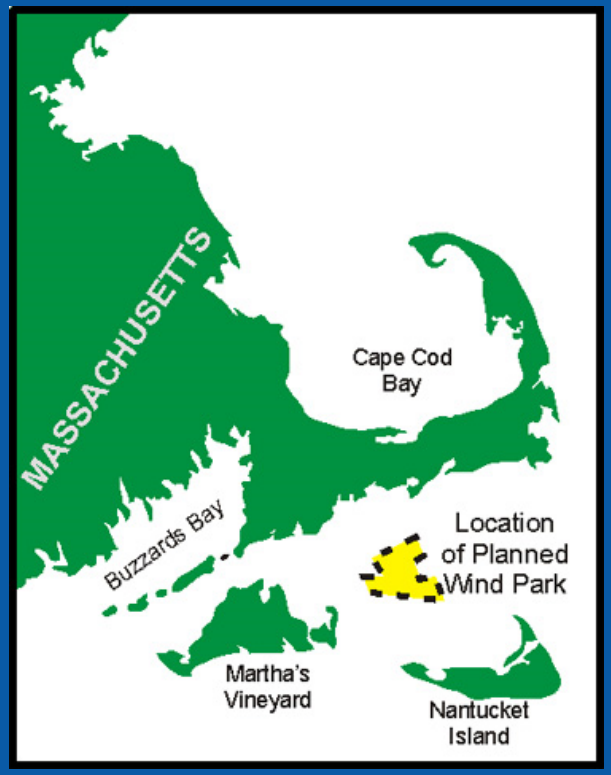
National Renewable Energy Laboratory
Innovation for Our Energy Future

Wind Energy Update and Social Acceptance Analysis in the U.S.

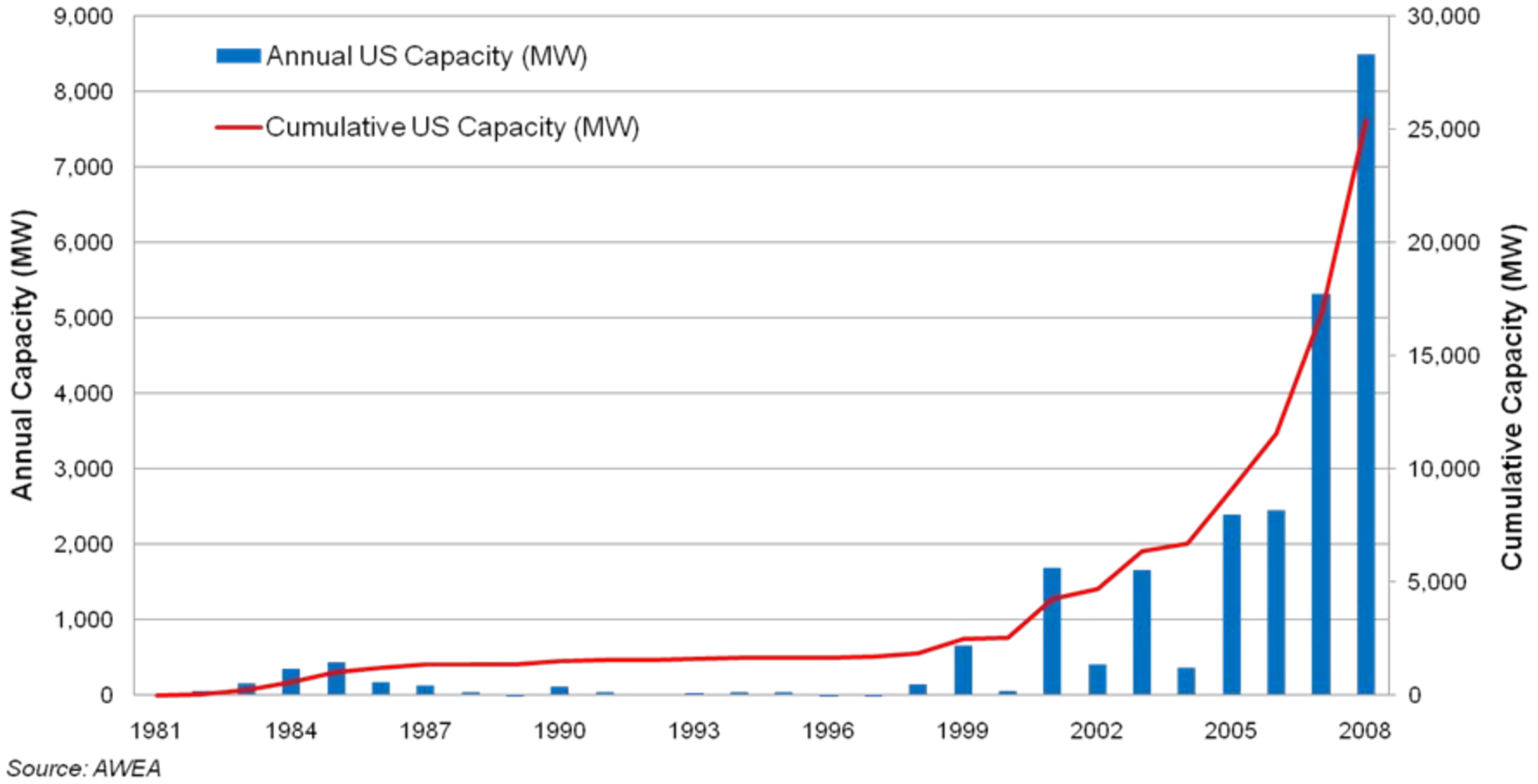


IEA Task 28:
Working Group Meeting II
Magdeburg, Germany

Eric Lantz
National Renewable Energy Laboratory

March 20, 2009

U.S. Wind Power Capacity Up 50% in 2008



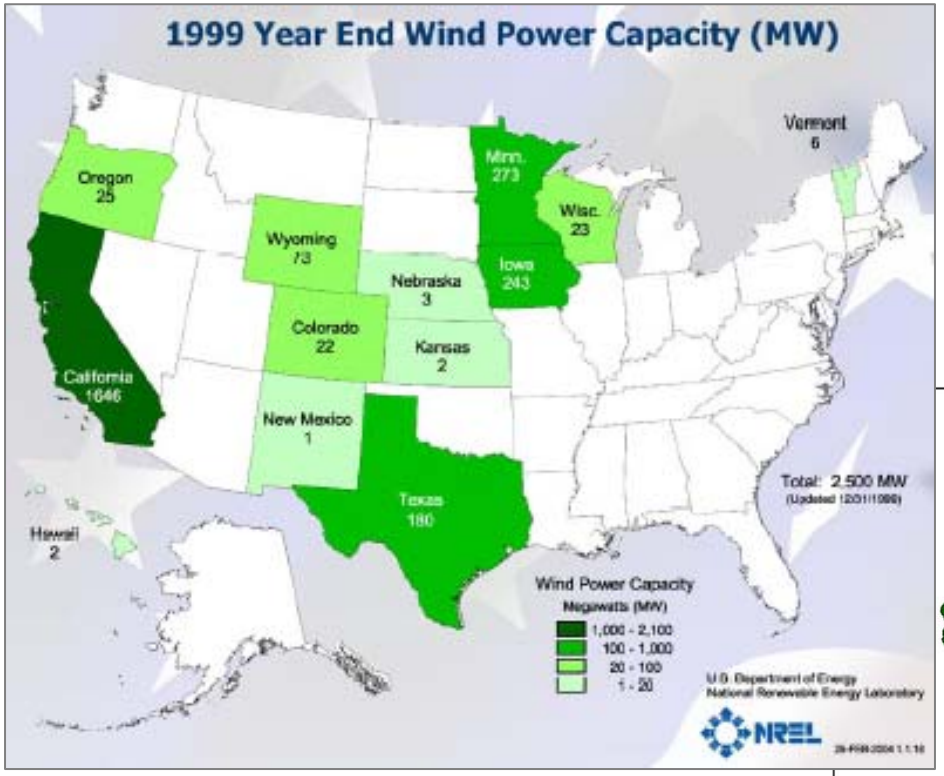
Source: AWEA

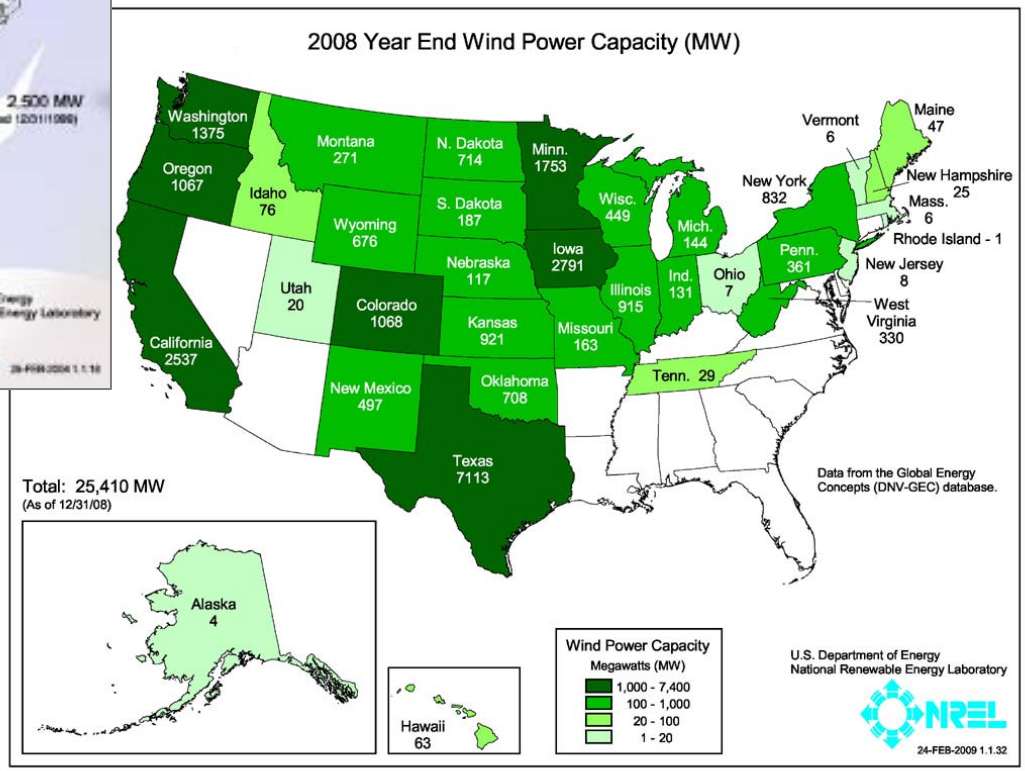
Another record year for new U.S. wind capacity:

8,506 MW of wind added (4,112 MW in Q4)

Roughly $17 billion in investment

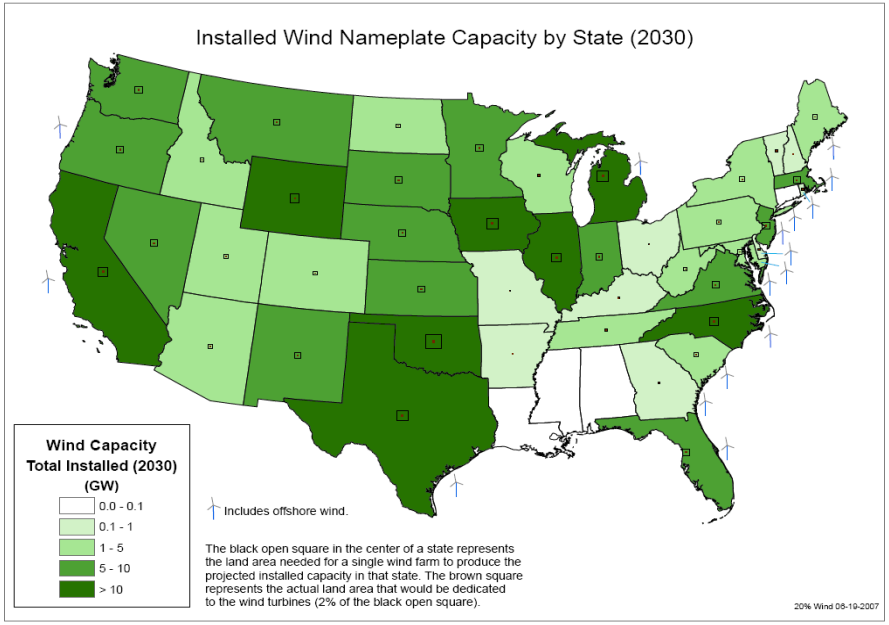
Installed Wind Capacities (‘99 – 2008)

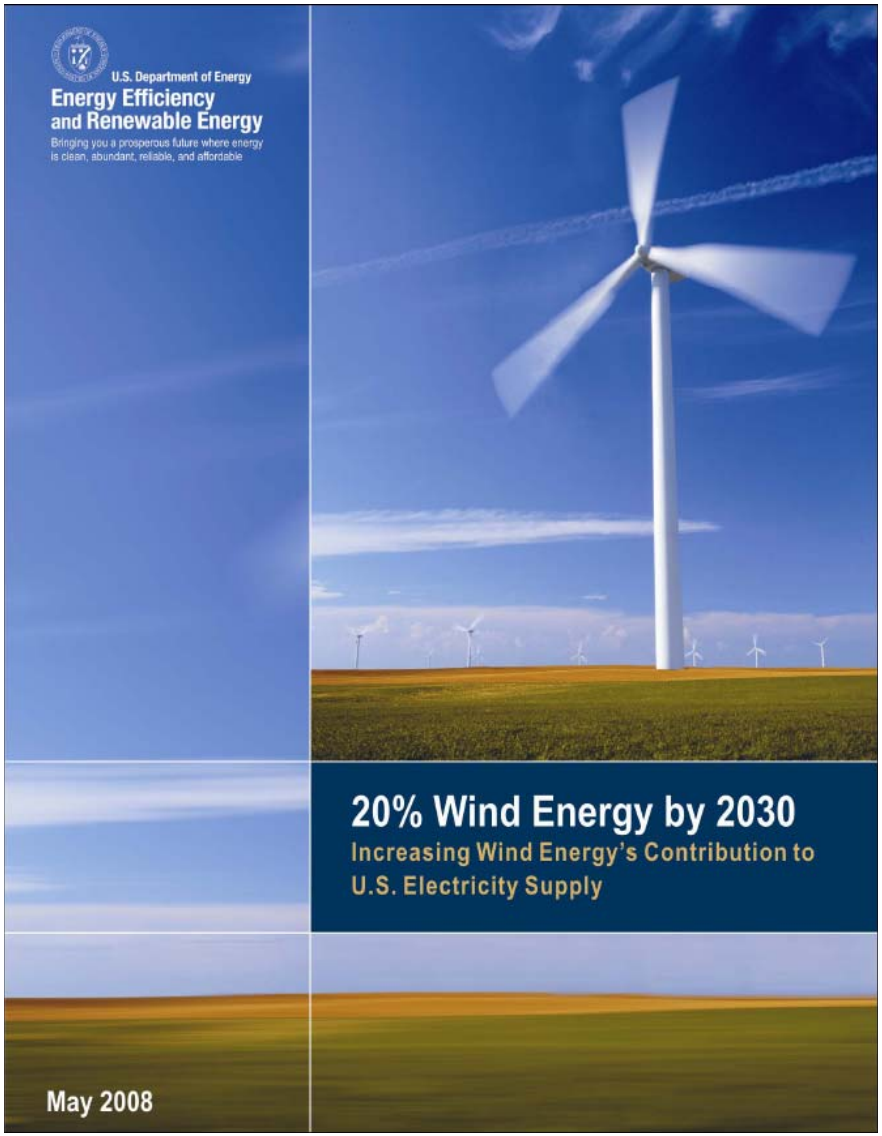




Additional 2008 Milestones

- 20% by 2030 Report
- Bats and Wind Energy Cooperative
- American Wind and Wildlife Institute
- New political leadership on RE and climate
- Release of AWEA Siting Handbook





U.S. Wind Industry is not Immune from the Financial Crisis

Areas of Exposure

- ***Tax credits*** are the U.S.' primary incentive to encourage wind energy development
  - Works if the economy is solid and tax equity appetite exists
- **Debt** availability for development and construction costs
- Broad, systemic economic recession

Current Market Outlook

Challenges:

- Traditional generation fuel price decreases
- Tax equity investor consolidation, equity returns increasing
- Debt market illiquid, expensive

Opportunities:

- Reduced commodity prices
- Buyers market – turbine availability
- Expected all in project cost decreases
- New tax equity investors
- Economic stimulus package benefits

Policy Support

- Emergency Economic Stabilization Act of 2008
  - Extended utility scale wind tax incentives through 2009
- American Recovery and Reinvestment Act of 2009
  - Tax credit extension through 2012
    - Extends investment tax credit to manufacturing facilities
  - Ability to Convert Investment Tax Credits to Treasury Grants
  - Loan Guarantees funded and expanded
  - Remove subsidized energy financing restrictions for projects that use the Investment Tax Credit

Proposed Policy Support

National Renewable Portfolio Standard

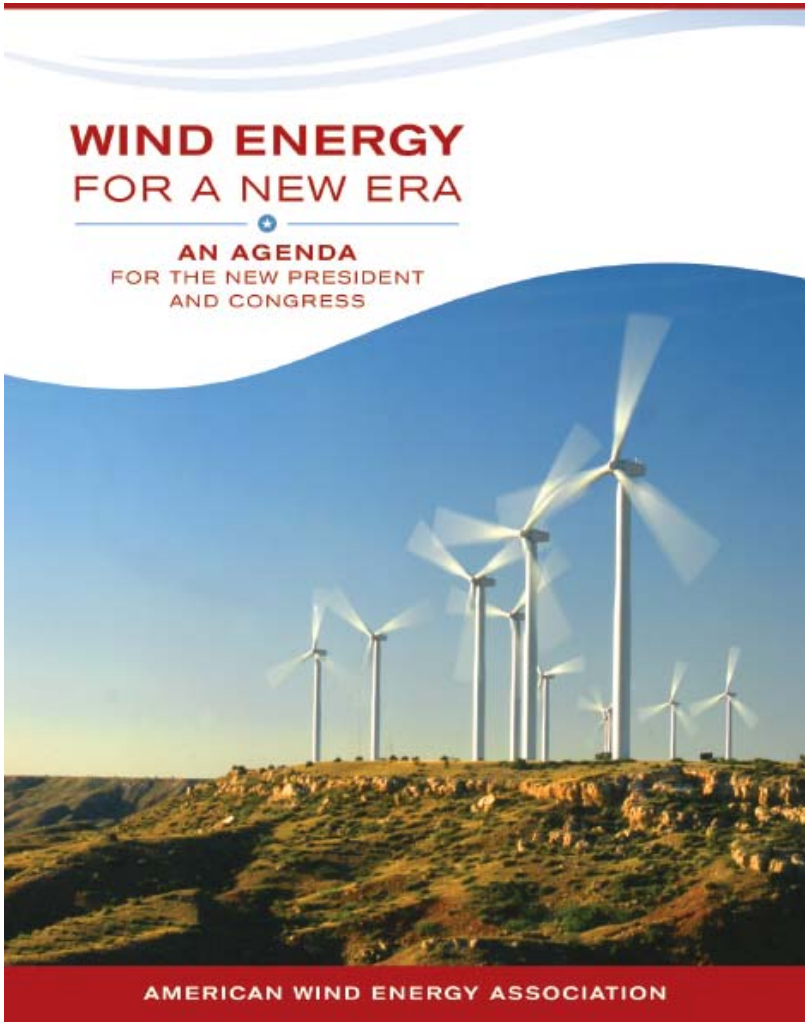
- 20% by 2021 (12% Effective Standard)
- 25% by 2025 (22% Effective Standard)

Clean Renewable Energy and Economic Development Act

- Creates national RE Resource Zones (75% of Capacity set aside for RE)
- Consolidates Federal Authority in Transmission Planning
- Promotes Transmission Investment

Carbon Cap and Trade

- Called for by Obama Administration
- Potential for a bill in weeks



U.S. Research on Social Acceptance: Property Values

Relatively few U.S. studies with mixed results

Author (Year)	Location	Method	Test	Conclusion
Sterzinger et. al. (2003)	10 US sites	Simple	Area Stigma	↑ $?
Haughton et al. (2004)	Cape Cod, MA	Survey	Area & Scenic Vista Stigma	↓ $?
Poletti (2005)	WI / IL	Simple	Area Stigma	↓ $ & ↑ $ x
Delacy (2005)	Washington	Paired Sales	Area Stigma	↑ $?
Hoen (2006)	New York	Hedonic	Area Stigma	↓ $ x
			Scenic Vista Stigma	↑ $ x
Poletti (2007)	WI / IL	Simple	Area Stigma	↓ $ & ↑ $ x
Crowley (2007)	12 US Counties	Survey	Area Stigma & Nuisance	no change ?

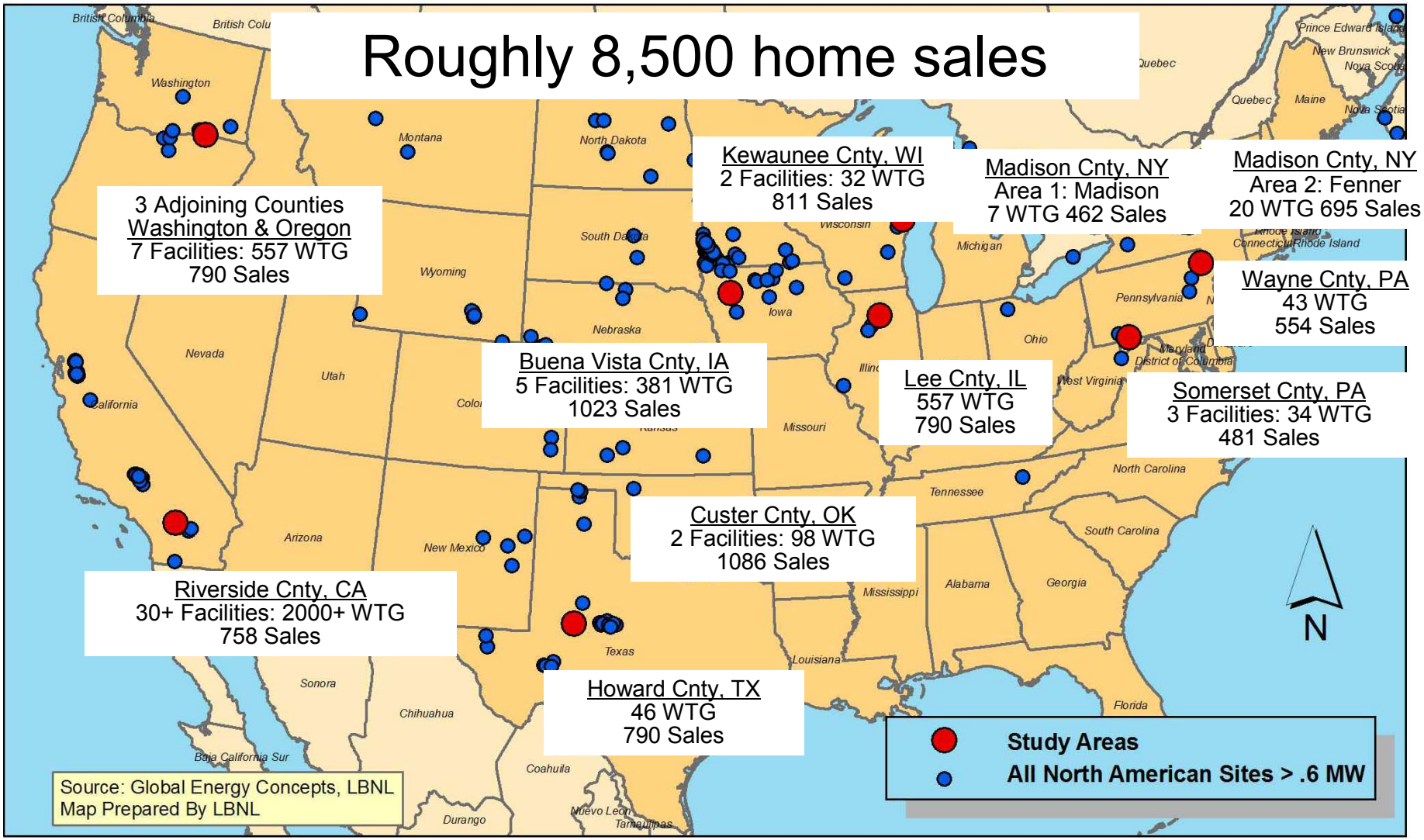
Note: ? signifies no statistical significance reported; X not significant 90%

Existing research highlighted above carries important limitations

- Generally insufficient statistical analysis
- Often limited sample size and insufficient diversity in study areas
- Most tested only one parameter (area stigma)
- Only one study actually visited sites to evaluate actual proximity of turbines and local landscape characteristics
- None subject to the rigor of publication in peer reviewed journals

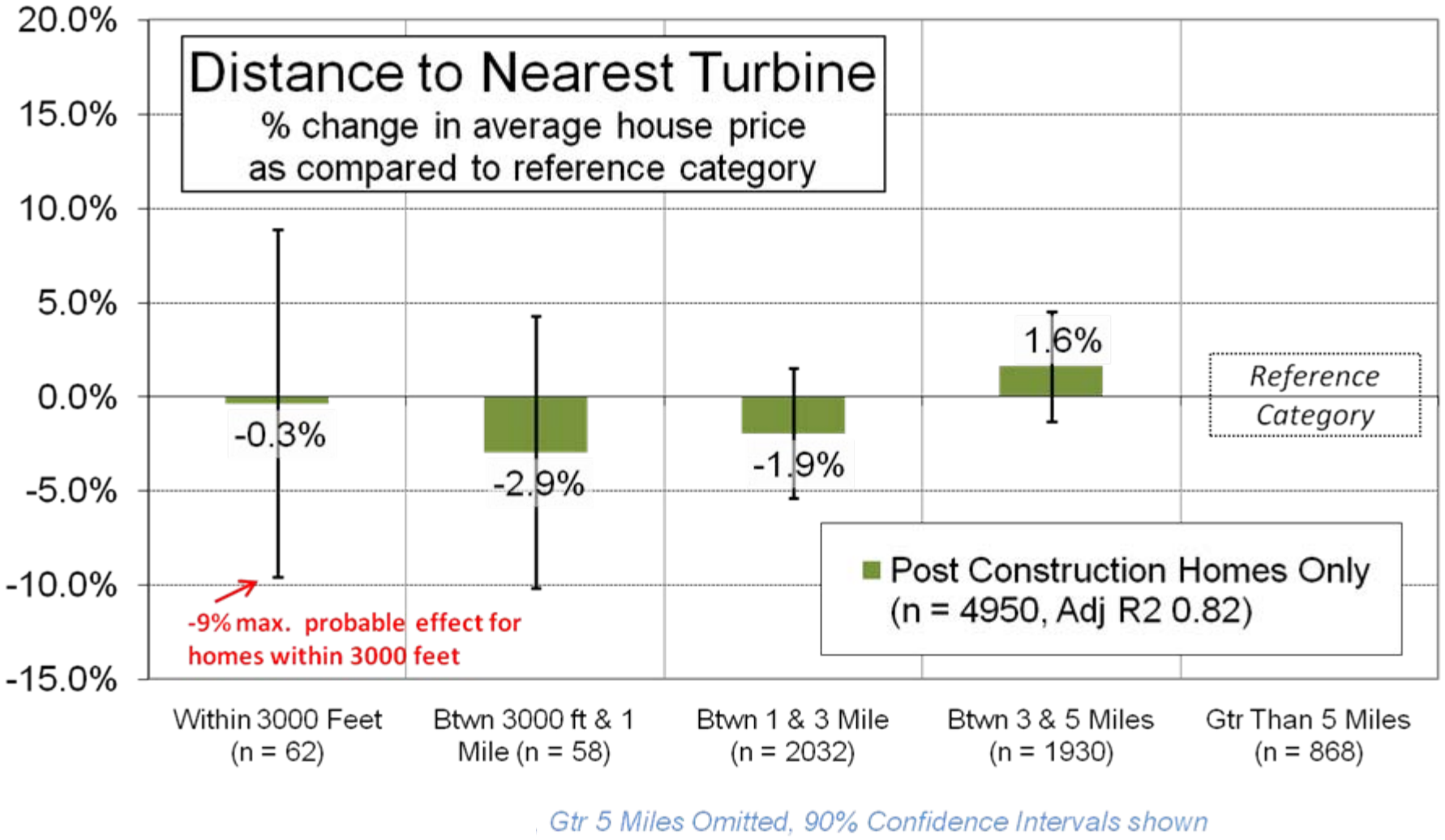
Literature compilation and analysis courtesy of Ben Hoen, LBNL

U.S. Research on Social Acceptance: Ongoing Property Values Research



Graphic Courtesy of Ben Hoen, LBNL

U.S. Research on Social Acceptance: Preliminary Results for Nuisance Effects and Area Stigma (Hoen)



Graphic Courtesy of Ben Hoen, LBNL

U.S. Research on Social Acceptance: Preliminary Conclusions from Hoen (forthcoming)

- No statistical evidence of changes in the value of homes based on the "industrialization of the area" **(Area Stigma)** after a project is announced or after construction completed.
- No statistical evidence of that homes located in the view shed of a wind energy facility have a different value than homes that are not in sight of wind energy facilities **(Scenic Vista Stigma)**.
- No statistical evidence that homes located within a radius of 915 meters have a different value than homes outside of an 8 km radius **(Nuisance Stigma)**.
    - No statistical evidence that homes between 915 meters and 8 km have a different value than those outside of 8 km
- **Conclusion** - Isolated cases may exist, but there are no significant trends either positive or negative indicating that wind facilities change the value of homes located around or near them.

U.S. Research on Social Acceptance: Public Perceptions

Support for offshore wind

- 78% of Delaware residents
- 25% of Cape Cod residents
- Attachment to place is important in both contexts
- Later surveys suggest acceptance is increasing

Justifications based on survey results

- Delaware - electricity rates, climate change, and air quality outweigh aesthetics
- Cape Cod - marine life, aesthetics, and recreational use are more important than electricity rates and energy independence

Source: Firestone, Kempton, and Krueger 2009

U.S. Research on Social Acceptance: Public Perceptions (Firestone and Kempton)

Top three factors affecting Public Perceptions of Offshore Wind (factors may be positive or negative)

Issue	Cape Cod		Delaware	
	Supporters' top three (%)	Opponents' top three (%)	Supporters' top three (%)	Opponents' top three (%)
Marine life/Environmental Impacts	**48**	**65**	**57**	**47**
Electricity Rates	**47**	20	**62**	**44**
Foreign oil dependence	**37**	5	10	15
Alternative/Renewable Energy	36	1	10	13
Air Quality	23	3	**39**	20
Jobs/Economics	18	2	28	11
Fishing impacts/ Boating safety	15	**50**	38	30
Aesthetics	14	**51**	10	**67**
Property values	7	14	7	13
Private use of public lands	5	15	1	<<<1
Global warming/Climate Stability	4	4	12	0
Tourism	4	15	5	25
Other	41	55	21	11
Total	299	300	300	302

Source: Firestone, Kempton, and Krueger 2009

U.S. Research on Social Acceptance: Case Study Conclusions from Wisconsin

Strict ordinances can be used to effectively prohibit wind energy via:

- Unrealistic setbacks from residences and public right-of-ways
- Prohibition of waiver agreements between adjoining landowners
- Setting sound thresholds relative to ambient levels instead of an absolute level
- Requiring multiple studies incurred at the developer's expense
- Imposing onerous bonding /insurance requirements

The development process is facilitated by:

- Early outreach to affected community
- Environmental due diligence
- Clear contracts with a reasonable sunset period
- Compensating nonparticipating neighbors (Good neighbor payments)
- Avoiding piecemeal review

Source: Michael Vickerman RENEW Wisconsin

U.S. Research on Social Acceptance: Evaluating Stakeholder Perspectives

Preliminary Survey of Priorities as listed by key industry stakeholders

- Human health and safety
- Contribution to local economy
- Reliability
- Aesthetics & property values
- Noise
- Wildlife
- Land use
- Energy Security
- Environmental Considerations
- Cost of Energy

U.S. Research on Social Acceptance: Current Projects and Interests

Stakeholder and Public Perceptions

- Compile existing state and local surveys
- Expand survey work to increase our understanding of stakeholder perspectives; especially regional variability

Communication, Education, and Marketing

- Re-frame perceptions of wind energy as an important part of the energy portfolio (20% Wind Study, Gore, Boone Pickens)
- Support decision-making based on sound science (WWG)

Planning for Deployment

- Evaluate the role of state and local planning in facilitating new development
- Work to implement state and local planning processes through WWG

Distributional Justice

- Assess current developer strategies for facilitating social acceptance
- Evaluate the value of local ownership and community payments in reducing local opposition to projects in the US context
- Fair distribution of costs and benefits (e.g. ridgeline projects, transmission)

Questions

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