

DOCKETED	
Docket Number:	19-ERDD-01
Project Title:	Research Idea Exchange
TN #:	225137
Document Title:	Presentation - Panel I - Questions 1 and 2 - Next Generation Wind Energy Technologies and their Environmental Implications
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Submitter Role:	Public
Submission Date:	10/29/2018 2:40:34 PM
Docketed Date:	10/29/2018

CEC Staff Workshop

Next Generation Wind Energy Technologies and their Environmental Implications

October 25, 2018

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Two panel questions on taller wind turbines

Question 1: There are **neither new nor existing wind turbine manufacturing facilities located to California**. How critical is it and are there opportunities for **advanced manufacturing technology** in California? How can next generation wind energy technologies change this landscape in California?

Question 2: What are the **research needs** to enable on-site manufacturing or hybrid solutions for wind energy technologies? What are the main on-site manufacturing challenges in California and what are needed to address those challenges?

A state of the art large turbine and logistical challenges

78-m two-piece blades

200 t, 5-MW nacelle

160-m concrete tower



Photo from Windpower Engineering

<https://www.windpowerengineering.com/business-news-projects/uncategorized/liebherr-tower-crane-lifts-a-fully-pre-assembled-rotor-for-turbine-installation/>

Illustration from GE Renewable Energy

<https://www.ge.com/renewableenergy/wind-energy/turbines/cypress-platform>

California has a substantial large turbine deployment and jobs opportunities:

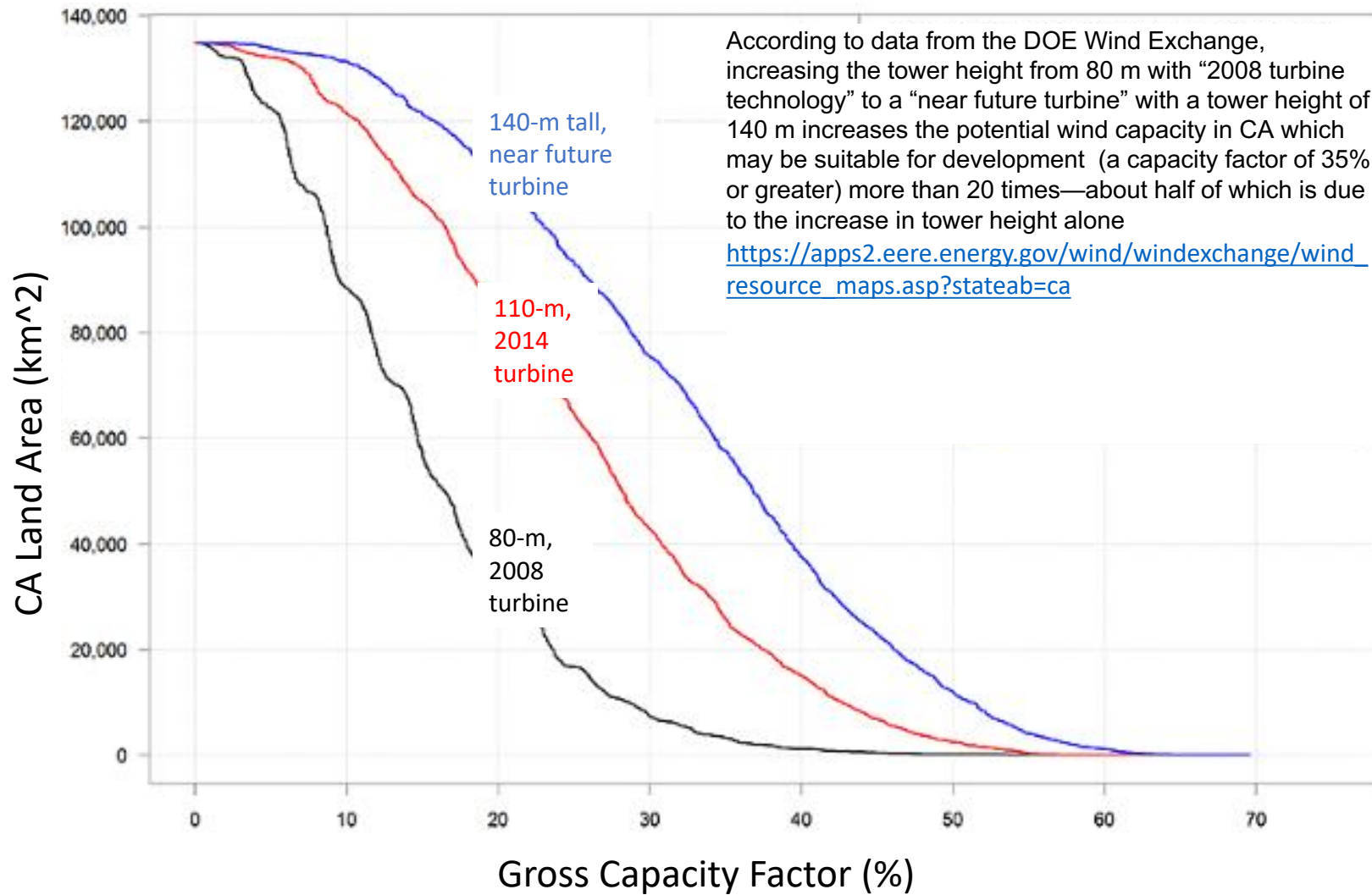


Photo from Greentechlead

<https://www.greentechlead.com/wind/global-wind-farm-om-market-hit-usd-9-84-bn-2016-19421>

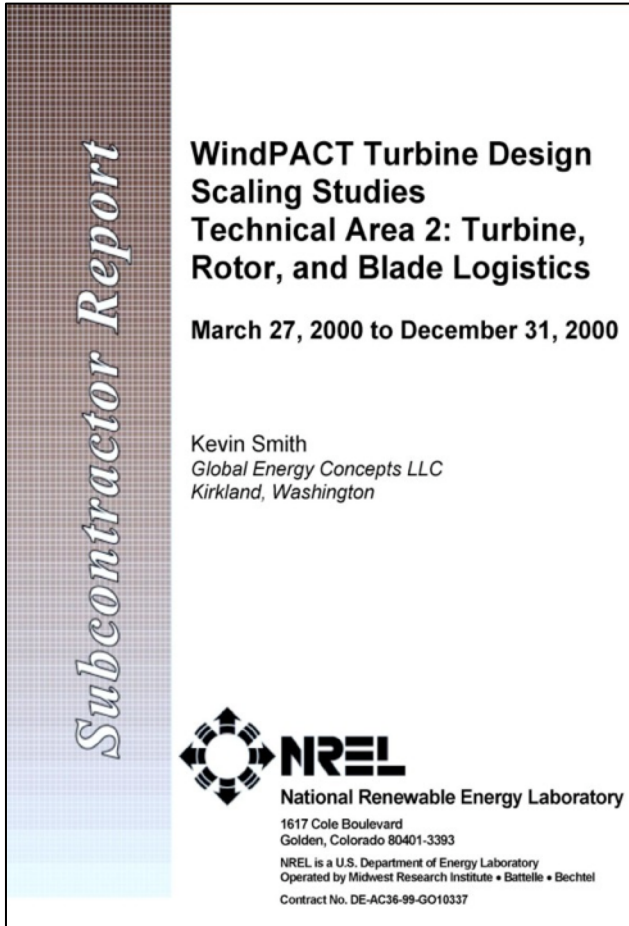


Responses from my informal survey of wind experts

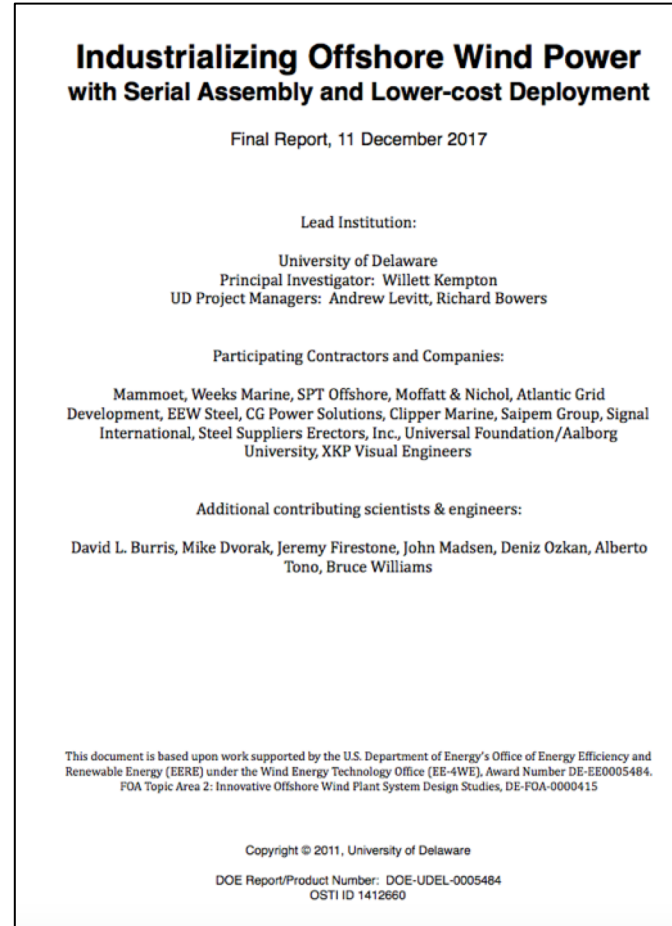
We need to better understand the potential benefits and challenges of large land-based wind technologies and on-site manufacturing:

1. What is the actual **deployment potential** for large-wind turbines in California?
2. How much would large-wind turbine deployments really **cost**?
3. What are the actual **wind shears** in different California regions?
4. How well do large-wind turbines **integrate** with other generation technologies (offshore wind, solar, etc....)?
5. What are the public acceptance, zoning, wildlife and military **constraints**?
6. What benefits could **on-site manufacturing and assembly** bring to California?
7. How does large wind compare with **offshore wind costs**?

My suggestion: California-focused studies or projects that help quantify the benefits and challenges of large turbines



<https://www.nrel.gov/docs/fy01osti/29439.pdf>



<https://www.ceoe.udel.edu/research/affiliated-programs/wind-power-program/research-projects/industrializing-offshore-wind>

Scope Examples:

- Wind resource assessment
- Tall tower conference or workshop
- “Open-source” reference turbines, towers, and site
- Logistics and assembly modeling and tools
- LCOE modeling
- Economic impact assessment
- Grid integration impacts
- Public acceptance survey
- Repowering potential
- Market survey or comparison to other markets that have deployed tall wind (i.e. Germany)
- Advanced technology studies and projects
- Explore the synergies of tall-wind and future offshore wind deployments