



# Michigan's Wind Supply Chain Development

*Leveraging Michigan's Competitive Advantage  
Through Advanced Manufacturing*



Your success begins in  
PURE MICHIGAN



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## Strategy:

### Develop / Support Industry Clusters

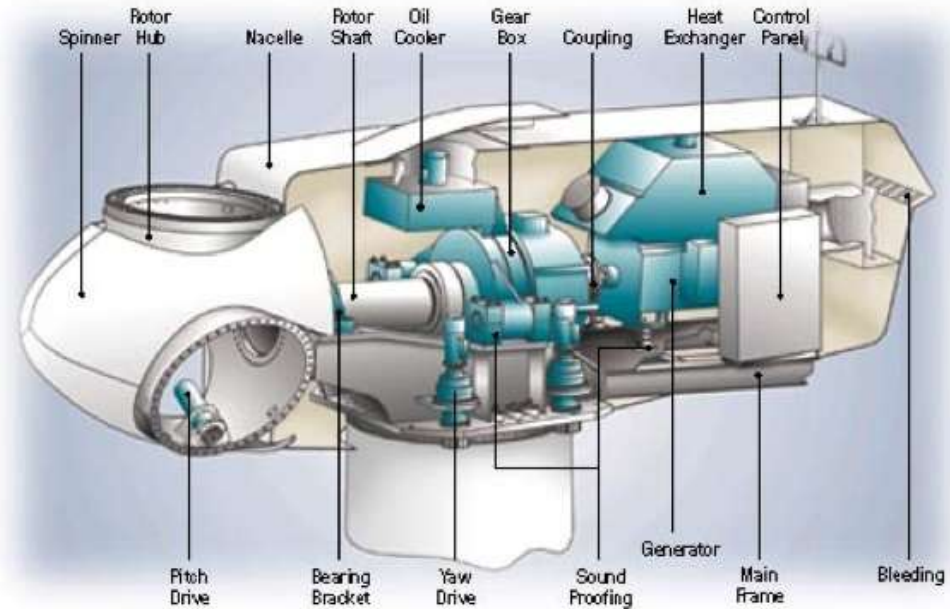
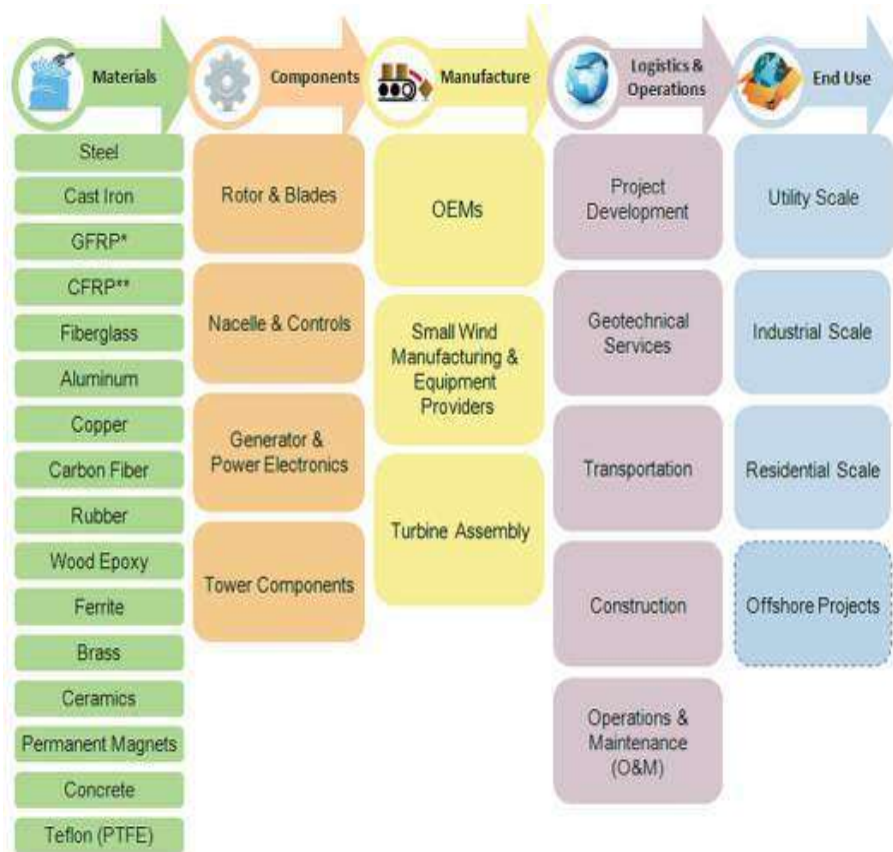
- Potential for significant growth
  - Leverage state strengths
  - Generally not mature
  - Gap exists – requires economic assistance
- 
1. Advanced Energy Storage
  2. Solar/Photovoltaic
  3. **Wind Turbine Mfg.**
  4. Bioenergy
  5. Advanced Materials

## Why Wind Turbine Manufacturing in MI

- Michigan Strengths – Advanced manufacturing capabilities, product development & engineering resources, materials & composites expertise
- Onshore and Offshore Capacity – 16,650 MW potential in onshore alone
- 10% Renewable Portfolio Standard by 2015 – requires nearly 1100 turbines.
- Logistically located to supply Midwest and Ontario

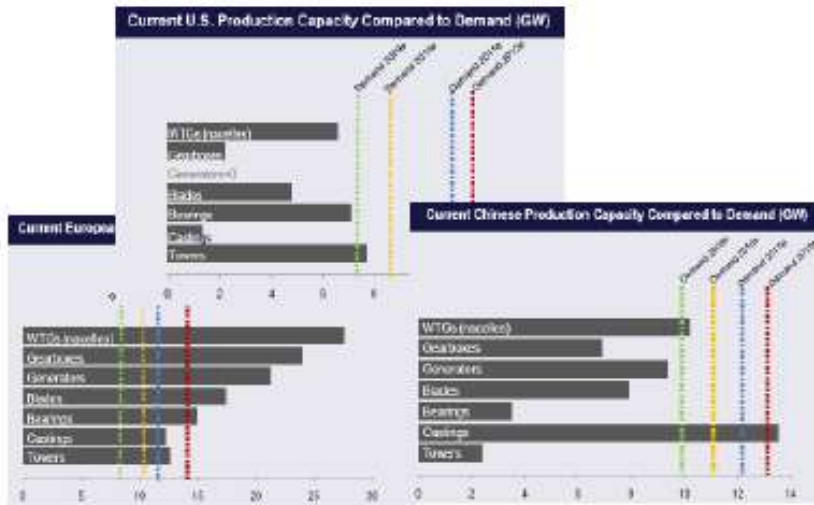


# Capabilities Analysis

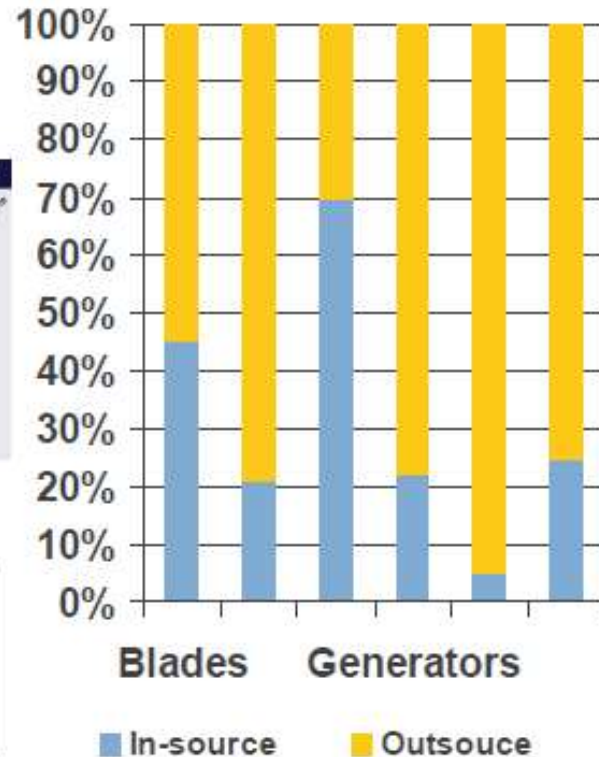


## Supply Chain Analysis

Production & new planned capacity and sourcing dynamics

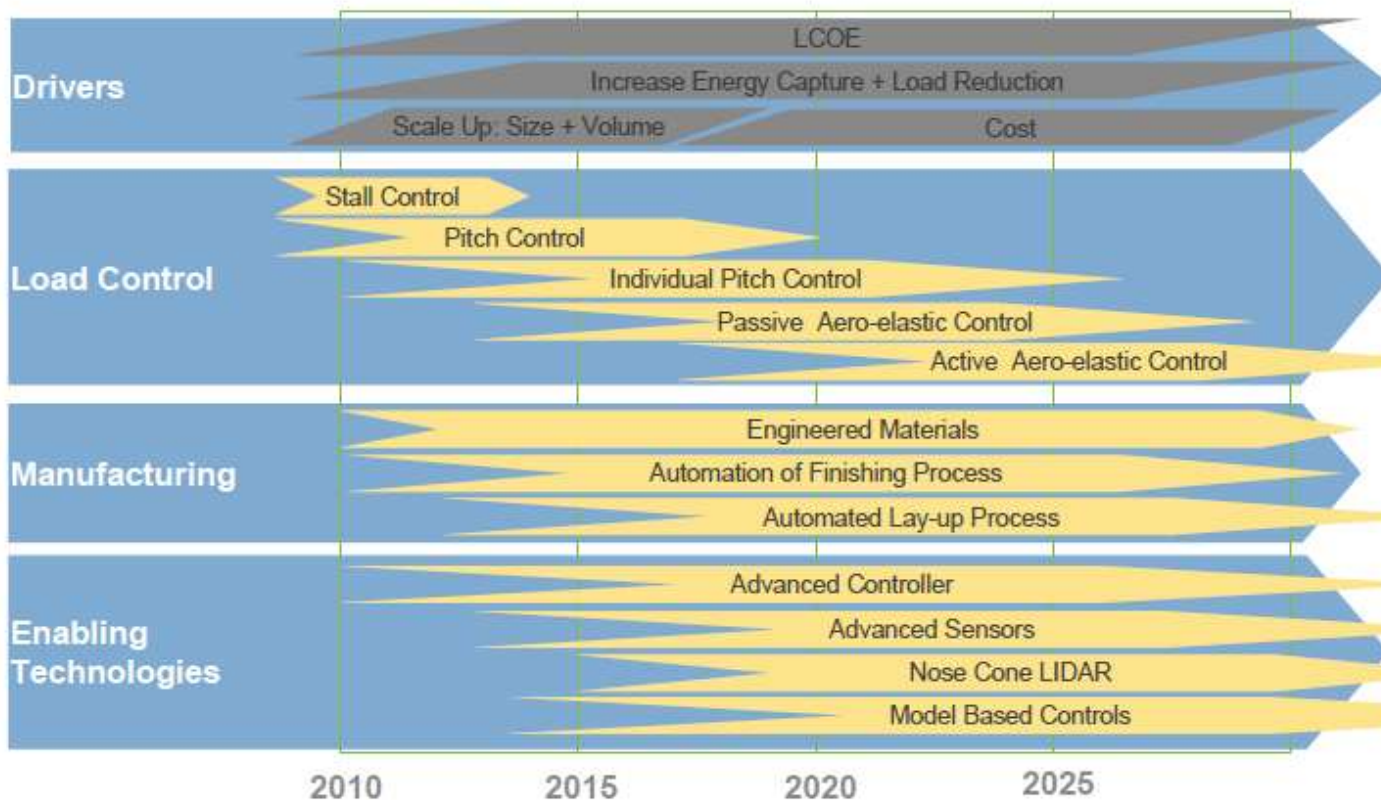


New Facilities 2007-08



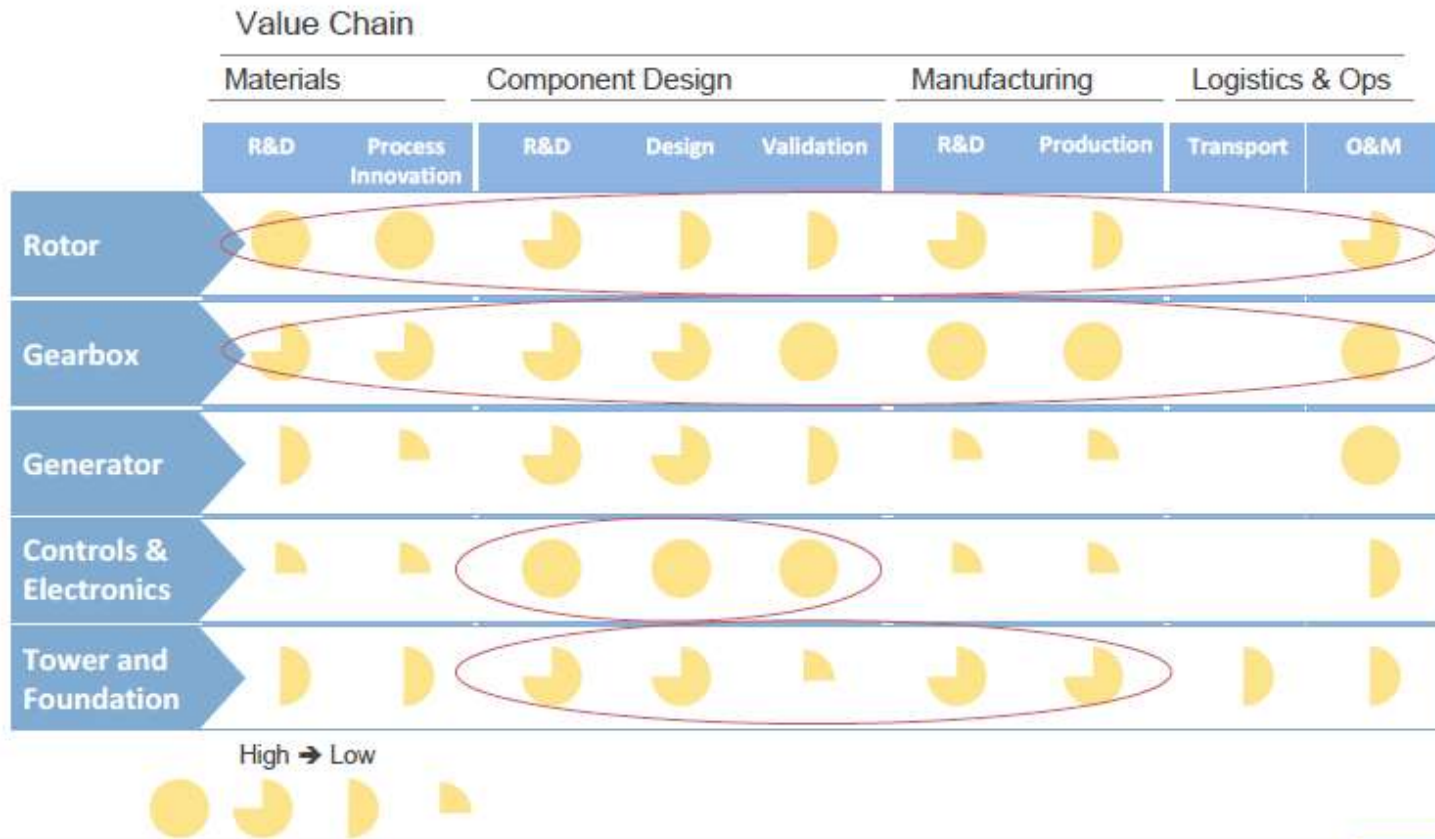
Technology Road Maps

Illustrative



**Corporate or Regional Capability Analysis**  
Regional capability analysis example

Illustrative



## Wind Supply Chain Development Strategy

- 1) **Awareness:** Educating the potential supply chain on the industry
- 2) **Matchmaking:** Conveying Michigan's supply chain value proposition to the industry through matchmaking and other events, providing opportunities for one-on-one meetings with OEMs and Tier 1 suppliers
- 3) **1-On-1 Support:** Providing industry focused training for high potential suppliers
- 4) **Centers of Energy Excellence / Clean Energy Advanced Manufacturing:** Supporting manufacturing and technology innovation through collaborative efforts and financial support



# Michigan Wind Supply Chain

*From Potential to Active...*

**MICHIGAN**  
ECONOMIC DEVELOPMENT CORPORATION  
MichiganAdvantage.org

**Michigan gives wind companies the Upper Hand**

- Manufacturing expertise and experience
- Active Wind Industry
- Demand for wind resources
- Research, training and first class collaborations.

**Michigan Companies**

- ADVANCED MANUFACTURING/LASER COMPONENT MACHINING, FABRICATION, ASSEMBLY & CASTINGS**
  - Jakobs (P&G/Dowling Industries)
  - K & M Machining and Fabrication
  - Merill Technologies
  - DT Tool
  - Tivee M Tool
  - ATI Coating
  - Ball Industries
- BLADE/ADVANCED MATERIALS**
  - Jakobs (P&G/Dowling Industries)
  - Creative Foam
  - Dow Chemical
  - Sea-Curing
  - Energys Composites
  - Cartel Products
  - Aeroblen
- TOWERS**
  - Nortower
  - RE Scale
  - Millato Farm
- GEARBOX/PIVOT & YAW SYSTEMS**
- GENERATORS/BRAKING SYSTEM**
  - SOC Performance
  - Great Lakes Gear Technologies
  - American Axle & Manufacturing
  - Danetek Motion Technologies
  - LY Combat Systems/ Magnet Motors
  - Williams Intl
  - Axle Tech
  - Arctic Harbort
- BLAD DESIGN/PRODUCT DEVELOPMENT & VALIDATION**
  - Bullis E. Porter
  - LMS International
  - Isando
  - Horbis
  - Romax Technology
  - AVL
- INSTALLATION/CONSTRUCTION**
- LOGISTICS**
  - Rockford Beige
  - Hubbridge
  - Windcracker
  - Barton Hollow
- BEARINGS**
  - Reption Corp
  - SKF
- DEVELOPER**
  - DTE Energy
  - Consumers Energy
  - Macquarie Power
  - Orsted
  - Heritage Sustainable Energy

- Over 120 active supply chain companies
- Across the value chain, from R&D to final product

## Examples:

Partnership that leverages Dow's global leadership in the manufacturing of polyolefins and Oak Ridge National Lab's Carbon Fiber Technology Center and conversion technologies.



## Objective:

Develop a lower-cost carbon fiber utilizing polyolefin precursors for the wind and transportation markets.

## Advantages:

Polyolefin-based carbon fibers offer significant cost benefit through higher carbon yield (70% vs. 50% in PAN) and lower raw material cost.

## Examples



**Automated Carbon Fiber Lay-up For Spar Cap Production**



**Wind Turbine Hub Machining Center**

## Examples

**ENERGETX** COMPOSITES

COMPOSITE MANUFACTURING

### News

#### Energetx Composites Exporting Wind Blade Molds to Spain

Posted on May 29, 2012

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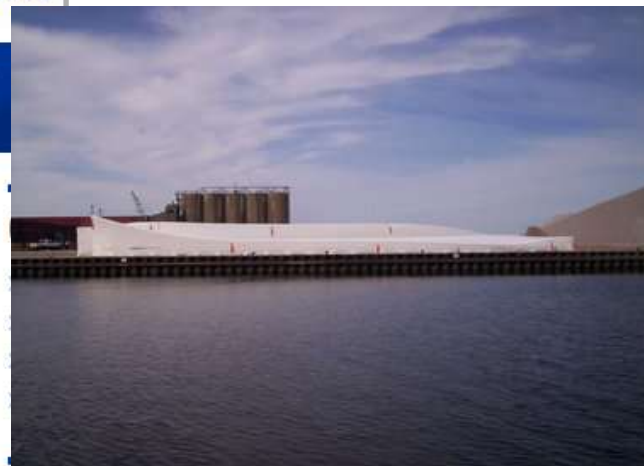
Direct: 616-405-6831

FOR IMMEDIATE RELEASE

#### Energetx Composites Exporting Wind Blade Molds to Spain

(May 25, 2012– Holland, MI, USA) Energetx Composites of Holland, Michigan, is exporting a complete set of 45.3 meter wind blade molds from its Michigan facility. The molds are shipping to Aeroblade, based in Minano, Spain. Energetx Composites is using an identical mold set in its Holland facility to manufacture the same 45.3 meter wind blade for the North American market.

The shipment brought together local companies to assist Energetx including Rockford Berge, Great Lakes Heavy Haul and Gelock Heavy Movers. Once the molds are delivered to Muskegon, they will be shipped to the Port of Bilbao in Spain.



## What's Next?

**Using methodology for other cluster development initiatives...**

- Solid-State Lighting
- Power Electronics
- Advanced Energy Storage
- Photonics

# Thank You

**Steve Bakkal**  
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