



U.S. Department of Energy
Energy Efficiency and Renewable Energy

Perspectives on an Expanded Wind Role in the National Energy Portfolio

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September 17, 2007



Wind Program Focus Areas

Technology Application:



Wind Powering America

- State and Ag Outreach
- Priority Markets and Applications
- Environment, Wildlife and Siting



Systems Integration

- Wind Integration
- Transmission
- Interconnection and operation

Technology Viability:



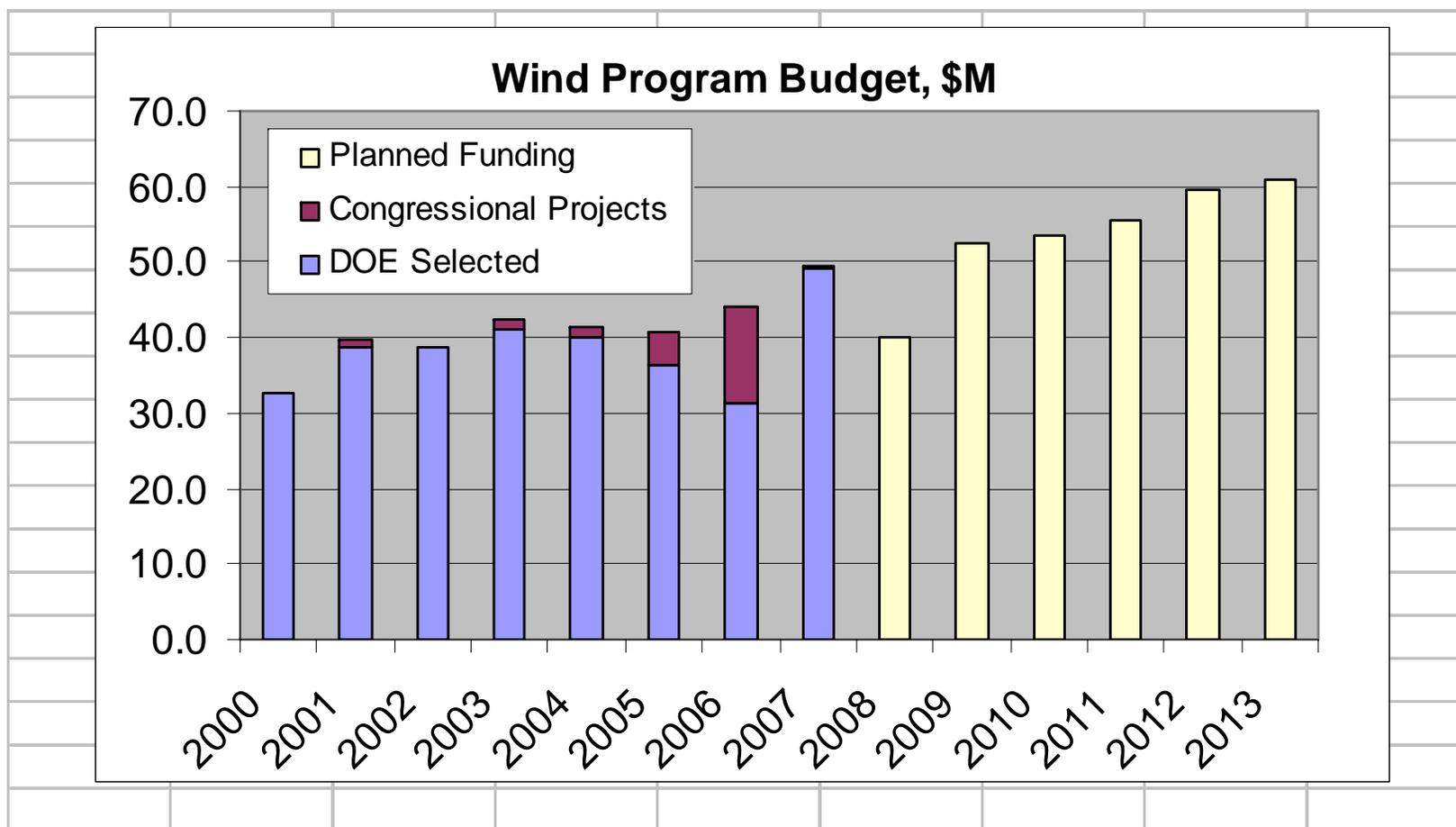
Large Wind Technology

- Utility Scale Wind Turbines
- Turbine Productivity and Reliability Enhancements
- Emerging Wind Applications



Distributed Wind Technology

- Residential & Businesses
- Industrial & Commercial
- Community-Based Wind Power





- **Large Wind Technology:**
 - By 2012, reduce the COE from large wind systems in Class 4 winds to 3.6 cents/kWh for land-based systems (from a baseline of 5.5 cents/kWh in 2002)
- **Distributed Wind Technology:**
 - By 2015, expand by five-fold the number of distributed wind turbines deployed in the U.S. market from 2007 baseline
- **Systems Integration:**
 - By 2012, complete program activities addressing electric power market rules, interconnection impacts, operating strategies, and system planning needed for wind energy to compete without disadvantage to serve the Nation's energy needs
- **Technology Acceptance:**
 - By 2010, facilitate the installation of at least 100 MW of wind energy in at least 30 states (from a baseline of 8 states in 2002)

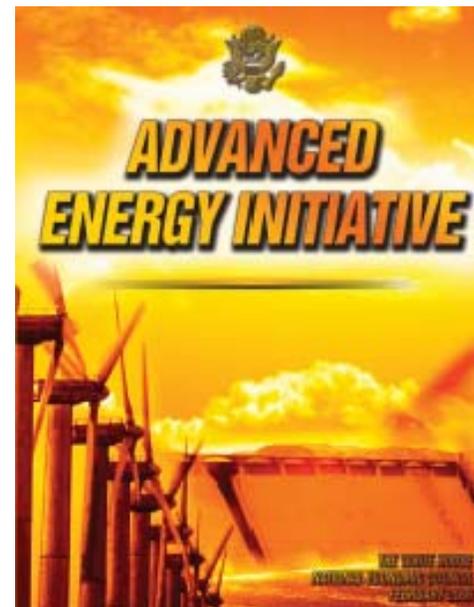


- **Move Today's Technology into Today's Market**
 - Remove siting & permitting barriers
 - Promote effective federal, state, local policies
- **Strengthen Competitiveness of Available Technology**
 - Enhance understanding of market needs
 - Enhance turbine performance & reliability
 - Support industry-led innovation
- **Lay Foundation for Market Transformation**
 - Align with vision of wind energy providing 20% of Nation's electricity by 2030
 - Secure road to marketplace
 - Balance of technology, market, and policy support
 - Effective transmission access/rules/policies
 - Market investment in transmission assets



National Wind Energy Vision and Planning Initiative

*"Areas with good wind resources have the potential to **supply up to 20% of the electricity** consumption of the United States."*



- Public-private team formed in June 2006
- Credible, in-depth business analysis and reporting
- Report release targeted for October 23
- Plan for extensive outreach, collaborative action

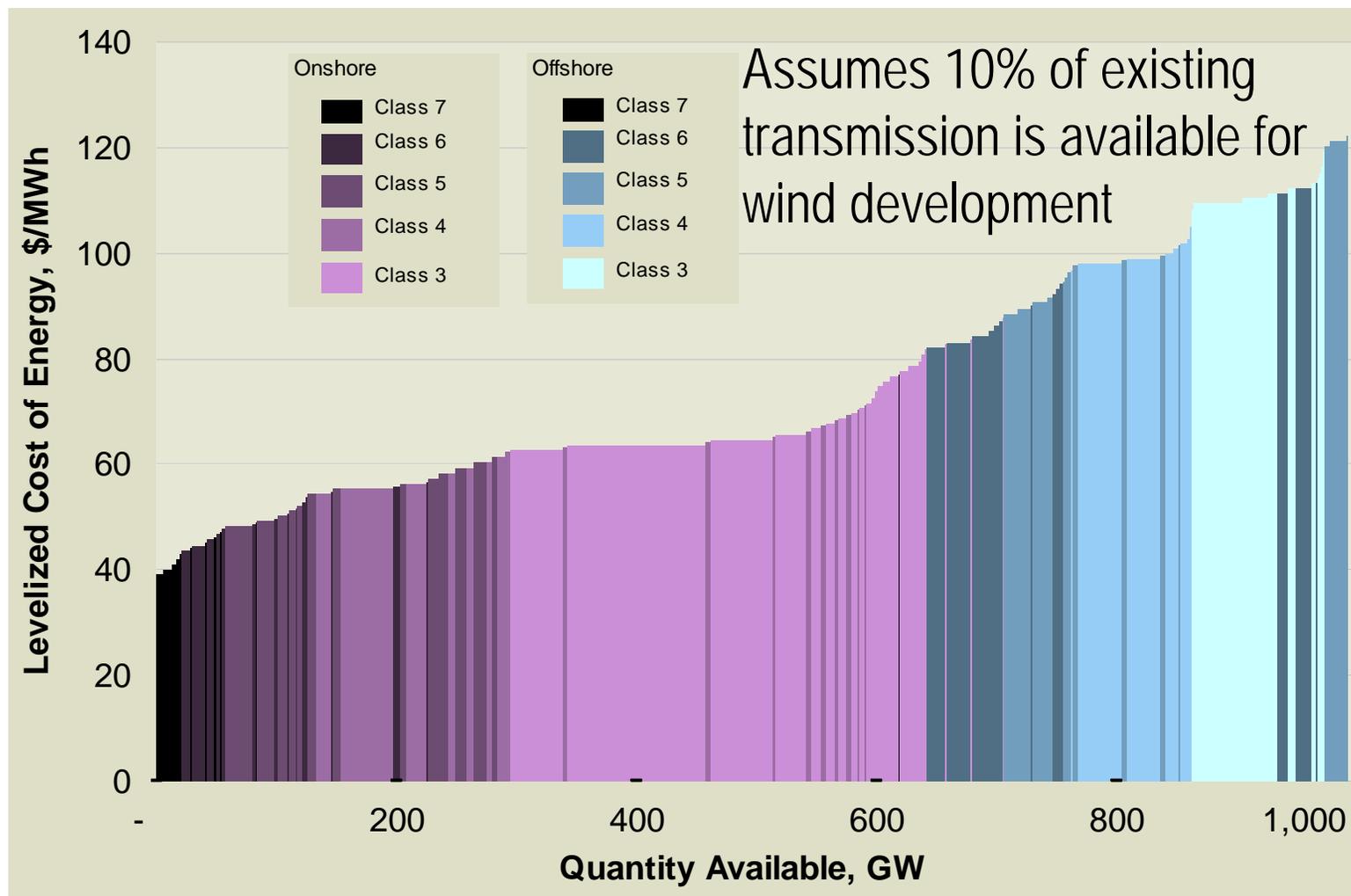


Initiative Task Forces, Leads

- Technology and Applications
Mike Robinson
NREL
- Manufacturing and Materials
Larry Willey
GE
- Customers and Stakeholders
Larry Flowers
NREL
- Utilities and Transmission
Charlie Smith
UWIG
- Environmental and Siting
Laurie Jodziewicz
AWEA
- Policy and Regulation
Jim Walker
enXco
- Supporting Analysis
Maureen Hand
NREL
- Communications and Outreach
Mary McCann-Gates
Jill Pollyniak
Clipper Wind Power



U.S. Wind Supply Curve

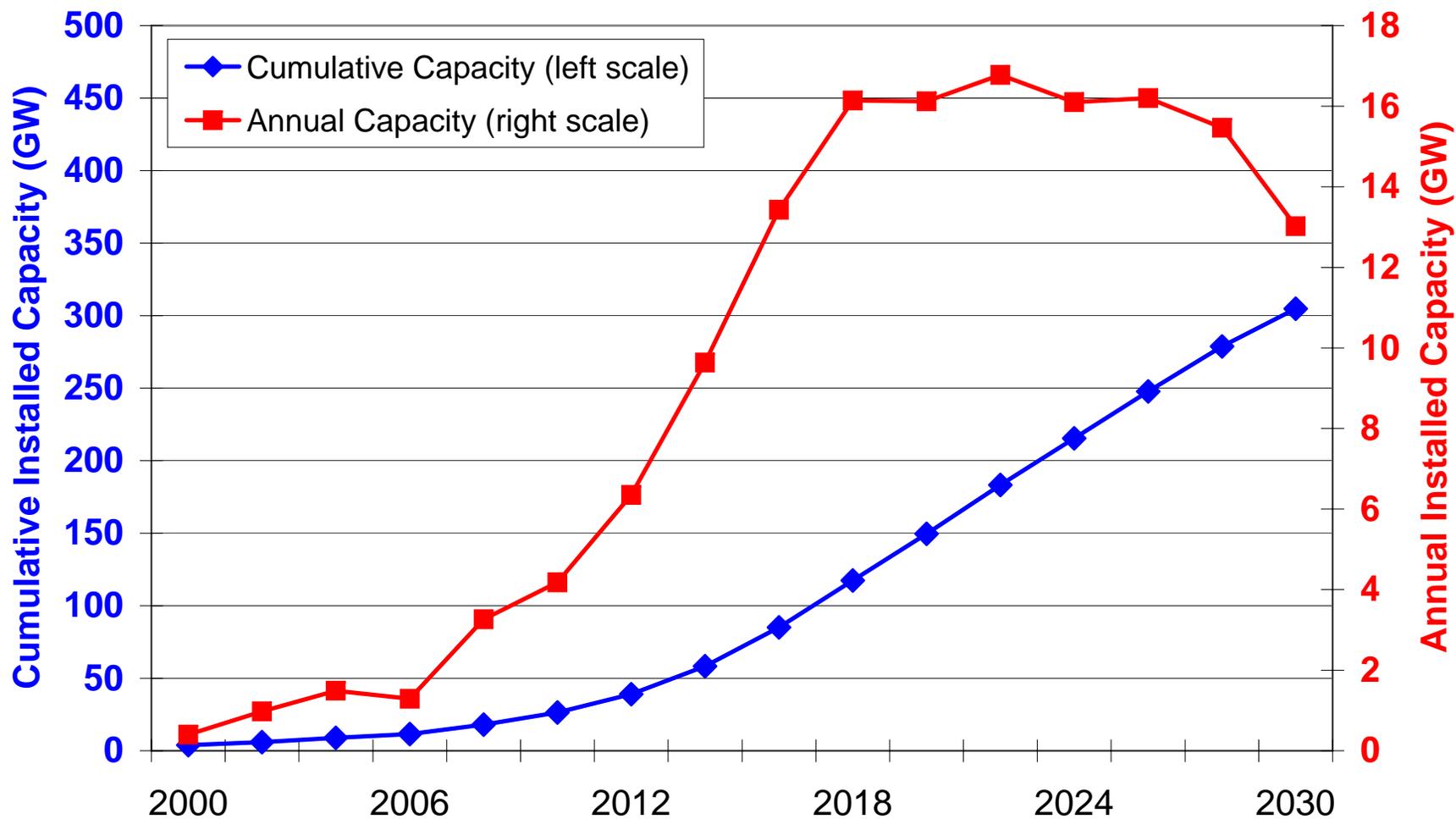


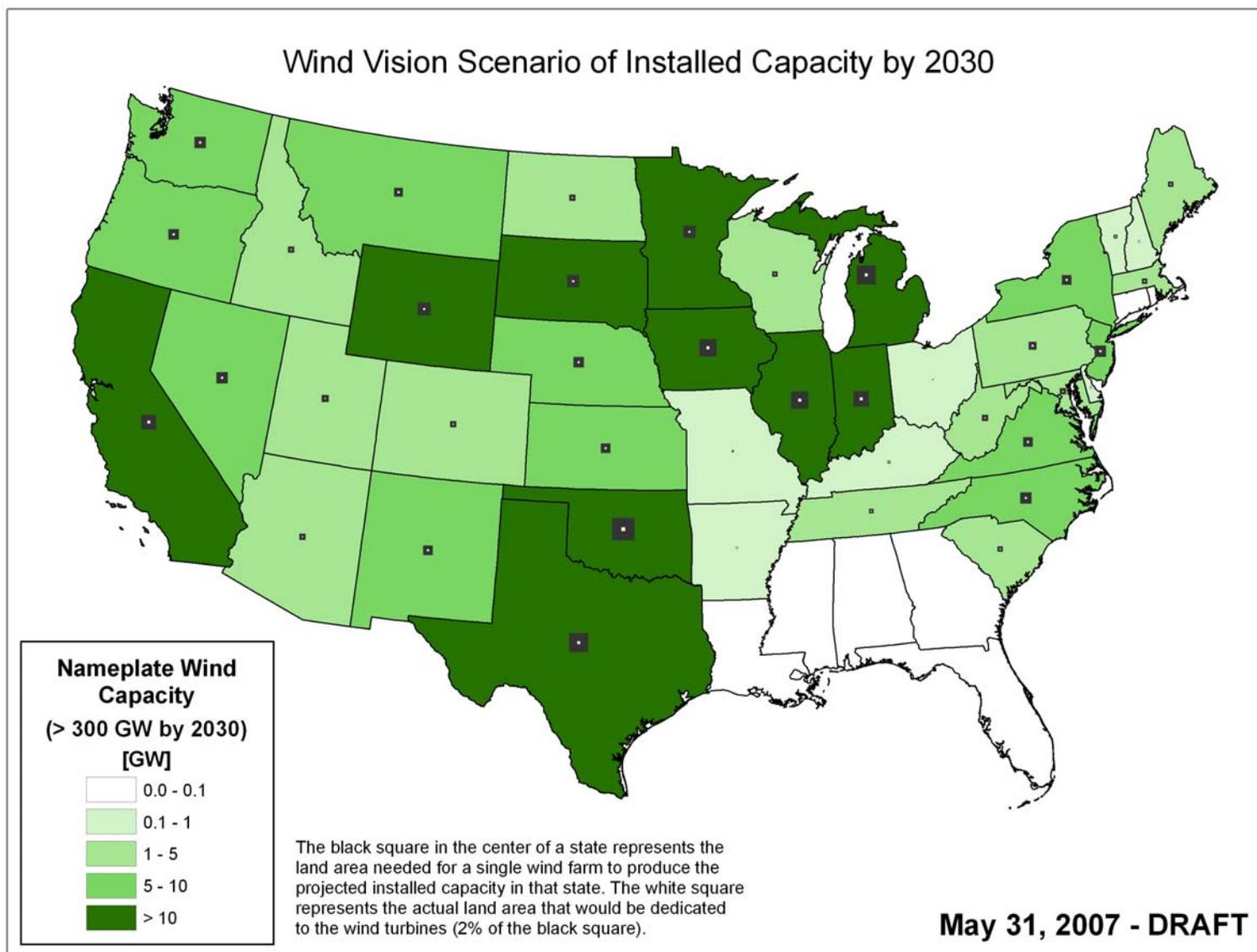
2010 Costs w/ PTC, \$1,600/MW-mile transmission, w/o Integration costs

Source:
Black & Veatch/NREL



20% Growth Scenario

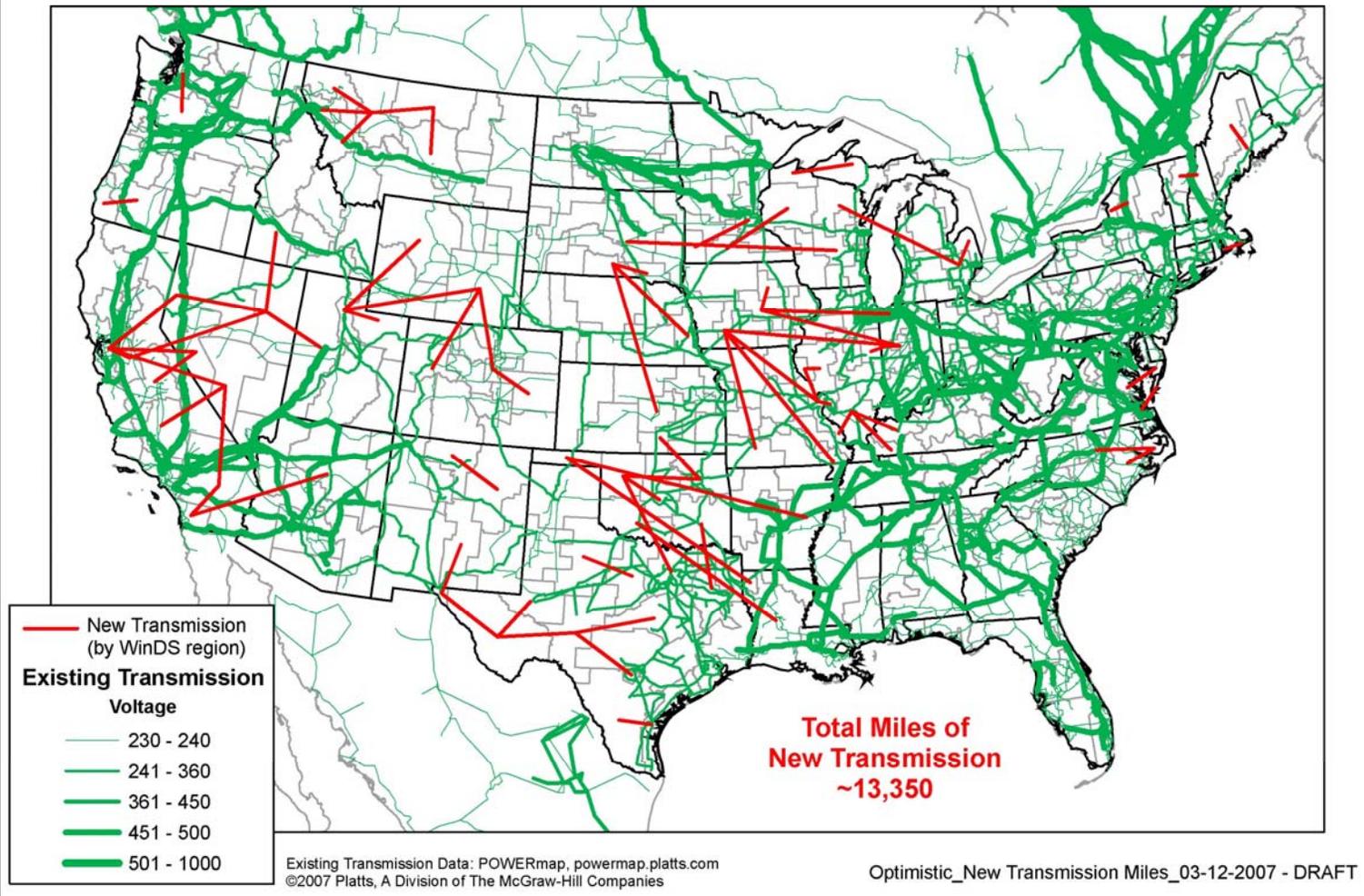






2030 - New Transmission Lines - WinDS Region Level - Simplified Corridors

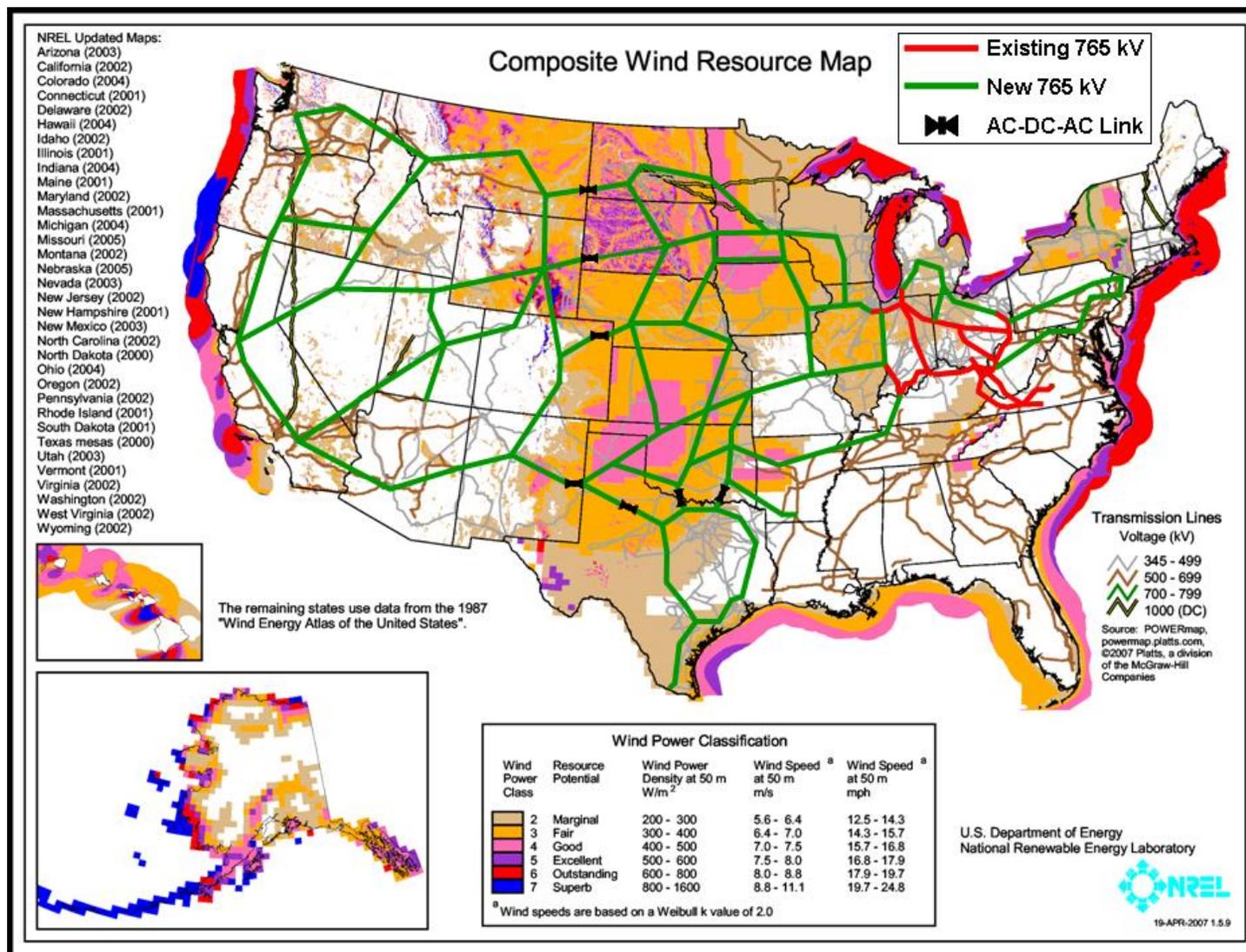
Total Between Region Transfer ≥ 100 MW (all power classes, onshore and offshore), visually simplified to minimal paths
Arrows originate and terminate at the centroid of the region for visualization purposes; they do not represent physical locations of transmission lines.





20% Wind – 765kV Network Concept

Prepared by American Electric Power





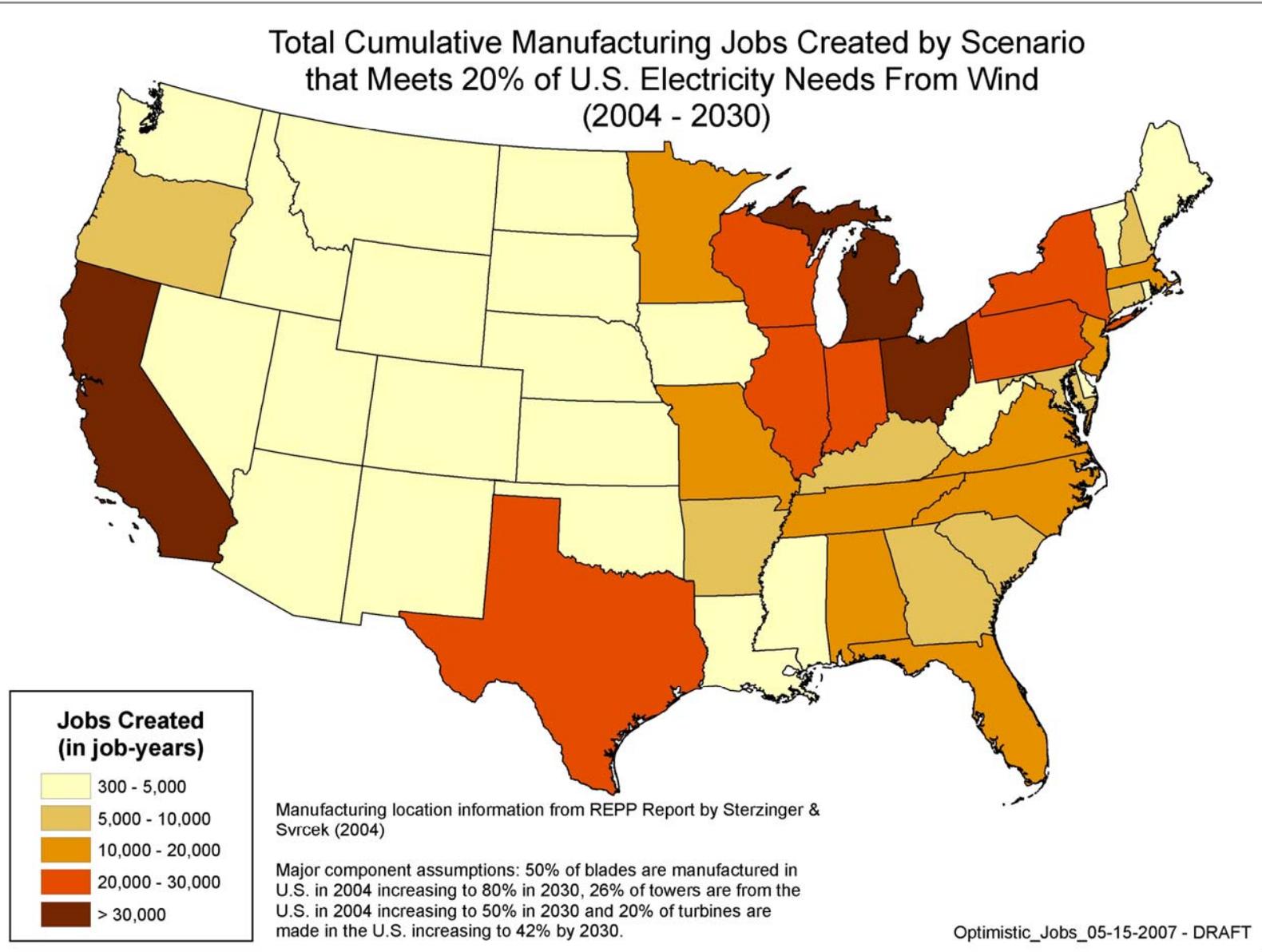
State/Regional Wind Integration and Planning Studies

- Western Governors Association - Clean and Diversified Energy Advisory Committee (CDEAC)
 - <http://www.westgov.org/wga/initiatives/cdeac/index.htm>
- Northwest Wind Integration Action Plan
 - www.nwcouncil.org/energy/Wind/library/2007-1.htm
- California Energy Commission Intermittency Analysis Project
 - www.energy.ca.gov/2007publications/CEC-500-2007-014
- New DOE/NREL – Industry – Utility Efforts
 - *Western Wind Integration Study*
 - *MISO-PJM-SPP Wind Integration Study*



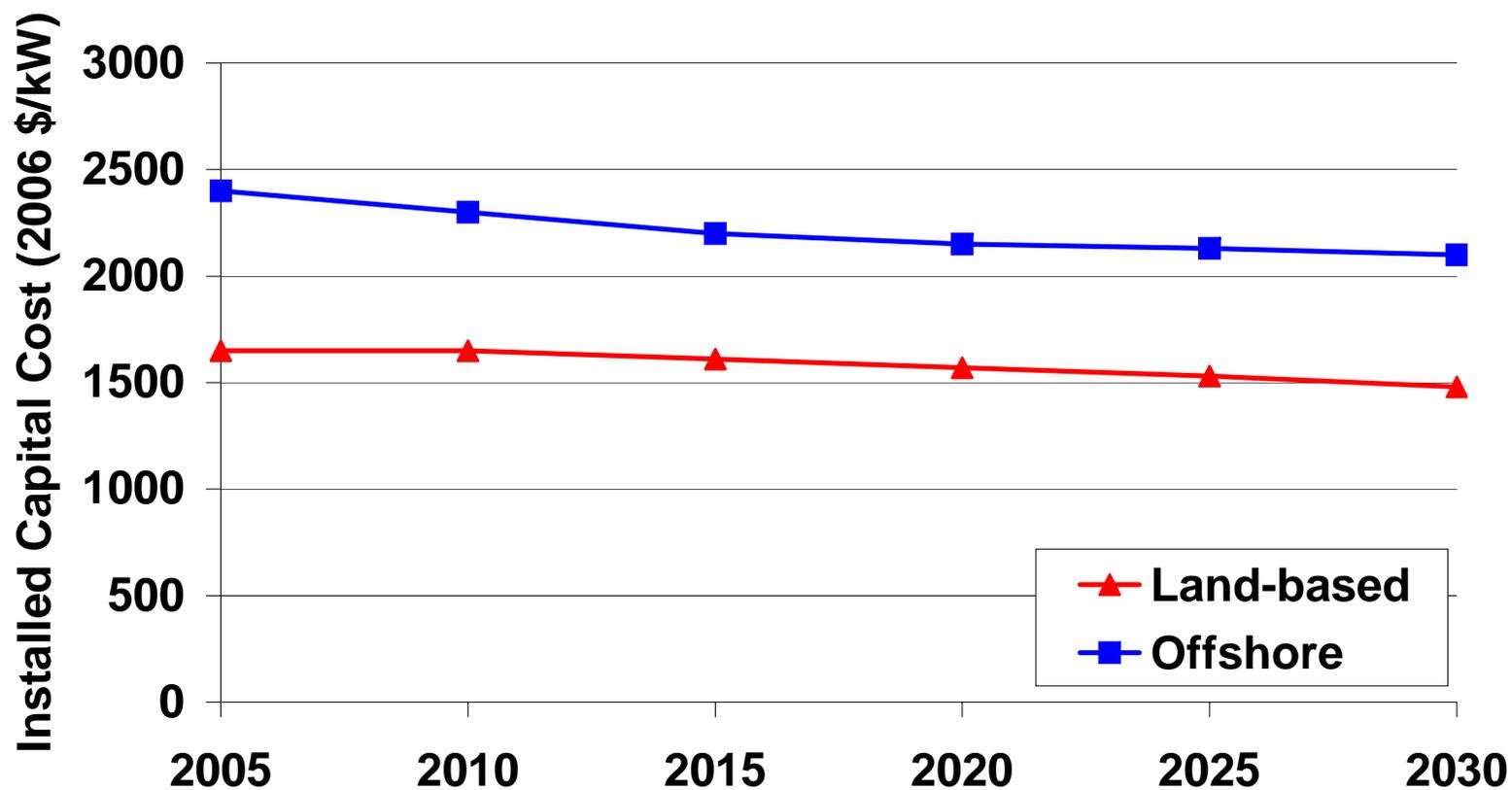


Total Cumulative Manufacturing Jobs Created by Scenario
that Meets 20% of U.S. Electricity Needs From Wind
(2004 - 2030)





Capital Cost Assumptions





- Two outfalls of reliability/performance risk:
 - directly borne by the owners of wind manufacturing and operating facilities
 - indirect where the consequences are detrimental to the continued growth of investment in wind
 - Financial community chill
 - Public perception



- The United States is truly preparing for major expansion of renewables – lead by wind
- Reliability – a challenge at current industry level – tolerable at over 5x current level??
- **Thank You** for being here to contribute to the national effort to manage wind energy technology reliability
 - Help Sandia and NREL define and provide the best program possible
- Maximize uptake of experience from other industries
 - eg aerospace, auto, turbomachinery, marine, infrastructure etc
- Please share as much data as possible!
 - Recognize sensitivity – all efforts will be made to protect proprietary interests