

# SMART Wind Consortium Launch Event

**Developing a Consensus-Based  
Sustainable Manufacturing, Advanced Research & Technology  
Roadmap for Distributed Wind**

**October 16, 2014**



- Overview of project vision, goals and objectives and likely evaluation for future funding
- Participant expectations, benefits
  - Decision points through out
- Plans for Subgroup Meetings
- AWEA Roadmap 2002
- SMART Wind Roadmap Table of Contents

2-year grant awarded to DWEA,  
supported by eFormative Options and  
Wind Advisors Team to:

- 1) Form a **consortium** of DW manufacturers, suppliers, university researchers, manufacturing centers; and
- 2) Develop a **roadmap** to identify manufacturing gaps, prioritize actions, and foster solutions

*Overall program aim:  
Support OEMs by identifying areas to  
reduce technology and  
manufacturing costs.*

# SMART WIND CONSORTIUM

Developing a Consensus-Based Sustainable Manufacturing, Advanced Research & Technology Roadmap for Distributed Wind

Proposal to National Institute of Standards & Technology AMTech Program

2013-NIST-AMTECH-01

**DWEA**  
DISTRIBUTED WIND ENERGY ASSOCIATION

[www.distributedwind.org](http://www.distributedwind.org)

***Consortium:*** an agreement, combination, or group (as of companies) formed to undertake an enterprise beyond the resources of any one member

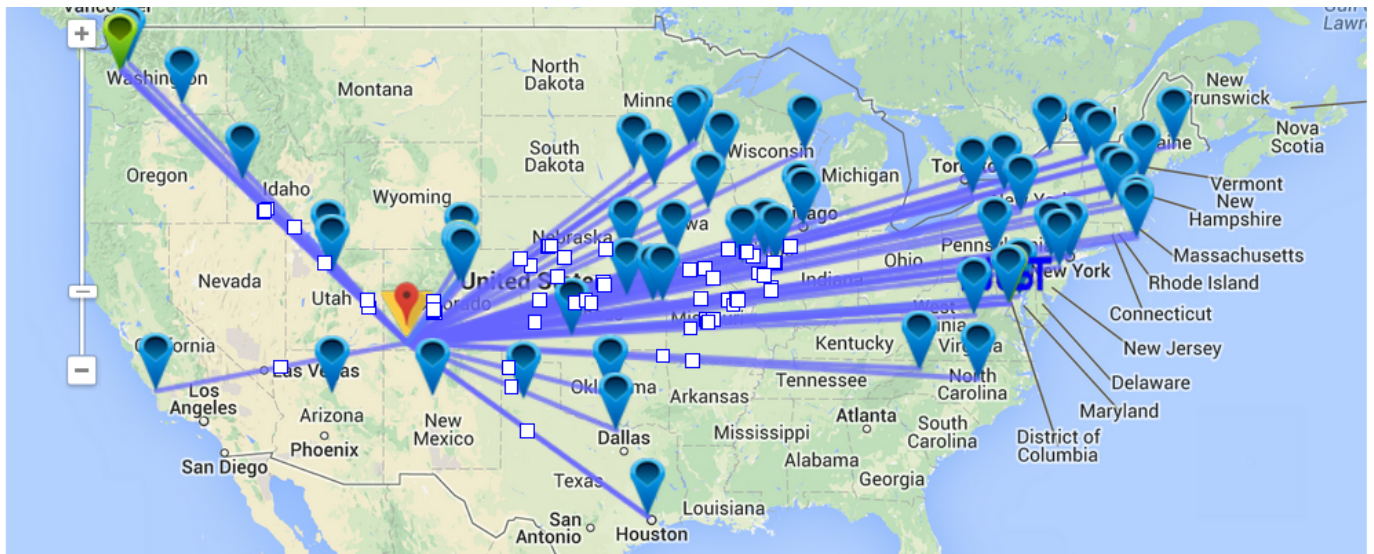


Image courtesy NIST

SMART Wind Consortium is connecting more than 80 collaborators to form consensus on near-term and mid-term actions needed to increase cost competitiveness through the use of advanced manufacturing techniques  
[www.distributedwind.org/smart-wind-sign-up/](http://www.distributedwind.org/smart-wind-sign-up/)

## Core Team



**DWEA Executive Director**  
Jennifer Jenkins



**Project Manager**  
Heather Rhoads-Weaver  
eFormative Options



**Technical Lead**  
Trudy Forsyth  
Wind Advisors Team



**DWEA Business Manager**  
Christine Larsen

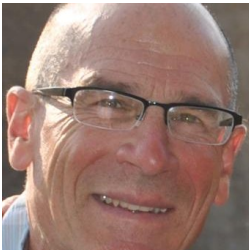


**Technical Co-Lead**  
Brent Summerville  
Summerville Wind & Sun

# Support Team



**Communications**  
**Ruth Baranowski**  
Wind Advisors Team



**Stakeholder  
Research**  
**Kurt Sahl**  
eFormative Options



**Bookkeeping &  
Accounting**



**Financial Operations**  
**Mary Childress, CPA**



**Market Analysis**  
**Matthew Gagne**  
eFormative Options

# Why Distributed Wind: Benefits to America



- Promotes more energy choices for Americans
- Plays to American technology and manufacturing strengths
- Creates long-term sustainable jobs
- Strengthens exports
- Increases private sector investment in clean energy
- Places more wind energy in the public eye

# Distributed Wind's Diverse Market Potential



**Residential**



**Schools**



**Commercial**



**Military**



**Farms**



**Public**



**Foreign Assistance**

## Industry Participation (partial)

*DWEA speaks for all the Major Players*



## Academic-Research University Participation in Consortium (partial)



Appalachian State University



- **Overall Project Vision**

Aid DW growth and adoption of innovative manufacturing techniques, increase production volumes and reduce costs throughout technology lifecycle, maintain high product quality and value

- **Project Goals**

- U.S. distributed wind market is on track to grow from 2012 installed capacity of nearly 800 MW to >10 GW over next decade
- DWEA is convening targeted SMART Wind

## Initial SMART Wind strategies

- Identify common distributed wind manufacturing gaps and barriers
- Prioritize solutions to those gaps for today and for future scalability
- Facilitate a rapid transfer of innovation into American-manufactured wind turbines, open new market opportunities, expand distributed wind applications
- Reduce lifecycle costs, maintain high product quality and value
- Secure U.S. global competitiveness and leadership



## Consortium Meetings

Bring together critical U.S. distributed wind turbine and component manufacturers to maintain edge in a growing global market

Leverage industry-academic dialogue to develop strategies to aid distributed wind industry growth and advance innovative manufacturing techniques

Share ideas and forge ahead as global leaders in the growing market of distributed wind



photo courtesy Northern Power Systems

## SMART Wind Consortium In-Person Meetings

Meeting		Location	Date
	Project Meet & Greet, Initial Steering Meeting	Stevens Point, WI	June 17 and 19, 2014 In conjunction with Small Wind Conference
1	Consortium Launch	Albany, NY	October 15-16, 2014 In conjunction with DWEA All-States Summit
2	Mechanical Systems Subgroup	Denver, CO	November 12-14, 2014
3	Support Structures Subgroup	Denver, CO	January 13-14, 2015
4	Composites Subgroup	Denver, CO	February 16-18, 2015
5	Electrical Systems Subgroup	Washington, DC	March 25-27, 2015 In conjunction with DW15 Hill Event
6	Roadmap Prioritization	Washington, DC	February or March 2016
	Finalize, Produce & Distribute Roadmap		Project Completion: May 31, 2016

Register at [www.distributedwind.org/smart-wind-consortium](http://www.distributedwind.org/smart-wind-consortium)

# Consortium Organization

**DWEA OEM  
Steering Group**

**Jennifer Jenkins**  
DWEA  
Consortium Lead

**Research &  
Academia  
Group**  
Subgroup Leads



**Matt Gagne  
Kurt Sahl**  
EFO Support

**Heather Rhoads-  
Weaver**  
eFormative Options  
Project Manager

**Mary Childress**  
CPA  
**Christine Larsen**  
DV s Support  
 **jitasa**  
NUMBERS FOR GOOD

**Trudy Forsyth**  
Wind Advisors Team  
Technical Lead

**Ruth Baranowski**  
WAT Communications  
Director

## Core & Support Team

**Brent Summerville**  
Summerville Wind & Sun  
Co-Technical Lead

## DWEA OEM Steering Group (new and existing OEMs with different needs)

- Expectations
  - Oversight advice and specific recommendations
  - Provide direct feedback on areas or partners to explore within SMART Wind project
    - Provide individual feedback directly to Technical team leads
    - Technical team may set up surveys to evaluate group priorities
  - Team together to develop overall Roadmap that helps technical development and manufacturing efforts

- DWEA OEM Steering Group Requirements

- Must be DWEA Industry-level members
- Meet domestic content & foreign participation criteria
  - At least 40% of total installed costs with a goal of increasing above 50-60% through the project
  - Investment and program opportunities, IP protection in parent company country
- One vote per company
- Provide advice on SMART Wind project
- Provide technical and manufacturing gaps (current and scale-up) & baseline and benchmark data

- Participant Expectations Frequently Asked Questions

[www.distributedwind.org/smart-wind-faqs/](http://www.distributedwind.org/smart-wind-faqs/)

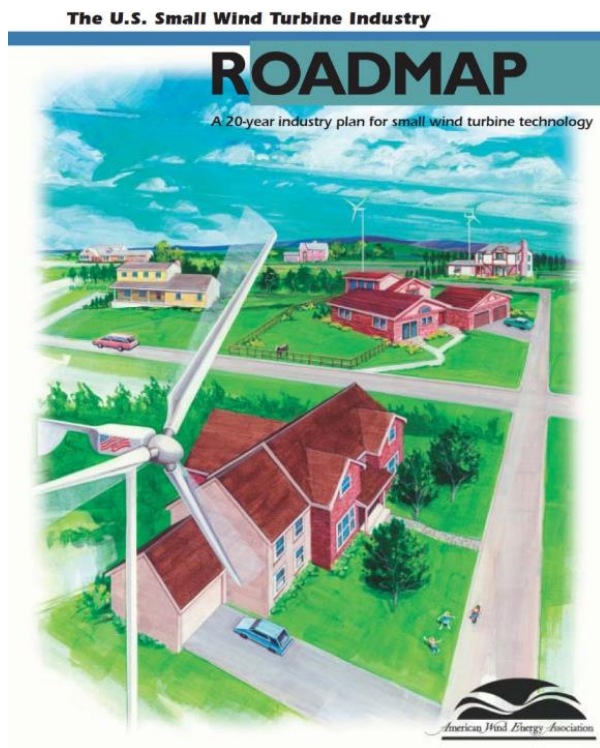
- **Project Objectives**

- Address major technological and related barriers that inhibit growth of advanced DW manufacturing by building an industry-based Consortium with a wide variety of stakeholders to reach consensus on advanced manufacturing opportunities
- Connect more than 80 existing and new collaborators to form consensus on near-term (low and high cost) and mid-term plans needed to increase cost competitiveness through the use of advanced manufacturing techniques as documented in the SMART Wind Roadmap

*(continued)*

- **Project Objectives (continued)**

- Accelerate university-based research to develop innovative technology solutions and facilitate deployment to support advanced U.S. manufacturing, increasing number of American jobs throughout DW supply chain
- Reduce levelized cost of energy (LCOE) of installed DW projects to achieve parity with U.S. retail electricity grid rates in more markets
- Integrate NIST work with other federal and state government opportunities, namely to unite strategies and complement DW efforts of U.S. Department of Energy (DOE)

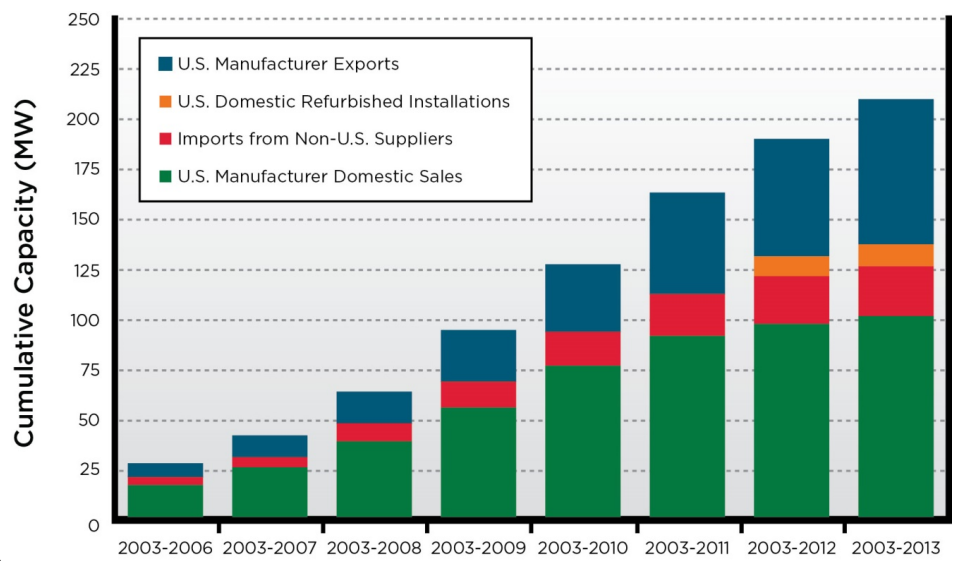


Last Small Wind Industry Roadmap was produced in 2002

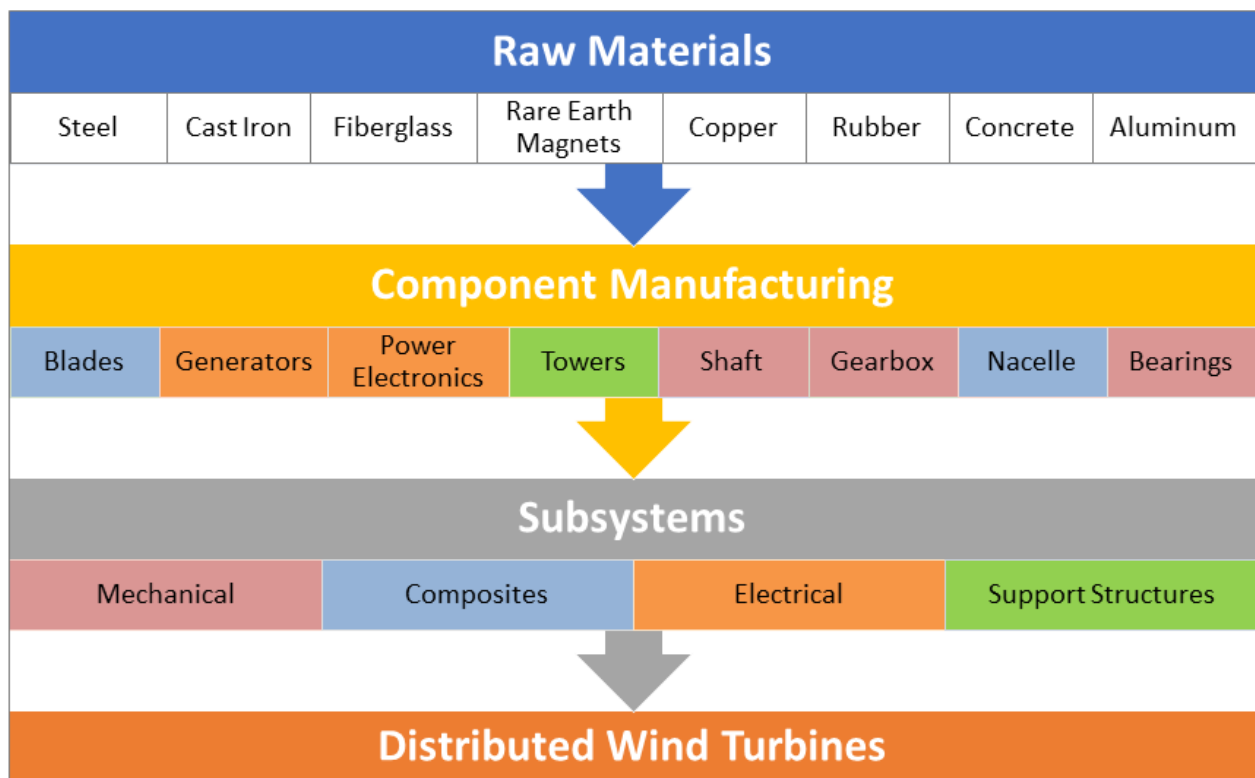
SMART Wind project will identify and prioritize cost-effective solutions so U.S. distributed wind industry can claim its share of projected **potential global \$2 trillion market**

# U.S. Small Wind Domestic, Imports, and Export Sales

Estimated Total  
Available Market  
(2030 Theoretical Potential)



## Consortium Structure: DW Supply Chain



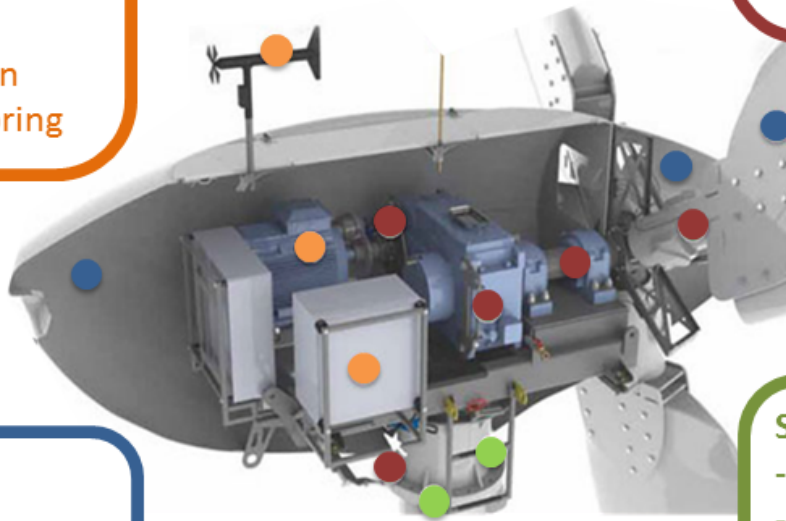
### Electrical Systems

- Inverter
- Controller
- Alternator
- Power electronics
- Generator
- Magnets
- Bus bars
- Slip rings
- Interconnection
- System monitoring

**Distributed wind energy turbine systems, subsystems, components and piece parts divided into four subgroups**

### Mechanical Systems

- Shafts
- Bearings
- Braking system
- Gearbox
- Pitching system
- Furling system
- Yaw system



### Composites

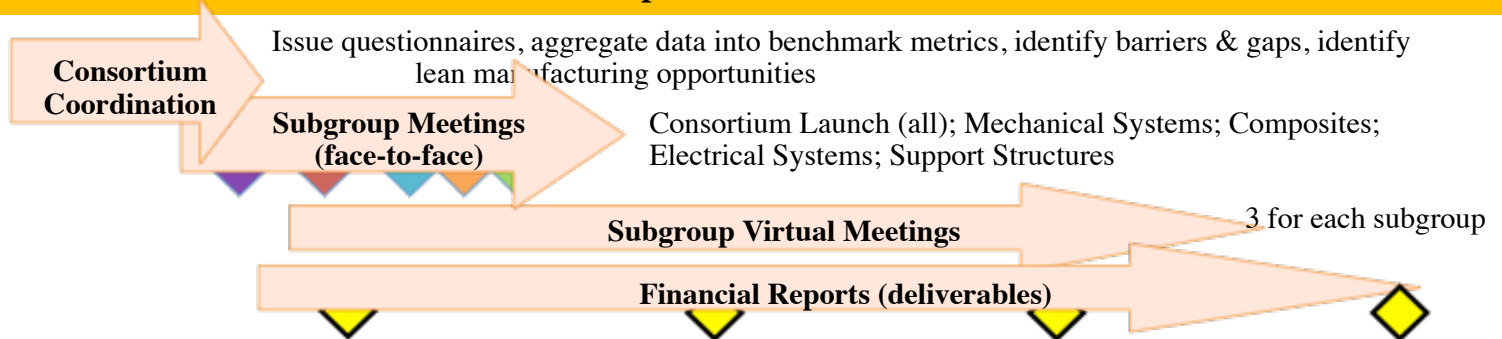
- Blades
- Nacelle housing
- Nosecone
- Tower

### Support Structures

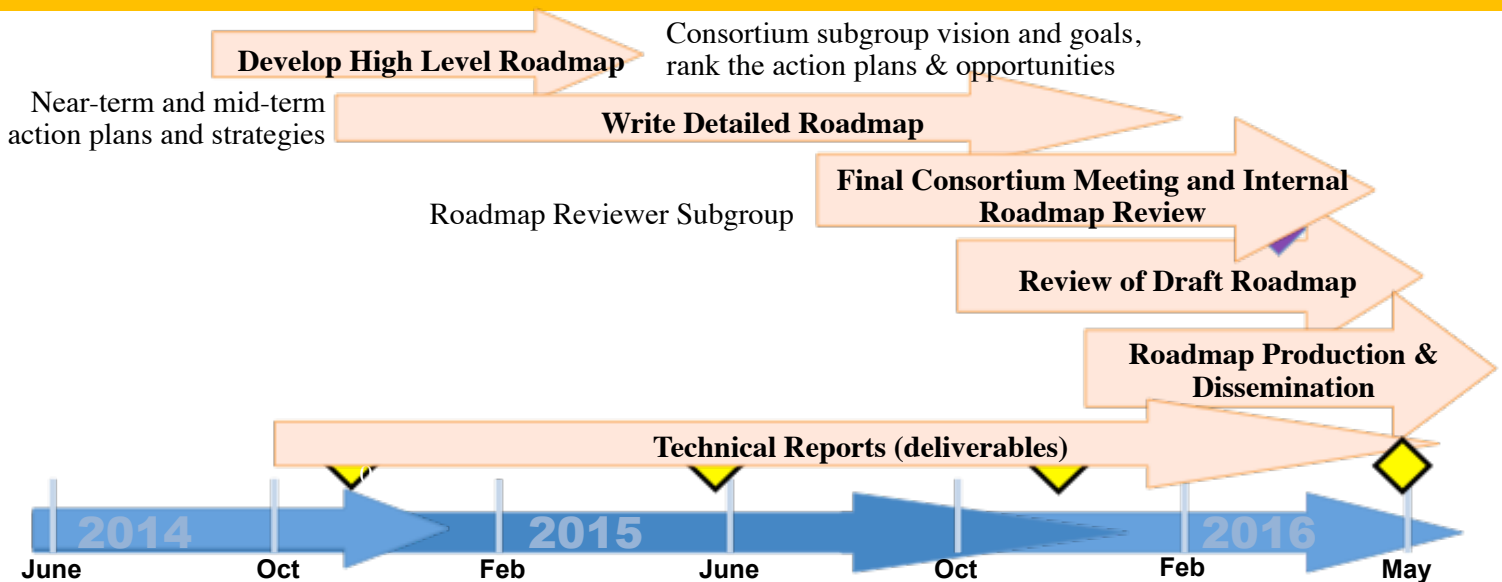
- Tower
- Access ladder
- Foundation
- Anchoring System
- Permitting

# Roadmapping SMART Wind

## AMTech-SMART Wind Consortium Development



## AMTech-SMART Wind Technology Roadmap Development



# *Questions, discussion*

<http://distributedwind.org/smart-wind-facs/>



photo courtesy Endurance Wind Power

***To sign up for Subgroups or more information:***  
**[www.distributedwind.org/smart-wind-sign-up/](http://www.distributedwind.org/smart-wind-sign-up/)**  
**[jjenkins@distributedwind.org](mailto:jjenkins@distributedwind.org)**



Back-up

## **Proposed Roadmap Table of Contents**

- Foreword – sets the vision
- Introduction to the SMART Wind project (DOC/AMTech and DWEA) and members
- Current Distributed Wind Turbine industry – baselines and benchmarks
- Current Distributed Wind Turbine Market – global and national
- Near-term Technology Barriers (relevant to DOE?)
- Manufacturing Barriers and Gaps (relevant to DOC)
  - Organized by Subgroup: Parts, processes, materials, quality, etc
- Action Plan
  - Organized by Subgroup
  - Evaluated near-term (0-3 years), mid-term (3-6 years), low & high cost
  - Prioritized at Roadmap Prioritization Meeting, March 2016
- Strategies for implementation
  - Rural development, maximum American jobs, maximum market growth, potential baseline and benchmark changes

- **Mechanical subsystems**

Tower top is boundary with support structure subgroup

- Rotor, hub, mainshaft, mainframe: Rotor connection to generator, generator support
- Overspeed control/yaw mechanism (i.e pitching, furling, yawing)
- Tower top/bed plate, tower adapter

- **Electrical subsystems**

- Generator
- Power Electronics
- Balance of system electrical components (all the way up to the electrical service; transformer, bus bars, slip rings, etc.)

