Wind Farms and Municipal Protection of Military Facilities from Encroachment

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Land Use Panel
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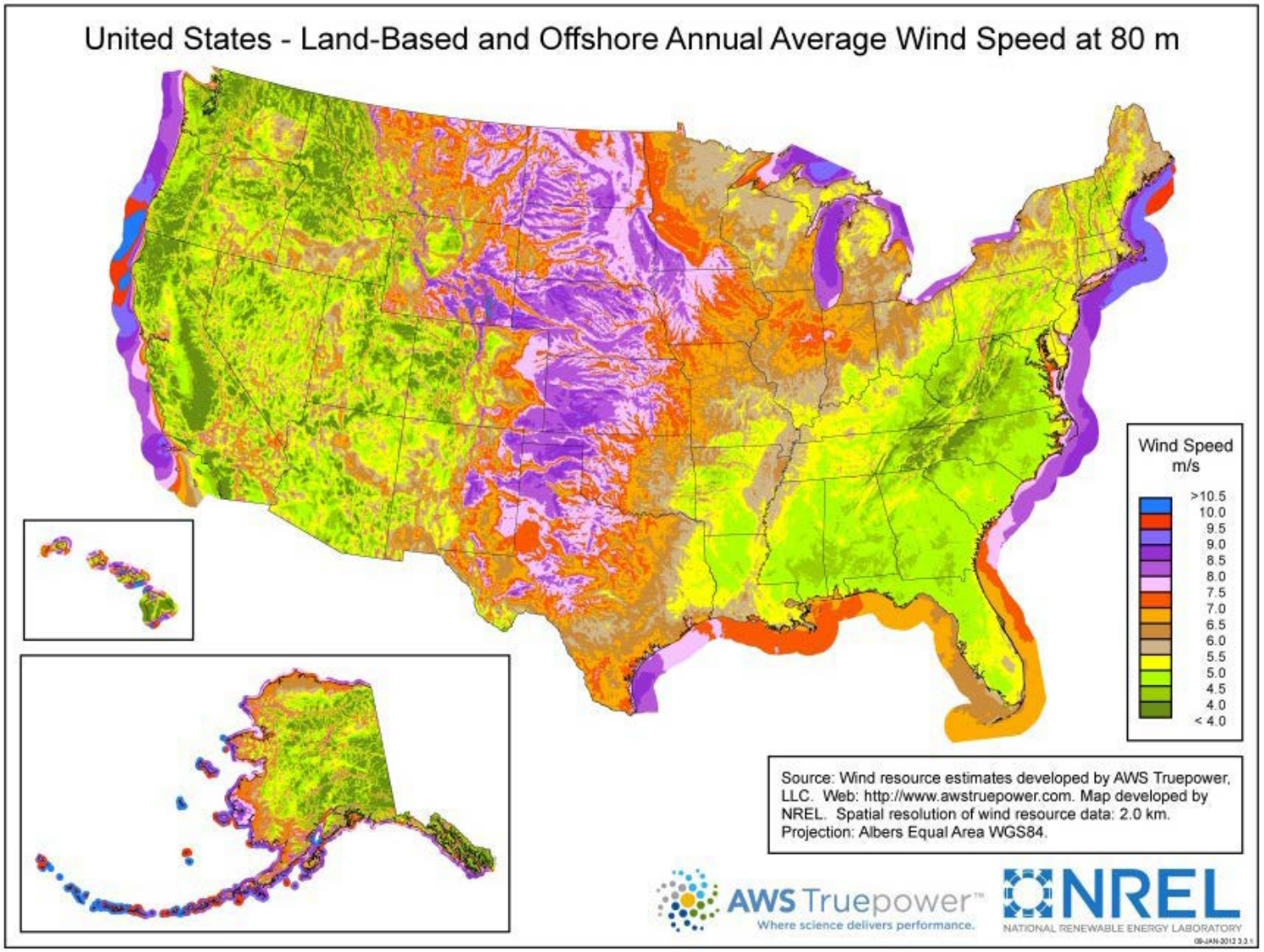
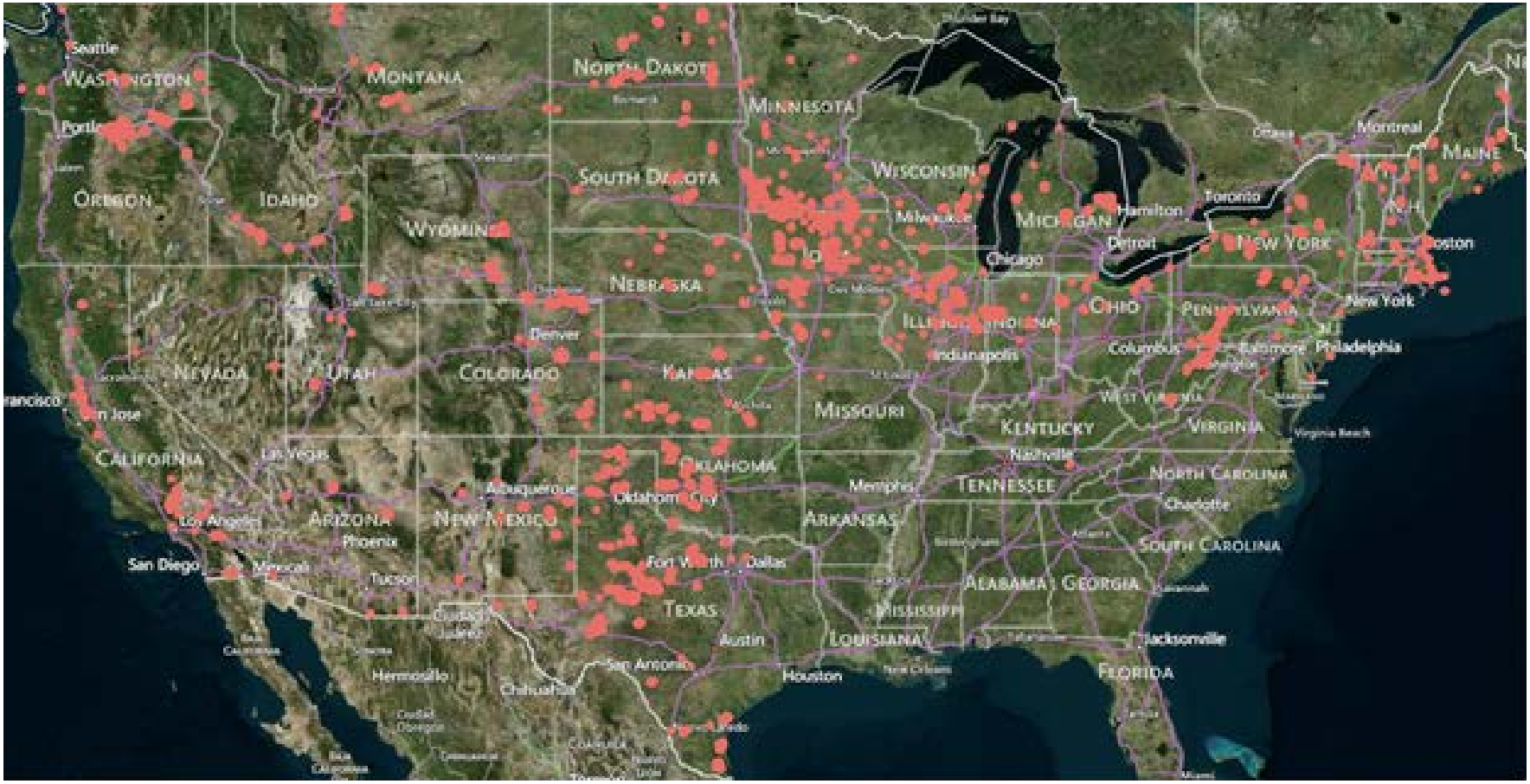
Current Locations of Wind Farms




Seattle
WASHINGTON
MONTANA
NORTH DAKOT
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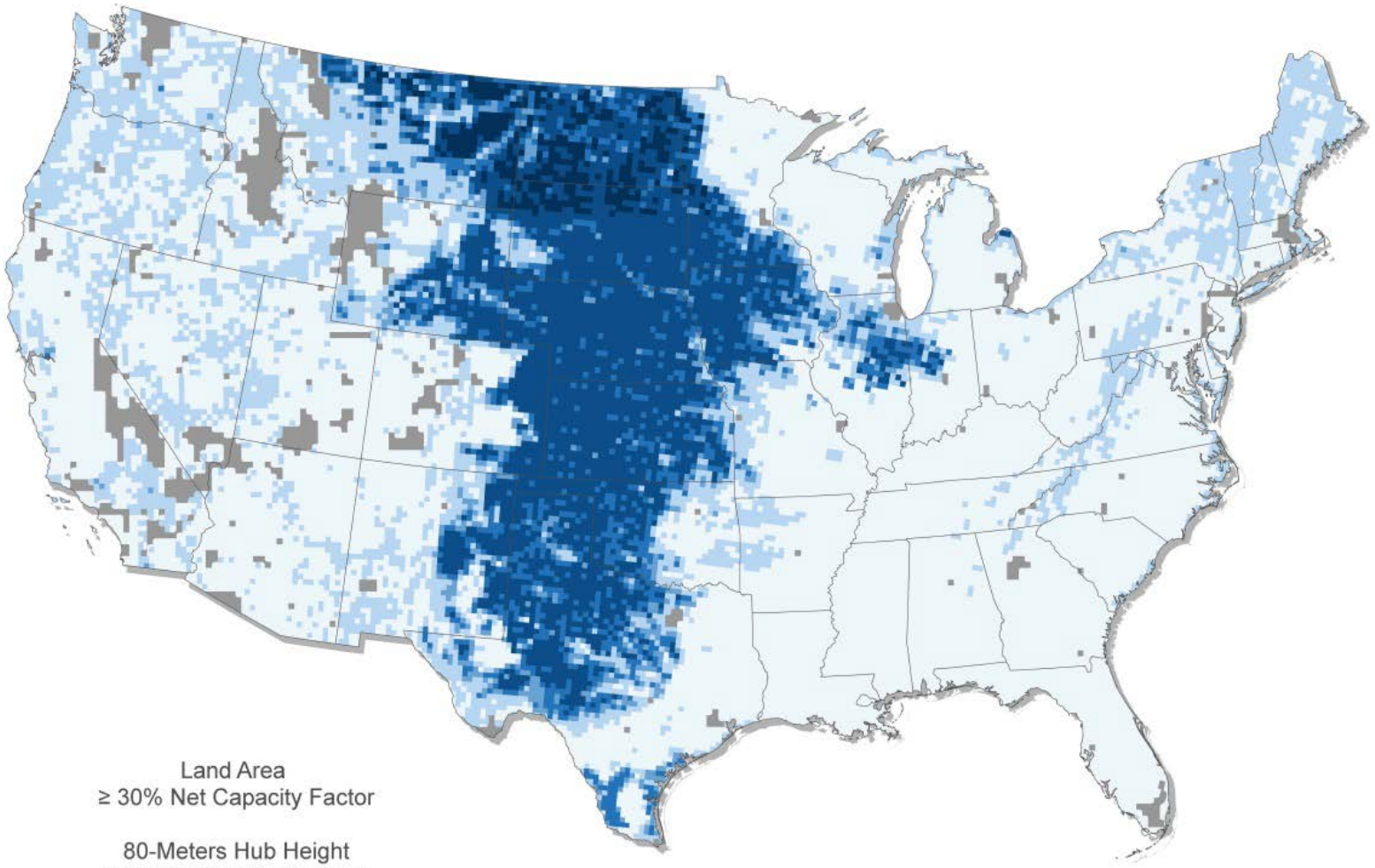
Montreal
MAINE
OREGON
IDAHO
SOUTH DAKOTA
WISCONSIN
Toronto
WYOMIN
Detroit
NEW YORK
Chicago
NEBRASKA
OHIO
New York
Denver
Columbus
Philadelphia
NEVADA
UTAH
COLORADO
Indianapolis
MISSOURI
KENTUCKY
VIRGINIA
CALIFORNIA
Nashville
OKLAHOMA
TENNESSEE
NORTH CAROLINA
Albuquerque
Memphis
Charlotte
ARIZONA
NEW MEXICO
ARKANSAS
Phoenix
SOUTH CAROLINA
San Diego
Tucson
Dallas
ALABAMA
GEORGIA
TEXAS
MISSISSIPPI
Austin
LOUISIANA
Jacksonville
San Antonio
Houston
Hermosillo
FLORIDA

Area for wind farm development – 2008 Tech



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.
Data sources: AWS Truepower, National Renewable Energy Laboratory

This map was produced by the National Renewable Energy Laboratory for the Department of Energy. March 2015

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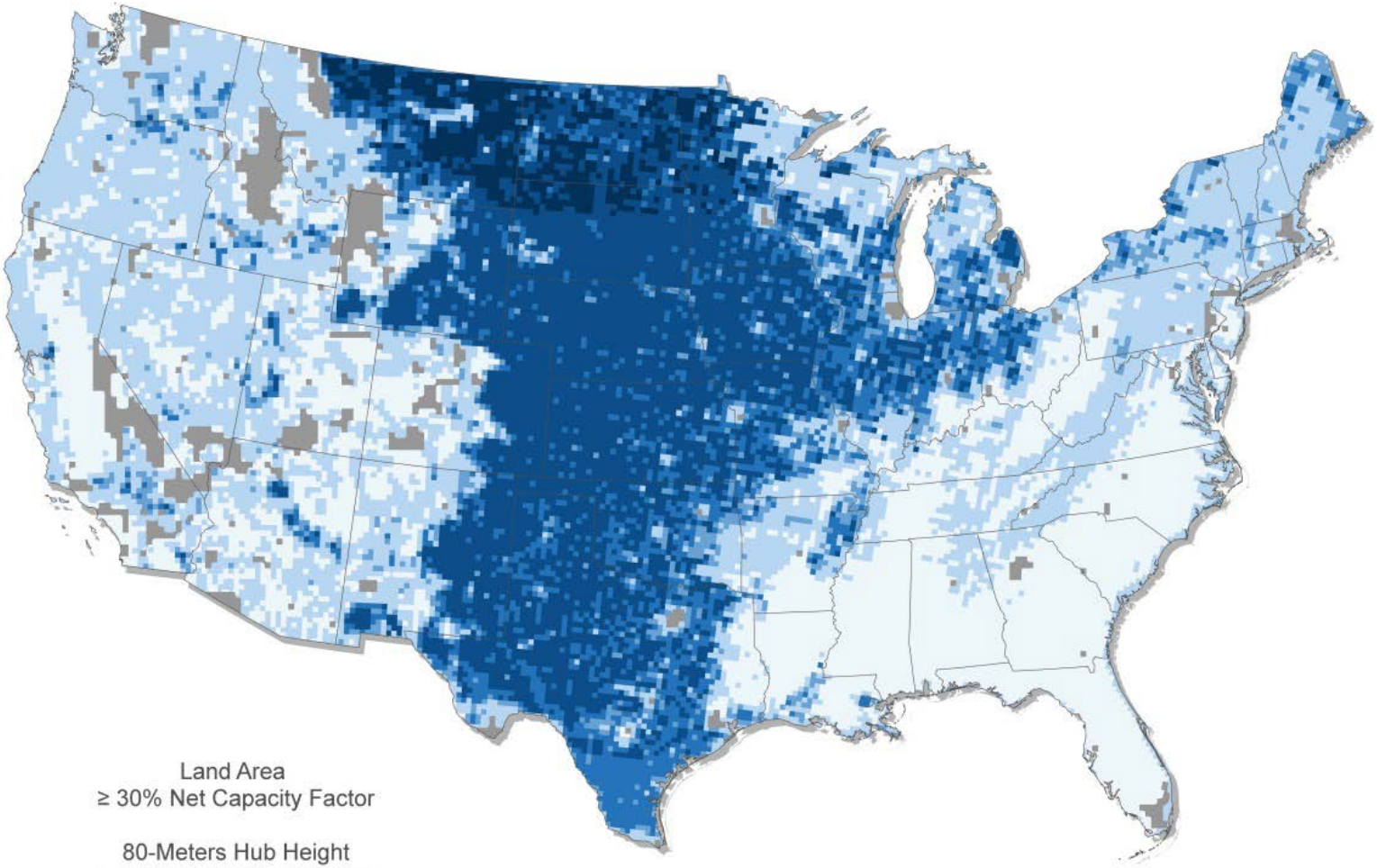
AWS Truepower®

Area for wind farm development – 2013 Tech



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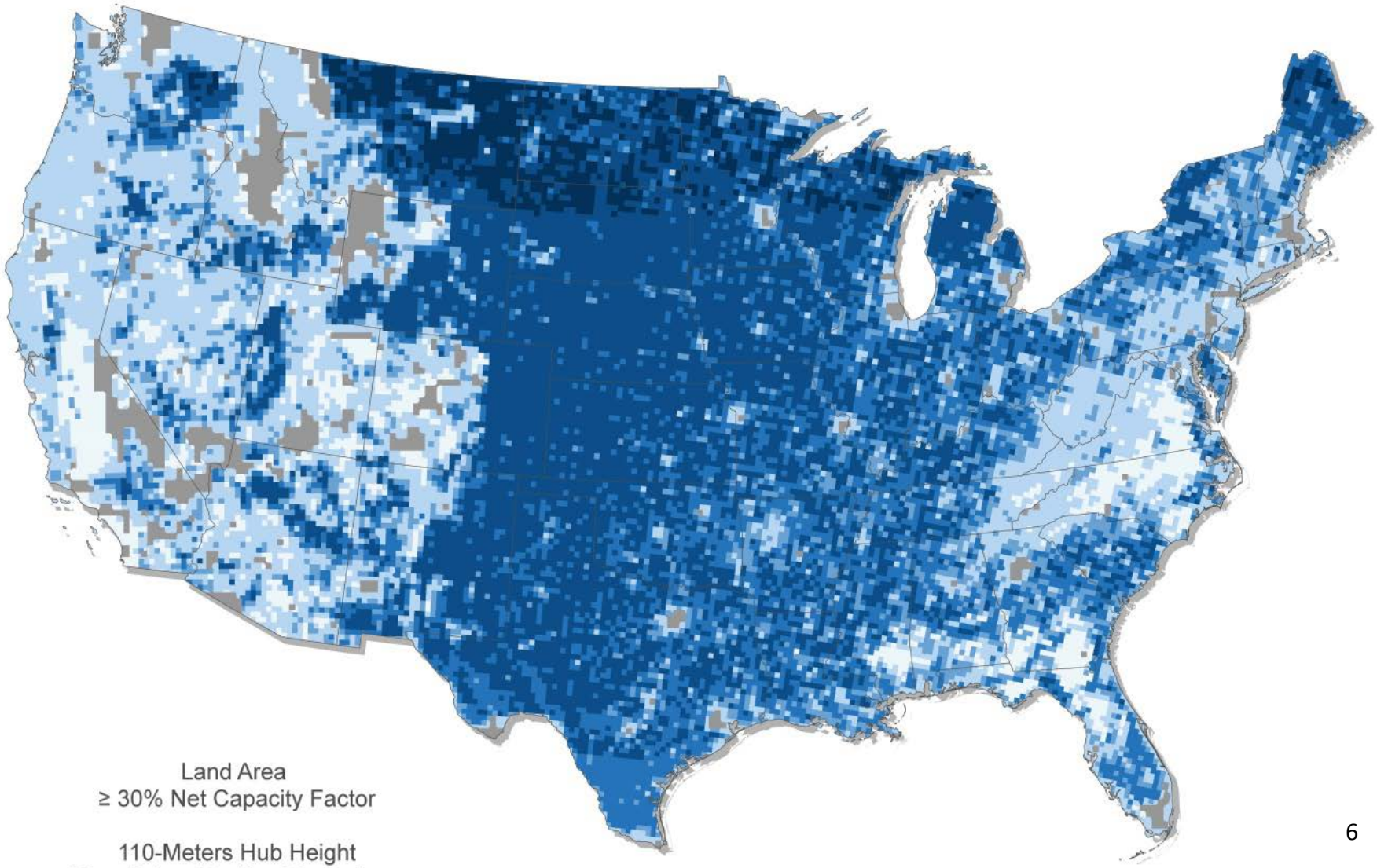
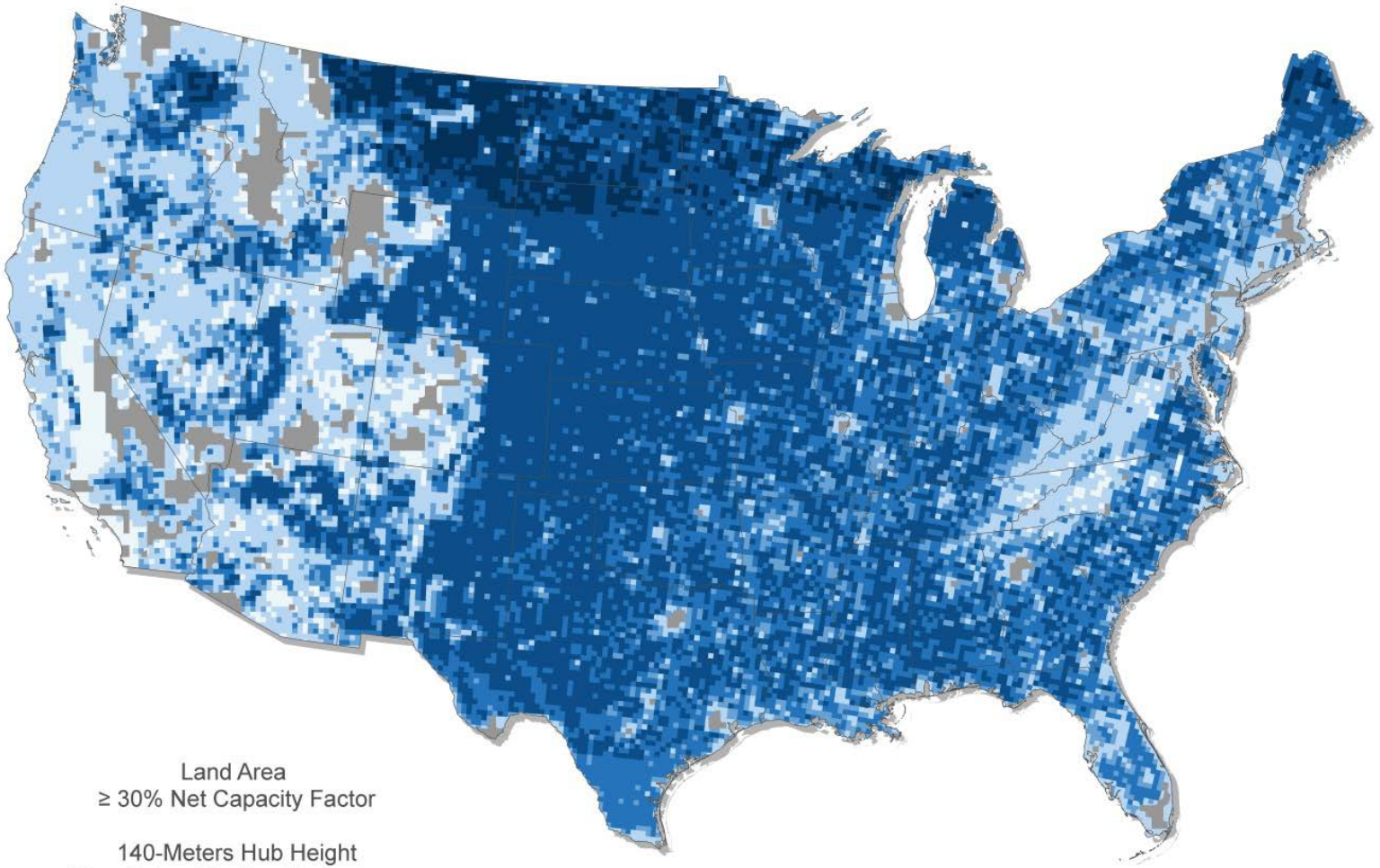
Area for wind farm development – 110 meter hub height- currently common in Germany



Area for wind farm dev't – Future – 140m



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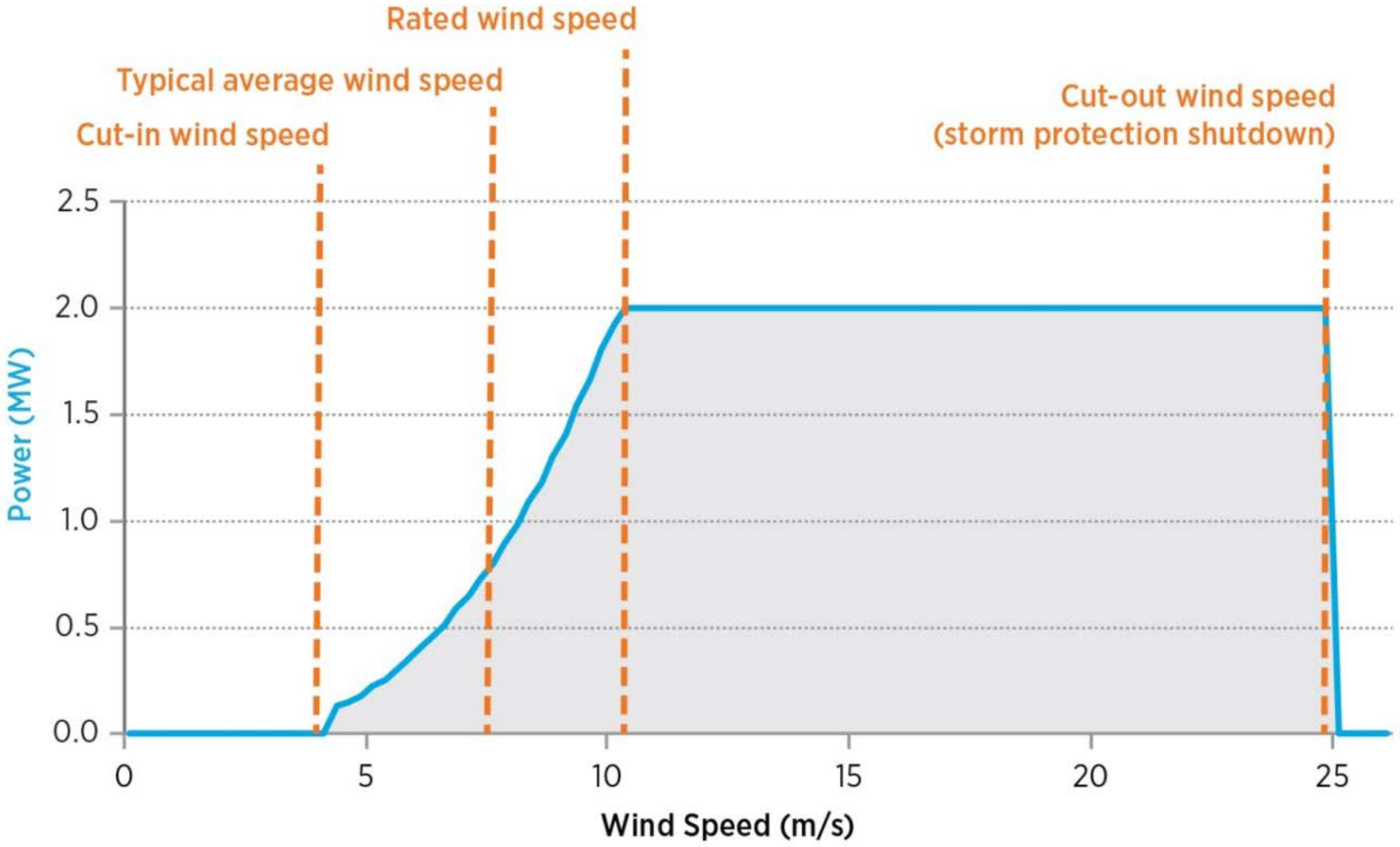
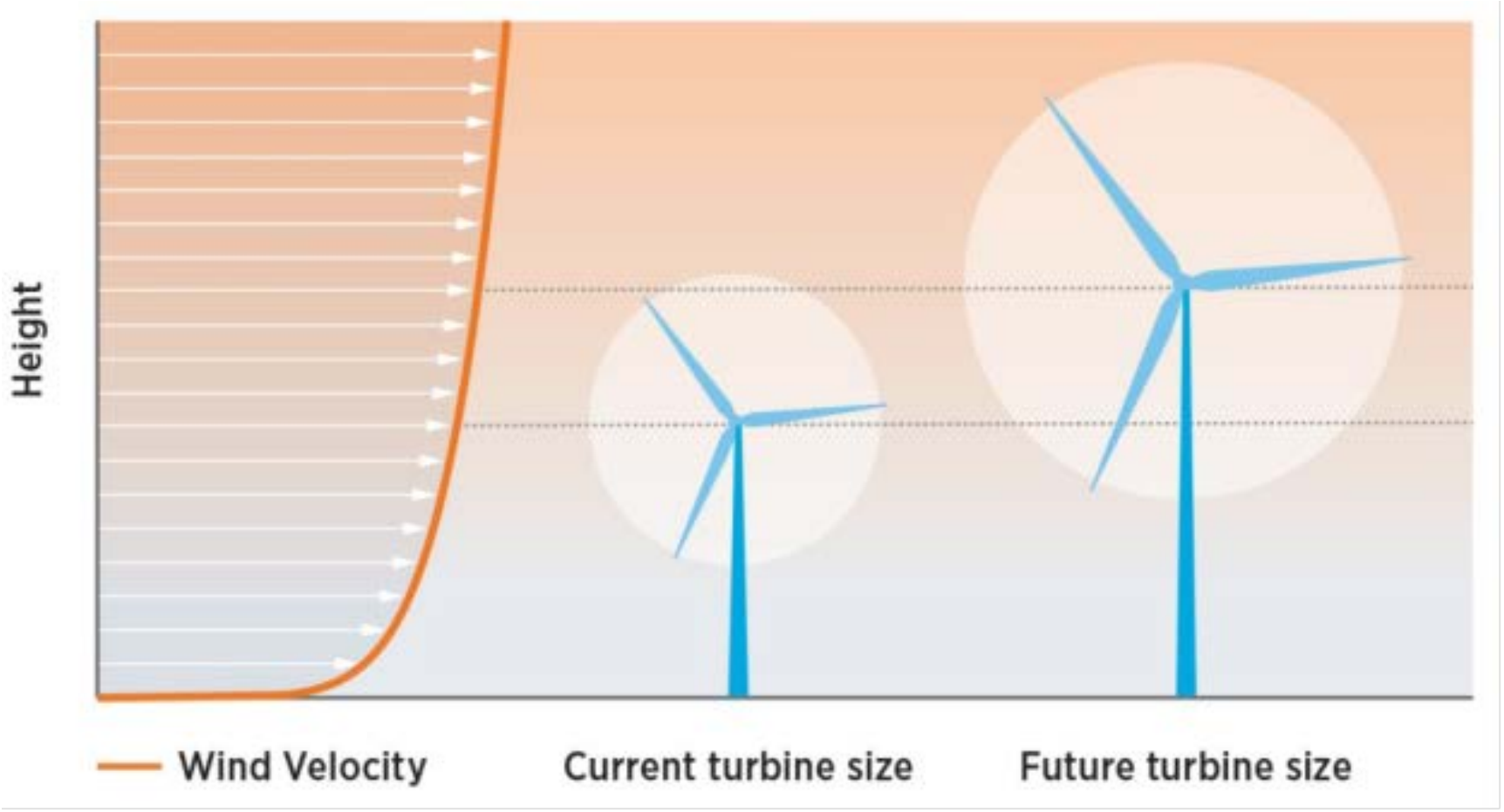
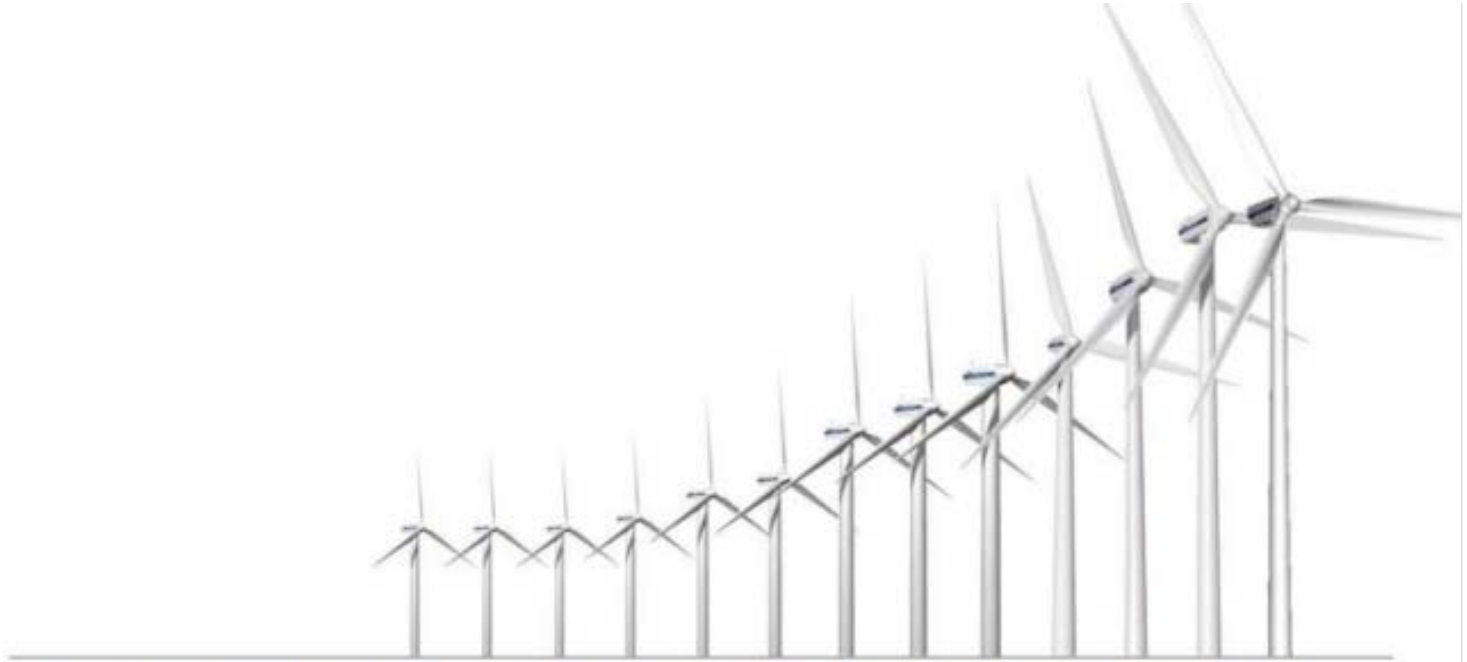
Why the big increase in area with larger windmills?



Exponential increase in power from larger and higher windmills

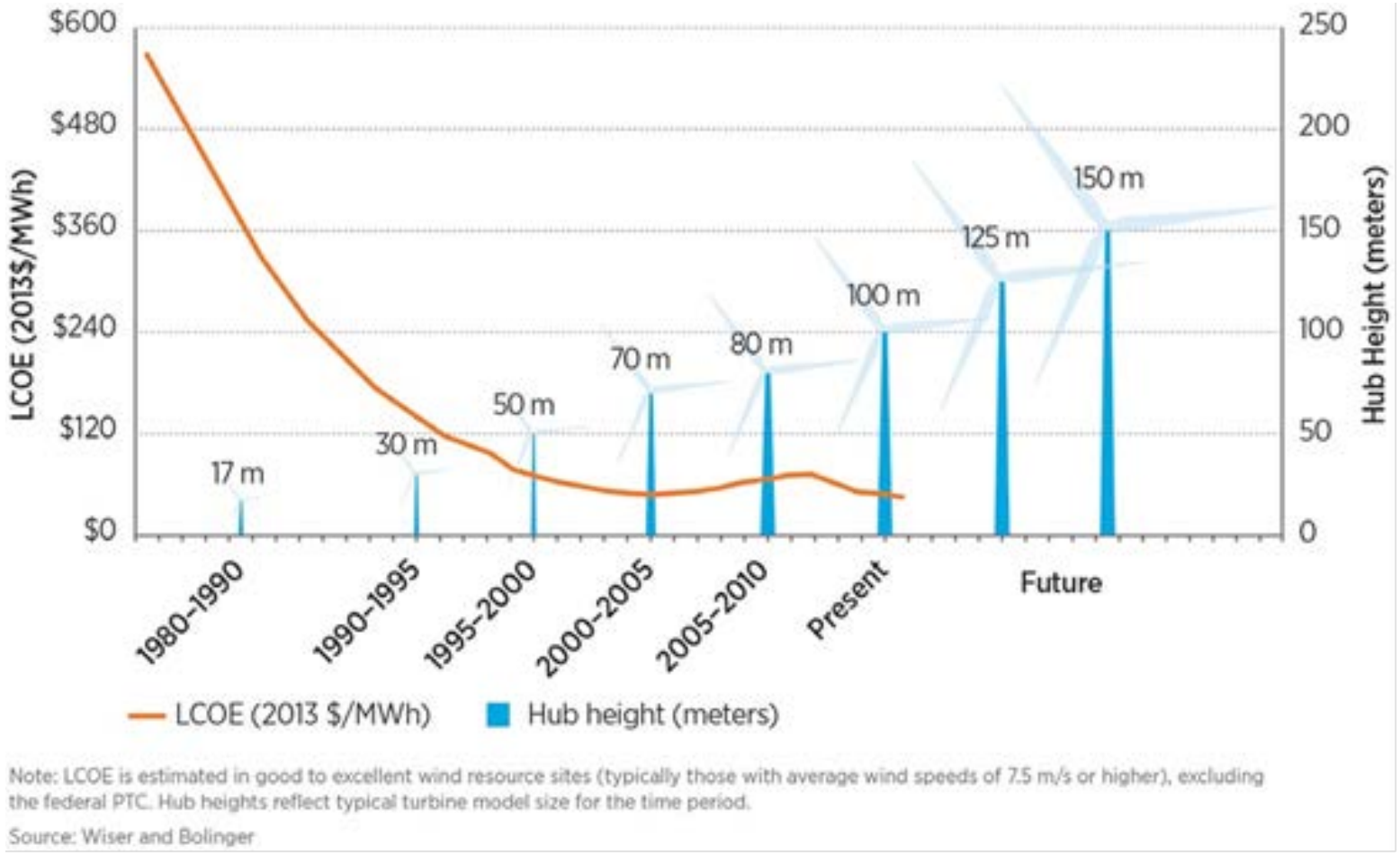


Increasing Windmill Size



Product/Rotor diameter (m)	V15	V17	V19	V20	V25	V27	V39	V44	V47	V52	V66	V80	V90
Year of installation	1981	1984	1986	1987	1988	1989	1991	1995	1997	2000	1999	2000	2002
Capacity (kW)	55	75	90	100	200	225	500	600	660	850	1750	2000	3000
MWh/year	217	265	301	346	481	647	1304	1581	1947	2530	4705	6768	9152

Increased hub height will no longer dramatically reduce the levelized cost of energy from wind energy. However, hub heights will continue to increase in areas that need these higher hub heights to make wind energy viable in lower wind regions



Note: LCOE is estimated in good to excellent wind resource sites (typically those with average wind speeds of 7.5 m/s or higher), excluding the federal PTC. Hub heights reflect typical turbine model size for the time period.

Source: Wiser and Bolinger

The primary limiting factor of increasing hub heights is the transportation costs of components. New technologies are providing for on-site assembly, which should allow height and size increases to continue into the future.

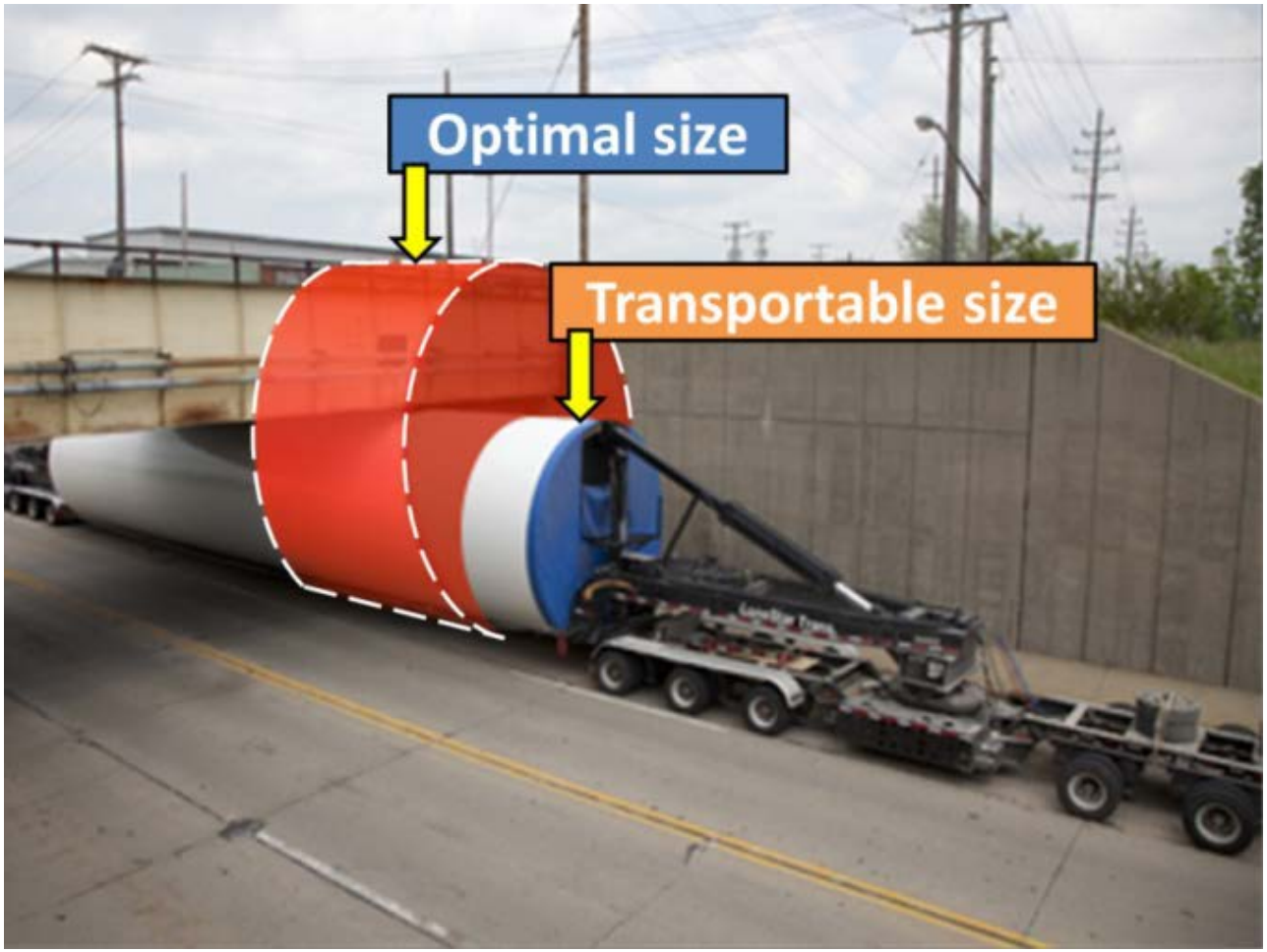
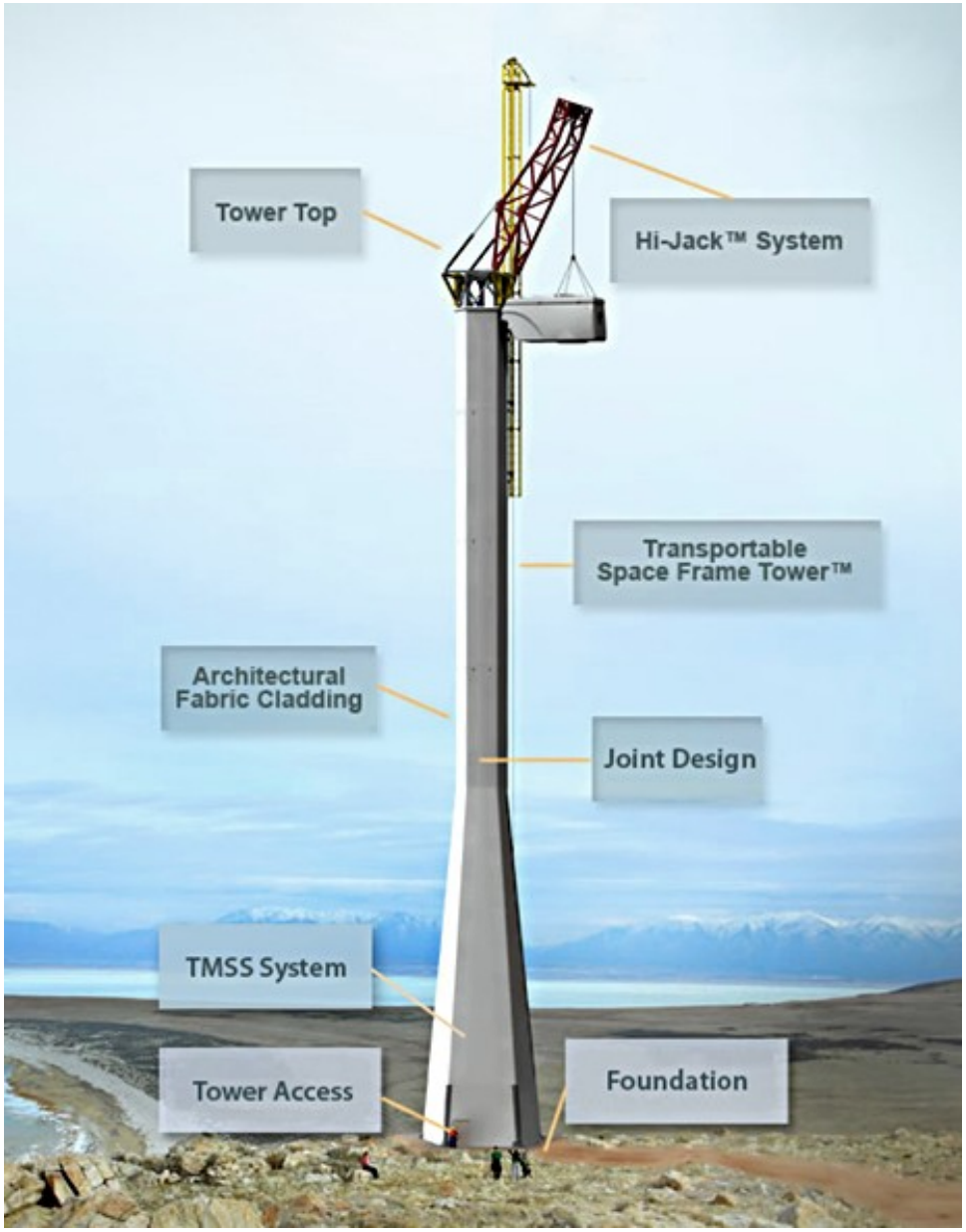




Photo credit: SSP Technology


Tower Top
Hi-Jack™ System
Transportable
Space Frame Tower™
Architectural
Fabric Cladding
Joint Design
TMSS System
Tower Access
Foundation



Locations of Military Bases in U.S.




Whidbey Island
Kitsap
Everett
Fallon
Lemoore
Monterey
China Lake
Port Hueneme
Point Mugu
Seal Beach
San Diego
area
Fort Worth
Great Lakes
Crane
Millington
Atlanta
Meridian
Gulfport
Pascagoula
New
Orleans
Kingsville
Corpus Christi
Ingleside
Pearl
Harbor
Naval Air
Stations
Brunswick
Portsmouth
Groton
Newport
Willow Grove
Earle
Lakehurst
Washington, D.C.
Annapolis
Patuxent
River
Dahlgren
Norfolk
area
Charleston
Kings Bay
Pensacola
Whiting Field
Jacksonville
Mayport
Panama
City
Key West

Joint Land Use Study (JLUS) is a Planning study prepared as a cooperative effort between civilian local officials, community representatives, and military personnel.

JLUS is funded by grants from the U.S. Department of Defense Office of Economic Adjustment.

JLUS Purpose - to mitigate or prevent incompatible civilian land uses that are likely to impair the continued operational utility of a Department of Defense (DoD) military installation.

Community Goal w/JLUS---retain base

JLUS study takes several years and results in:

- JLUS Executive Summary
- JLUS Report
- JLUS Background Report

JLUS study leads to implementation effort for new land use controls & acquisitions identified as needs in JLUS

JLUS' for airbases and naval air stations frequently place wind farms high on their list for incompatible land uses

JLUS often identify wind farms as problems including:

- Obstruction – obstacle to low level military flights
- Radio frequency (RF) clutter – moving blades cause doppler shift in radars
- Screening – radars detect and track aircraft behind path of wind farm

- Pre-2011 – military opposition to wind farms
- 2006-Cape Wind opponents put Defense study in 2006 Defense Authorization Act that limited wind approval
- 2011 - 2011 Defense Authorization Act that mandated friendlier defense relationship with alternative energy
- 2013-Military identifies climate change as defense threat

Methods of Mitigating Wind Farm Impacts on Radar:

- Reduced Radar Cross Section (RCS) Turbines
- Changing layout & number of turbines
- Replacing radar (ie. Phased array)
- Augmenting radar (infill radars)
- Radar upgrades (improving detection process)
- C2/Automation Upgrades- improving tracking performance – ie. Software upgrades

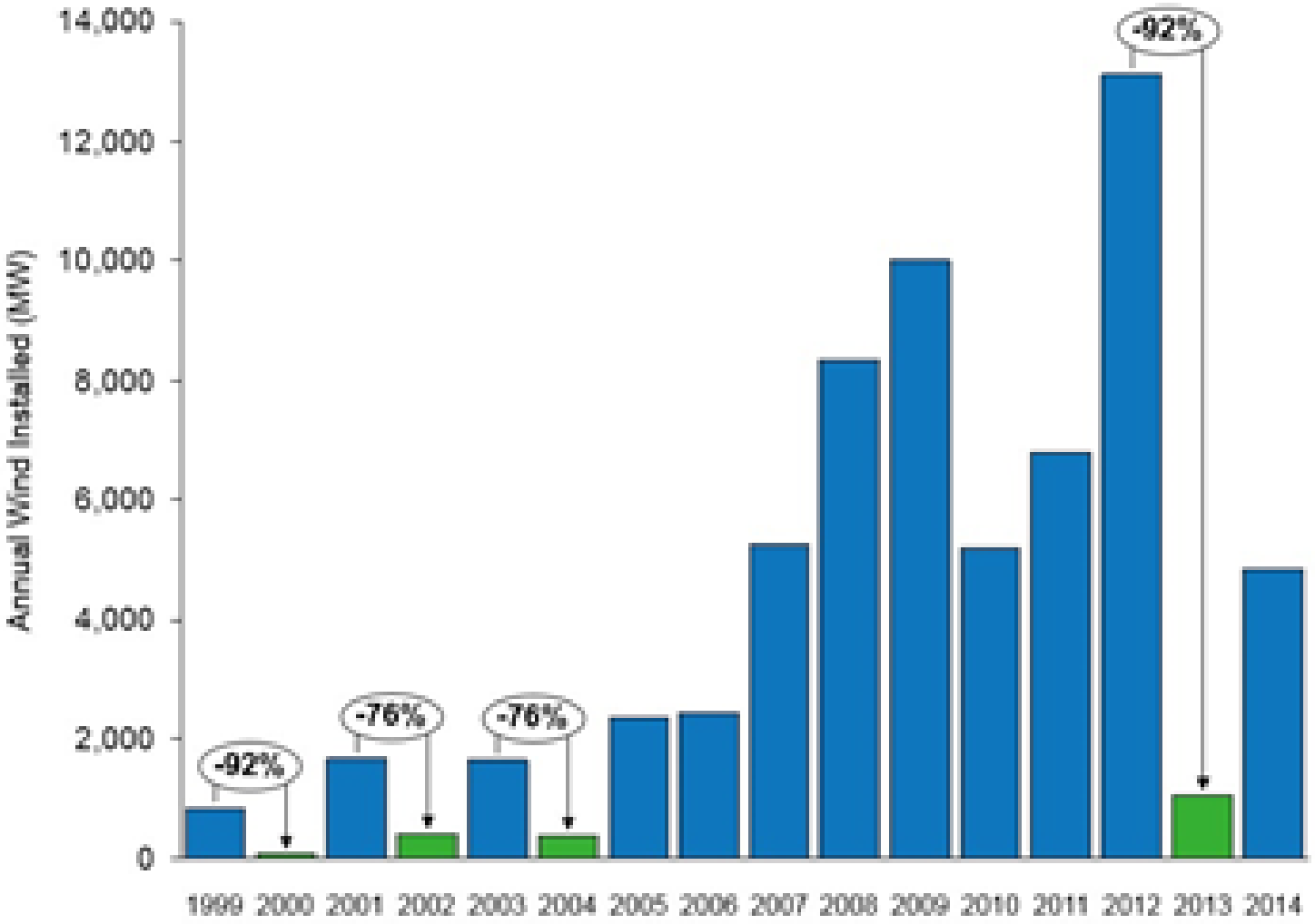
Limited Federal Authority to directly require Mitigation of Hazards to Air Navigation

- 14 C.F.R. § 77.31. Determinations – no power to fine persons who build without Determination- only persons who build without filing notice with feds
- Wind farms may be unable to obtain insurance unless they obtain a Determination of No Hazard. Therefore, this determination is highly sought
- 14 CFR § 77.9 – requires notice – construction 200'+
- Wind farm developers who are building structures offshore or in areas subject to the jurisdiction of other federal agencies will face agency regulations that may require compliance with FAA determinations.

Wind Farms driven by Federal & State Incentives

- Production Tax Credit (PTC) – 2.3 cents per KwH – expired in 2013 and 2014
- State Renewable Power Standards (RPS's)
  - 10% to 40%, often with higher tariffs
- Subsidized Transmission Lines (Texas)

Historic Impact of Production Tax Credit (PTC) Expiration

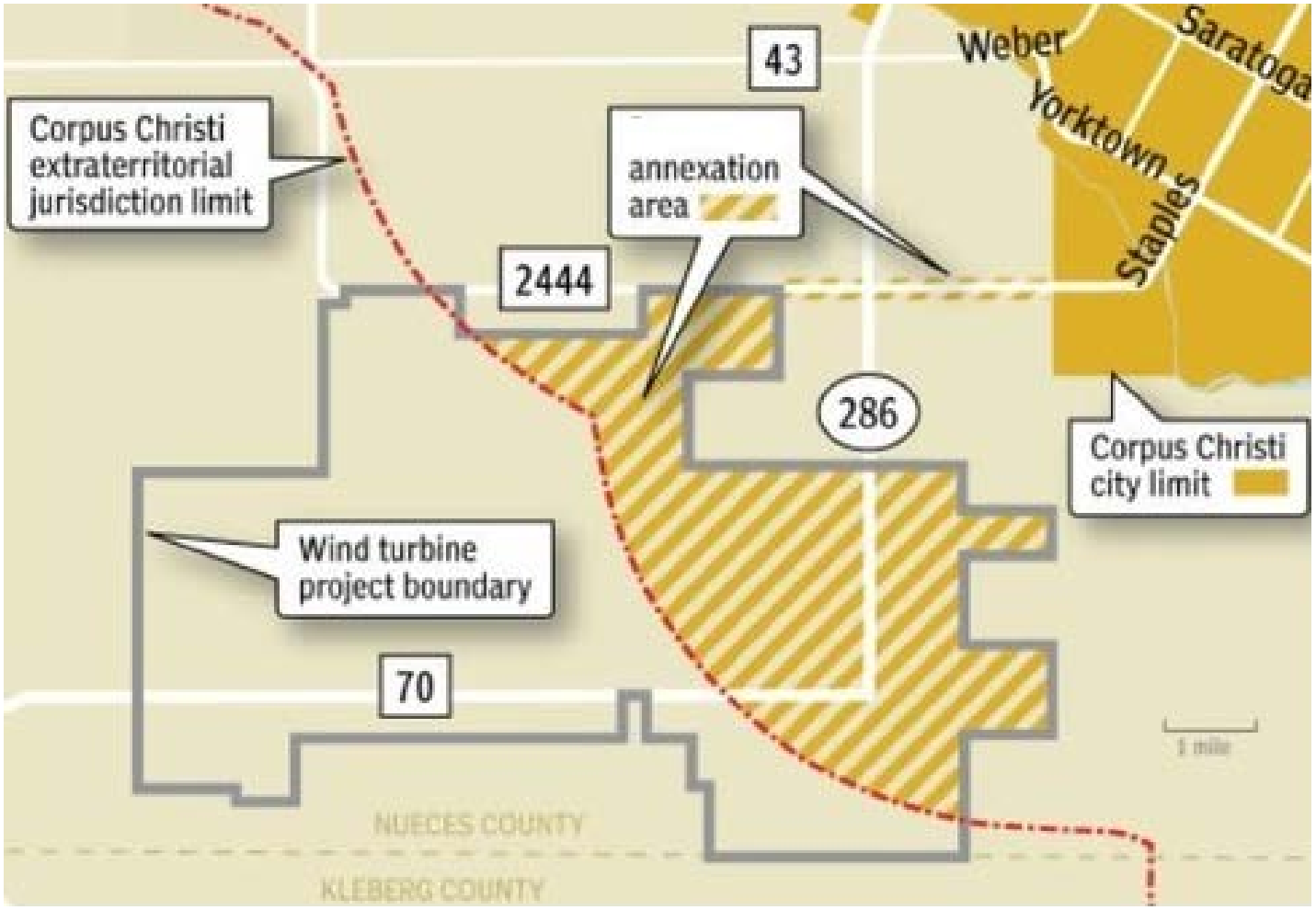


Balancing Military Needs with Wind Farm Development

- Identify conflicts jointly with military reps (JLUS)
- Military personnel will limit public statements indicating problems – complying with mandates
- Wind farms will claim compliance with fed laws
    - limited fed jurisdiction makes easy
- Wind farms will work out agts with military and claim full support by military- does not stop BRAC consideration of wind farms

Corpus Christi's Experience

- Conflict between missions of naval air station and prospective wind farm
- Limited land use regulation in Texas outside City limits
- Corpus Christi's response was to annex wind farm area


43
Weber
Saratoga
Yorktown
Staples
Corpus Christi
extraterritorial
jurisdiction limit
annexation
area
2444
286
Corpus Christi
city limit
Wind turbine
project boundary
70
1 mile
NUECES COUNTY
KLEBERG COUNTY