

20% Wind Energy: Siting and Environmental Issues and Benefits

Laurie Jodziewicz
Manager of Siting Policy
American Wind Energy Association

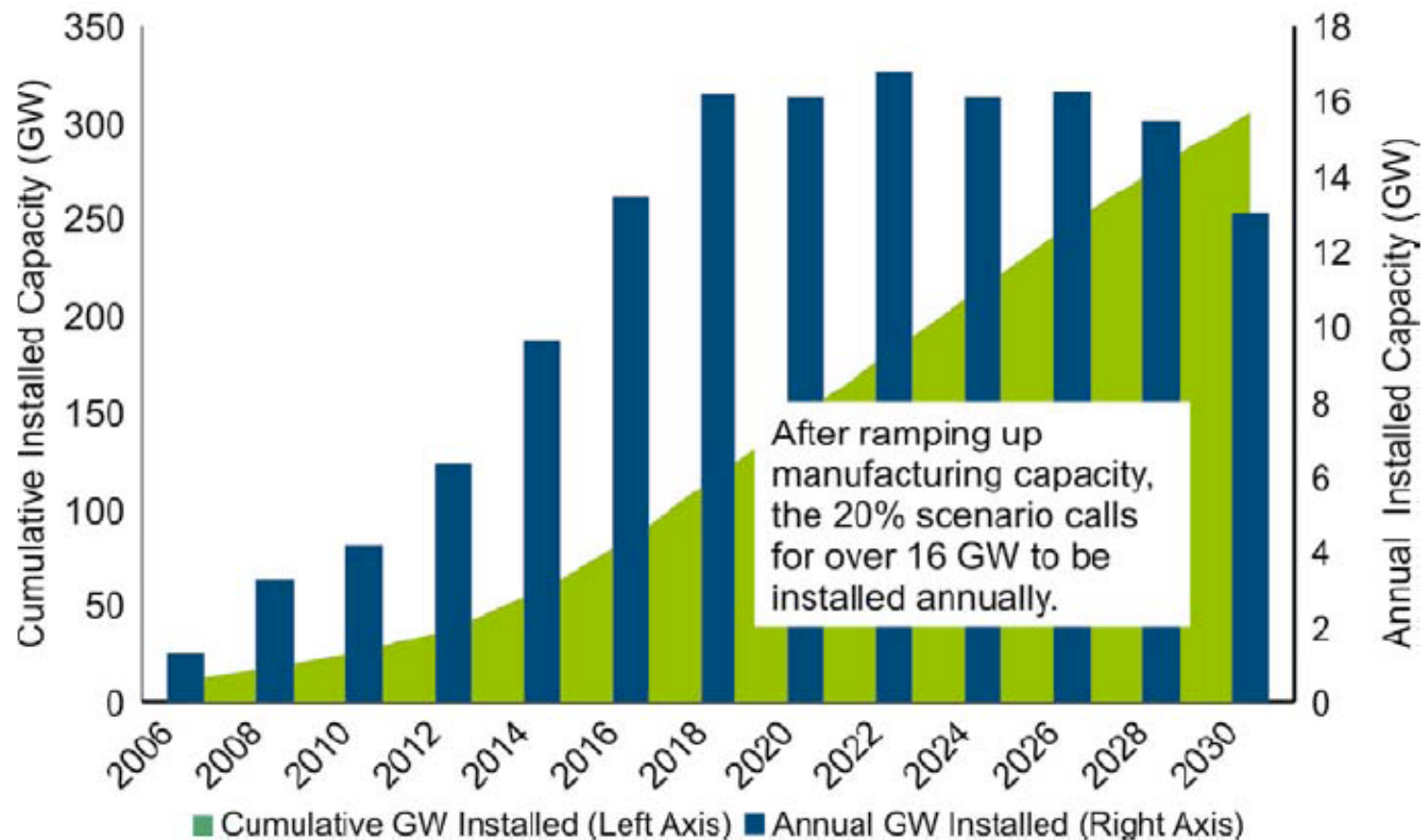
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Overview

- As wind power's contribution to electricity supply increases, concerns about local siting, wildlife, and environmental issues will grow. These concerns will need to be addressed in an orderly fashion.
- While there will be impacts related to increased installations, there will also be significant environmental benefits by way of reduced carbon dioxide emissions and reduced water use.

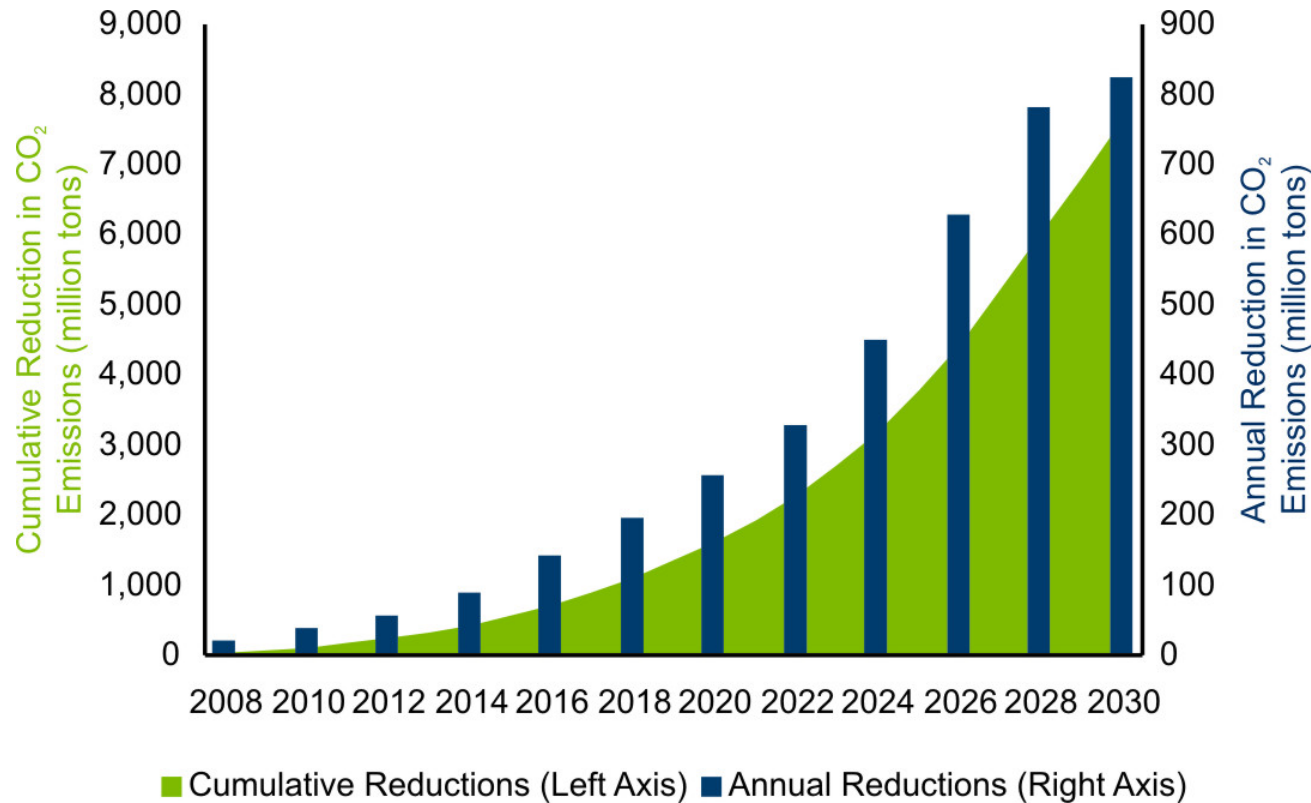
Installation Rate

Significant Annual Installations



Environmental Benefits

Carbon Dioxide Reductions



Reduces cumulative emissions from the electric sector by over 7,600 million metric tons of CO₂ by 2030

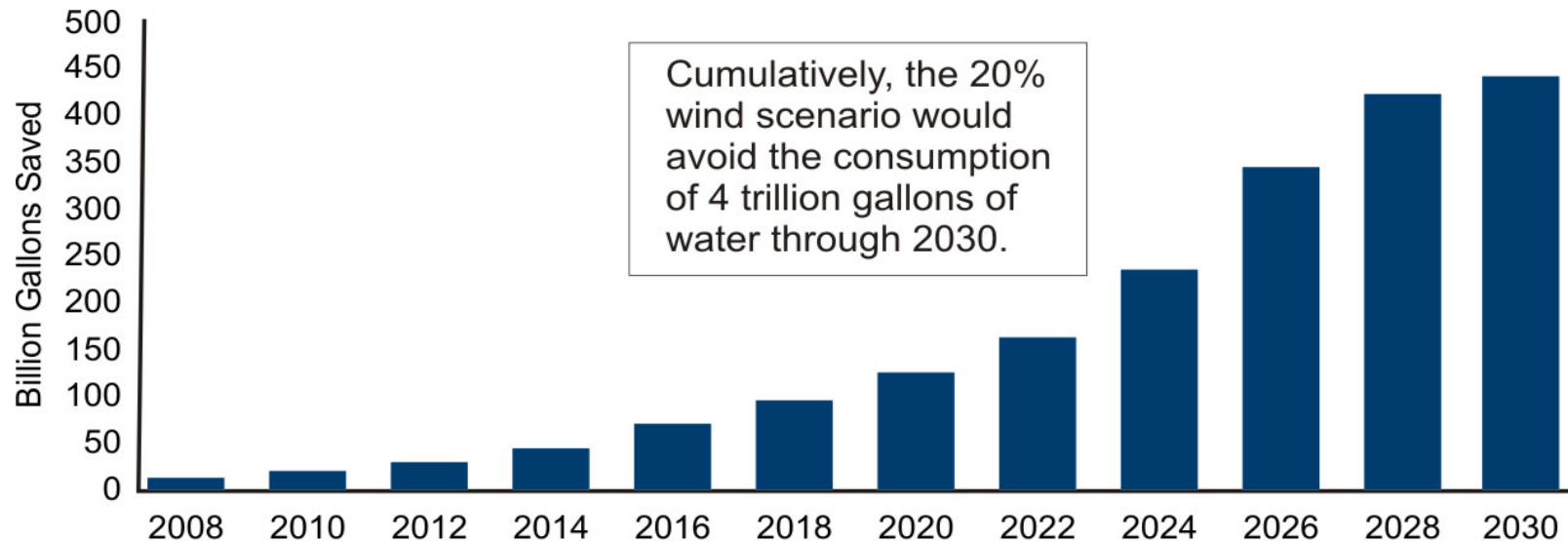
Almost single-handedly would keep electricity sector emissions level, despite a dramatic increase expected in electricity demand

Environmental Benefits

Reduced Water Use

- Cumulatively between 2007 and 2030, 20% wind reduces water consumption in the electric sector by 8%, or 4 trillion gallons.
- In 2030, reduces water consumption by 450 billion gallons or 17% of total electric section water consumption; a third of water conservation occurs in the arid West.

Annual National Water Conservation under 20% Wind Scenario



Siting Issues

Regulatory Framework

- Usually permitted locally, similar to other land use decisions
- Some states review projects in the PUC or equivalent
- State agencies, such as wildlife agencies, are consulted informally in most reviews
- Federal permits or reviews required, such as Federal Aviation Administration (FAA) review of structures more than 200 feet above ground level
- Projects on federally-managed land trigger NEPA
- Offshore wind projects will be regulated either by the Minerals Management Service, states or the Army Corps of Engineers, depending on location

Siting Issues

Community Acceptance

- Wind energy projects are unfamiliar to almost any community
- Concerns expressed include:
 - Aesthetics
 - Sound
 - Land value

Siting Issues

Community Acceptance - Aesthetics



Palm Springs, California

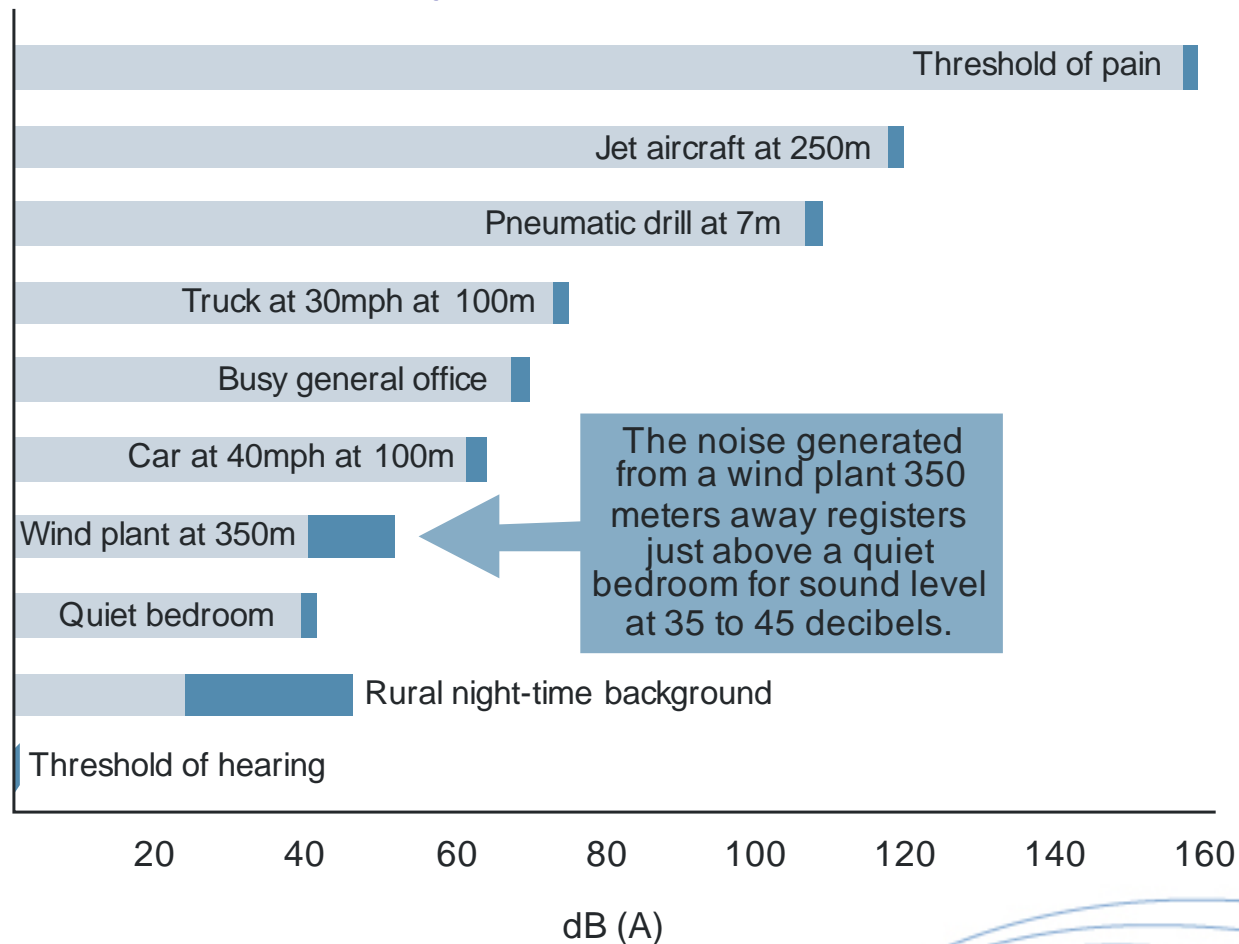


Top of Iowa, Joice, Iowa

Older vs. Modern Wind Plants

Siting Issues

Community Acceptance - Sound



Siting Issues

Community Acceptance – Land Value

- No statistically significant changes to property values found in multiple studies
- Lawrence Berkeley National Laboratory conducting comprehensive nationwide review
 - Data looks at quality of “vista” from specific properties, each home sold visited
 - Early results show no statistically significant effects
 - Final report due out this fall

Environmental Impacts

Land Use

- Total land area required: 61,000 km²
 - Land-based = 50,000 km²
 - Offshore = 11,000 km²
- Occupied land = 1,000 – 2,500 km²
(247,000 to 617,000 acres)—only 2% to 5% of total land area
 - Area occupied by turbines, equipment, roads
 - Slightly smaller than Rhode Island

Environmental Impacts

Wildlife Collisions

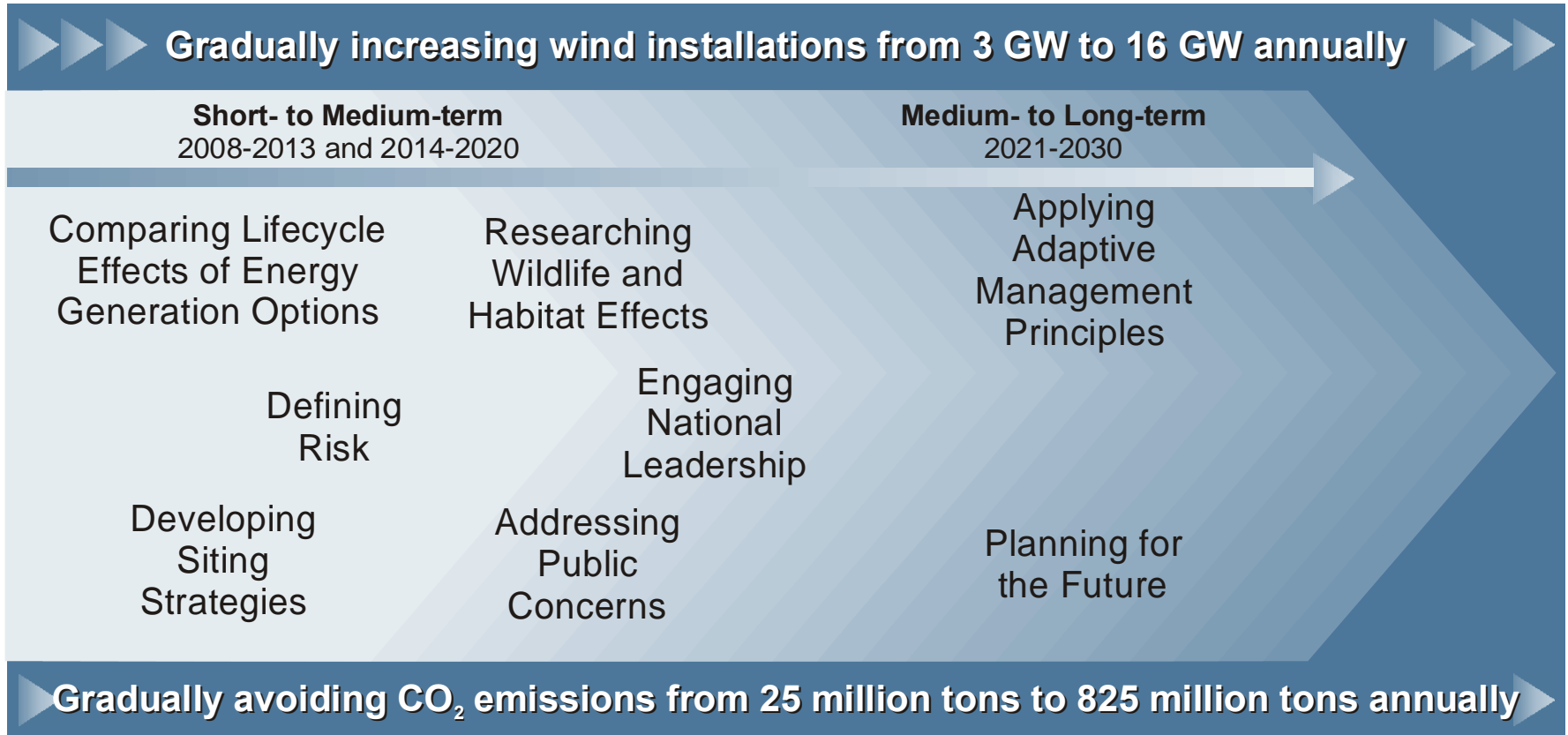
- National Research Council Report (2007) concluded that current wind generation is responsible for less than 0.003% of human-caused avian mortality
- Bat mortality has been higher than expected
- To date, no site or cumulative impacts on bird or bat populations have been demonstrated

Environmental Impacts

Habitat Fragmentation and Avoidance

- Native, unfragmented wildlife habitats threatened by many sources of human development
- Wind energy projects allow for open space as the amount of land directly affected is low (2-5% of the project area)
- Some species may be more affected
 - Some species require large areas devoid of even small roads and turbines, and other types of human intrusion.
 - Some species, especially grassland species, avoid areas with tall structures
 - In forested areas trees must be cut and edge areas created to reduce wind turbulence

A Look Ahead



Efforts Underway

Government review/permitting

- Wind Turbine Guidelines Advisory Committee (Department of the Interior)
- Industry seeks transparent and predictable aviation and military reviews, with sufficient agency resources for timely responses
- States developing guidelines for siting and wildlife issues

Efforts Underway

Community acceptance

- Studies on issues such as property values
- Outreach to affected communities part of industry best practices
- Increased education about wind energy
- Identification of potential issues

Efforts Underway

Addressing Wildlife Impacts

- Collaborative industry, government and non-governmental organization efforts to produce credible and applicable research
 - Bats & Wind Energy Cooperative
 - Grassland/Shrub-Steppe Species Collaborative
- Launch of the American Wind Wildlife Institute
- Comparative study of impacts of all energy sources



Contact information:

Laurie Jodziewicz

Manager of Siting Policy

American Wind Energy Association

Phone: (202) 383-2516

ljodziewicz@awea.org