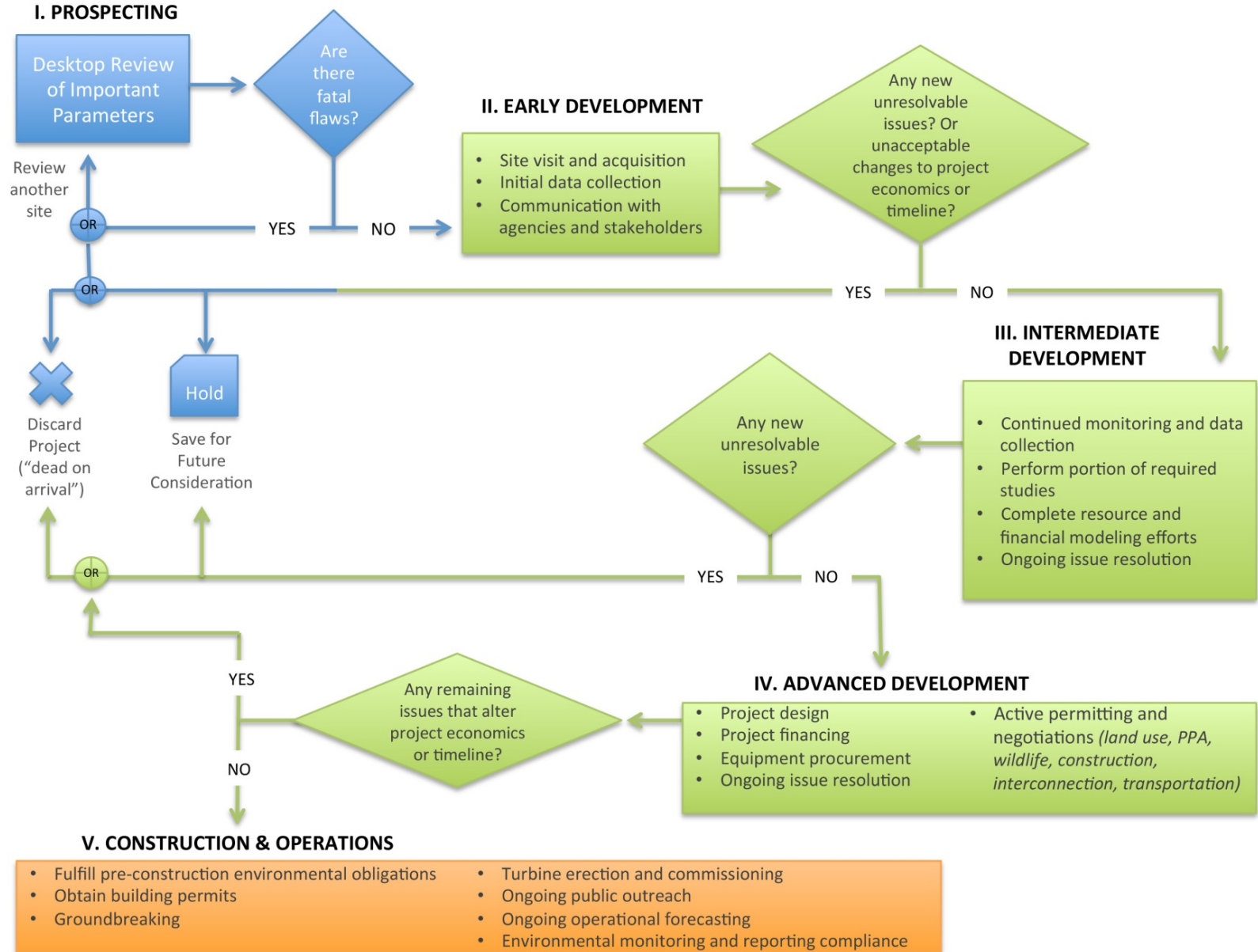
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National Policy Impacts on Wind

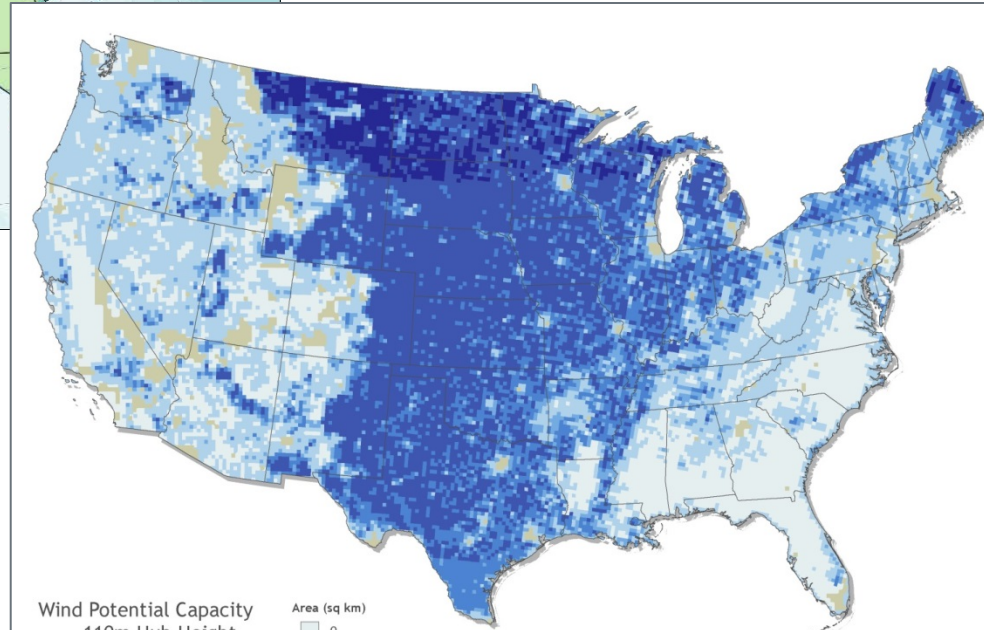
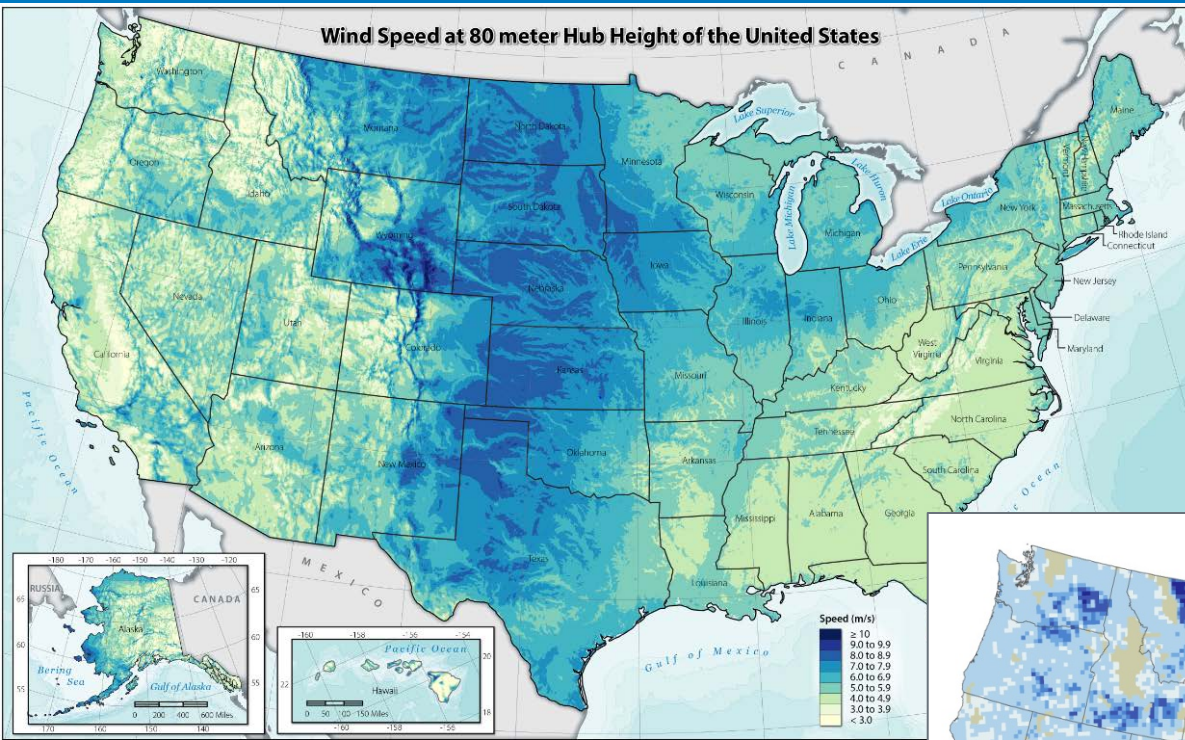
Policy uncertainty has resulted in fluctuations in historical wind deployment



When Does Public Engagement Matter?



Where Is the Wind?



Wind potential capacity at 80-m and 110-m hub heights

35% or Higher
Gross Capacity Factor

2014 Turbine Technology

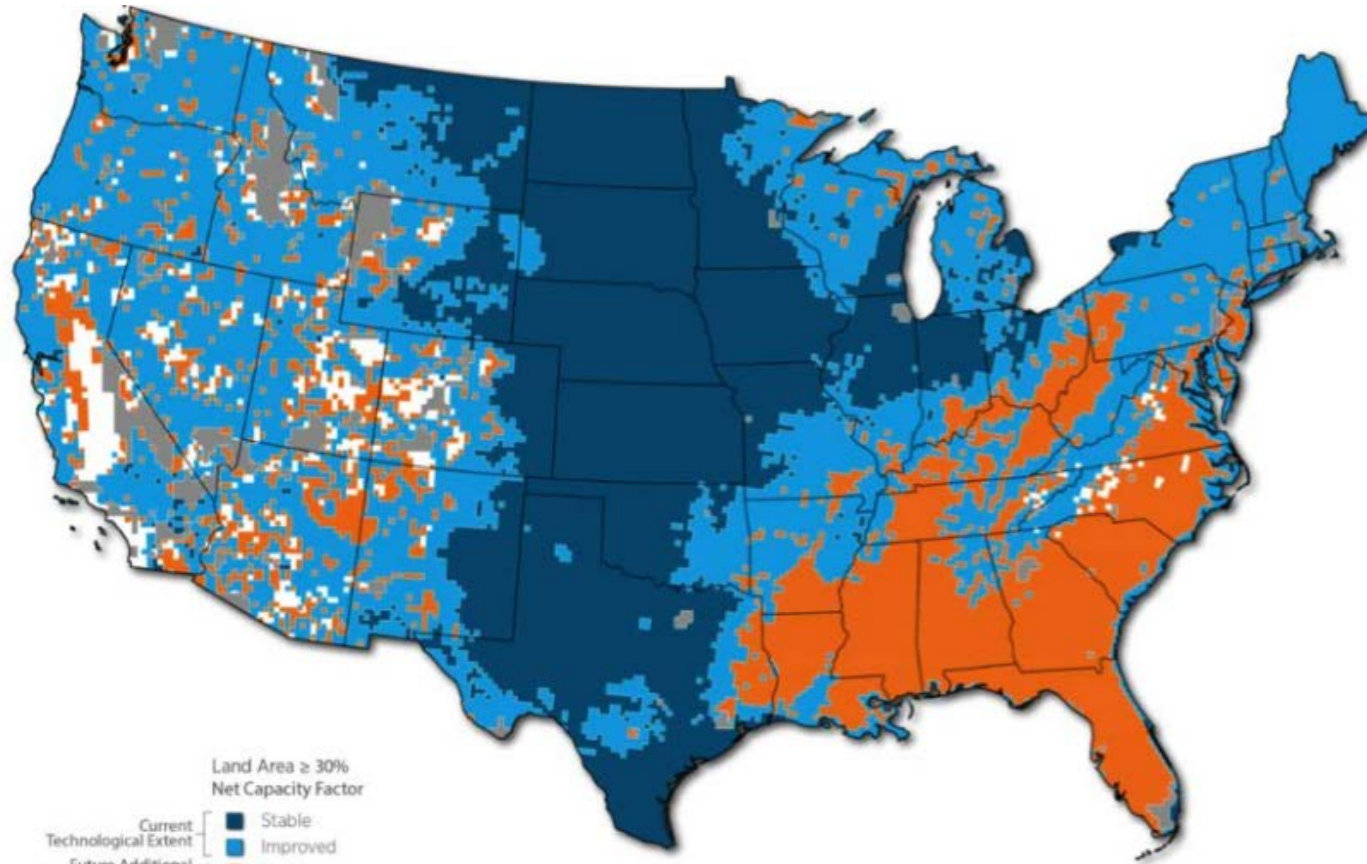
Data sources: AWS Truepower, National Renewable Energy Laboratory

This map was produced by the
National Renewable Energy Laboratory
for the Department of Energy,
October 2014



Future Potential: Where Is the Wind?

140-m hub height



Land Area \geq 30%
Net Capacity Factor

Current Technological Extent	Stable
Future Additional Technological Extent	Improved
No Development Potential	New
	Negligible
	Excluded

This map illustrates general wind resource potential only and is not suitable as a siting tool. More detailed site and wind speed data, as well as coordination with relevant authorities, are needed to thoroughly evaluate appropriate wind energy development at any given location.

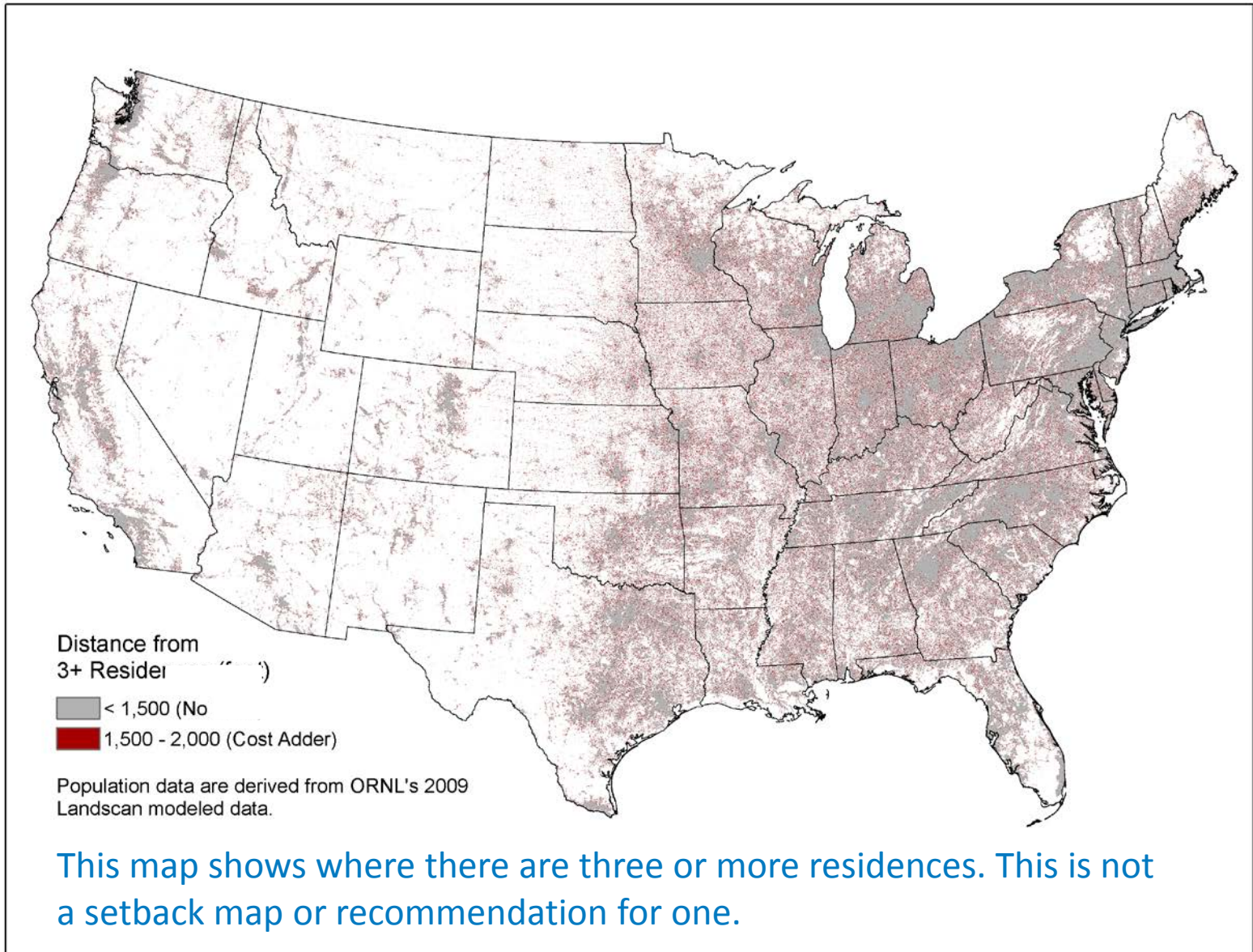
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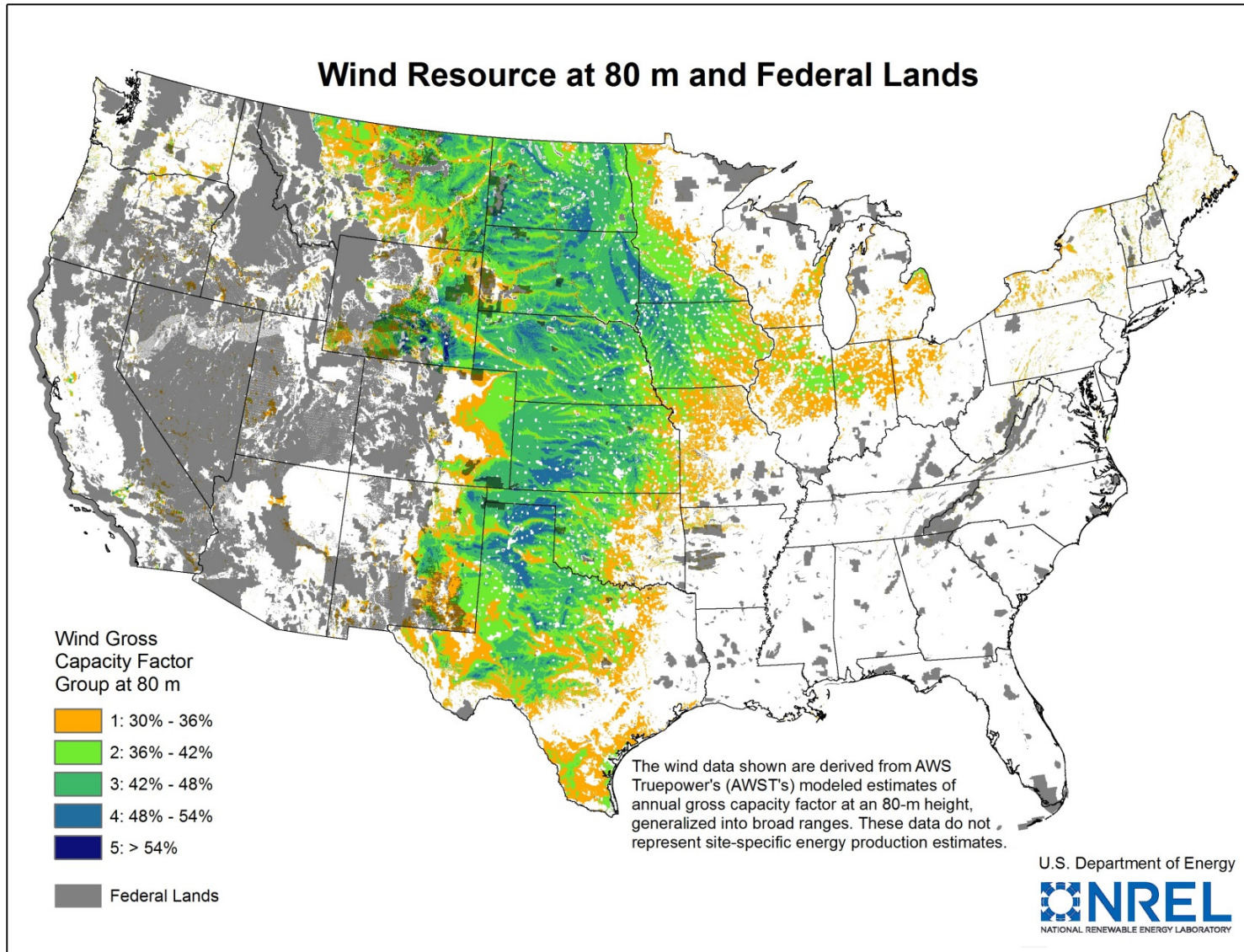
NREL
NATIONAL RENEWABLE ENERGY LABORATORY

AWS Truepower

Where Are the People?



Where Are the Federal Lands?



Public Acceptance – Siting Resources



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Siting Wind Energy



Wind turbines at the Forwa Wind Energy Center in Fond du Lac and Dodge Counties, Wisconsin. Photo from Rutl Baranowski/NREL, NREL 21



NARUC

The National Association of Regulatory Utility Commissioners

2012

Wind Energy & Wind Park Siting and Zoning Best Practices and Guidance for States

NARUC Grants & Research

January 2012

A report for the Minnesota Public Utilities Commission Funded by the U.S. Department of Energy



NREL Research Conclusions: There Is a Cost to Inaction

In the short term, developers tell us deployment is more difficult due to uncertainty and that they are hesitant to develop on federal land.

Modeled results show that the U.S. resource is vast, and Wind Vision deployment is possible, even with competing uses. Combined competing uses add cost.

In the longer term, wind power is a cost-effective resource. This could mean that more wind is deployed; thus projects are closer to co-existing uses and will take more time and capital.

Co-existence is significant to local communities. Issues should be included in energy planning – short and long term.

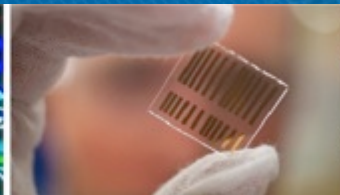


DOE Wind Vision

<http://energy.gov/eere/wind/wind-vision>

Enabling Wind Power Nationwide

<http://energy.gov/eere/wind/downloads/enabling-wind-power-nationwide>



For more information, please visit our website at
www.nrel.gov