NC Opportunities in Renewable Energy Manufacturing

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Presentation Goals

• To introduce renewable energy technologies, applications, markets and development trends
• To identify industries that produce renewable energy products
• To examine renewable-energy cluster initiatives
• To provide an overview of ongoing activities in North Carolina supporting development of renewable energy and efficiency manufacturing
Renewable and Efficiency Technologies

- Wind turbines
- Solar photovoltaics (PV)
- Solar thermal
- Biopower
- Biofuels
- Biogas
- Fuel cells
- Energy Star
“Renewable energy has created more than 14 million jobs worldwide; every renewable energy industry is rapidly expanding its workforce.”

--- source: IEA publication: Renewable Energy...Into the Mainstream 10/2003 p.6
Renewable Technology Market Growth and Projections 2000-2013


*note actual data given 2000-2003, and projections given 2010-2013, all other data points are linear approximations
Market Drivers

• Traditional market drivers
  – Health-related concerns from fossil fuel use
  – Air and water quality decline from fossil fuel use
  – Fossil-fuel price volatility, supply uncertainty

• Contemporary market drivers
  – Impact of pollution and resource imports on state economic health
  – Decline in power-grid reliability
  – Increasing risk of supply disruptions
  – National security risks from wholly centralized-production model
Why RE Manufacturing in N.C.?

• **IT’S A WIN-WIN**
  - High technology industry
  - Provides quality local jobs
  - Extremely fast growing industry globally
  - Grow North Carolina’s “New Economy” manufacturing base
    • Biotech, Microelectronics, Renewable Energy?
  - Increase use of locally produced raw materials including agricultural and municipal by-products
  - Leverage small but growing economic footprint
    • Over 40 manufacturing firms statewide
  - Increase capital investment in North Carolina
<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
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<tr>
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<td>Turbine and Turbine Generator Set Units Manufacturing</td>
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<td>Ethyl Alcohol Manufacturing</td>
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<td>335999</td>
<td>Other Misc. Elec. Equip. and Component Manufacturing</td>
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<td>325120</td>
<td>Industrial Gas Manufacturing</td>
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Development Strategies

• Supply side approaches
  – Industry cluster development
  – Industry recruitment incentives
  – Focus on research, technology transfer, and university capabilities
  – Creative utilization of local resources in new manufacturing applications

• Demand side approaches
  – Market transformation, awareness
  – Market access, long-term demand
  – Installation and production incentives
  – Policy approaches such as RPS, net metering
Supply Side Incentives

- Supply side / Business development
  - Construction tax credits
    - AR: 50% tax credit
    - NC: 25% tax credit
  - Employment incentives
    - VA: $700 per employee
    - MI: Refund total of employee’s state income tax
  - Production credits
    - VA: payment per watt produced for PV panels
  - Grants and loans
    - OH: Direct loan program to fuel cell businesses

Source: DSIRE Database www.dsireusa.org
Renewable Energy Equipment Manufacturer Incentive

N.C. Gen. Stat. § 105-130.28

- Corporate income tax credit
- 25% of construction costs (installation and equipment)
- Credit may be carried forward 10 years
- Taken in 5 equal installments
- Credit is capped at 50% of tax imposed
- No maximum limit

Source: Brooks Energy and Sustainability Lab, Texas A&M University, “Developing a Renewable Energy Based Sustainable Economy for South Texas.”, Solar San Antonio pg. 11
Renewable Energy Clusters

• Resource-based
  – Technology develops around an abundant natural resource supply
  – Examples include: Bio-fuels in the Midwest, solar in the Southwest, wind power in the Northern Plains

• Market-driven
  – Technology develops in response to market conditions like high-priced electricity, power grid stress, or increasing impact of pollution
Potential Clusters in NC

- **Bio-based**
  - Crops and crop residue: bio-fuels, hydrogen
  - Chicken and hog waste: turbines, fuel cells

- **Fuel cell**
  - Materials research: polymers, electrodes, nano-sized compounds
  - Variety of hydrogen sources
  - Current applications within state

- **Wind**
  - Most southern (currently mapped) Utility-scale wind resources on East coast
Wind Power of North Carolina at 50 meters
Total = 12 manufacturers of renewable energy equipment
Regional Manufacturing Profile

- Brunswick
  - American Distillation

- Cumberland
  - Filter Specialty Bioenergy, LLC, biodiesel producer

- Bladen
  - DuPont Nafion® membrane

- Pender
  - EC Systems, carbon system
<table>
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<tr>
<th>Energy Source</th>
<th>Jobs</th>
<th>RTP</th>
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<td>Wind</td>
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<td>Solar Cells</td>
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<td><strong>TOTAL RTP</strong></td>
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Regional Industry Advantages

• Bio-fuels and Biogas
  - Resources
  - Research
  - Economics

• Fuel Cells
  - Corporate research
  - Materials manufacturing
  - Workforce training
Fuel Cell Industry Occupations

Occupational Groups' % of labor
Other Electrical Equipment Mfg.

59%
11%
5%  5%  6%  7%

- 51-0000 Production occupations
- 43-0000 Office and administrative support occupations
- 17-0000 Architecture and engineering occupations
- 11-0000 Management occupations
- 53-0000 Transportation and material moving occupations
- 49-0000 Installation, maintenance, and repair occupations
Turbine Industry Occupations

Occupational Groups' % of labor
Turbine & Generator Equipment

- 58% Production occupations
- 11% Architecture and engineering occupations
- 8% Office and administrative support occupations
- 6% Management occupations
- 6% Installation, maintenance, and repair occupations
NC Competitive Advantages

- Research institutions and educational programs
  - NCSU Solar Center, ASU, NC A&T, Duke, Cape Fear Community College, UNC-Chapel Hill
- Existing industry presence
- Workforce availability and training programs
- Governmental support at the top
- Renewable energy manufacturing incentive
- Biotech, energy, and agriculture convergence
- Growing transportation component cluster
- Experience with high-technology cluster development
Opportunities and Risks

- Missed Opportunities
  - Solargenix (frm. Duke Solar) Chicago move
  - H-Power almost opened a fuel cell manufacturing plant in Union Co.

- Pending Risks
  - Microcell being heavily recruited by many states nation-wide
  - Porvair recruitment by South Carolina / Georgia

- Open Opportunities
  - Nano-material research
  - Variety of natural / bio resources
• NC State Energy Office/Div. Of Business and Industry [www.energync.net]  
  - Policy promoters of renewable energy  
• ASU Energy Center [www.energy.appstate.edu]  
  - Renewable Energy Manufacturers’ Database  
  - Strategic Development Analysis  
  - Economic Development Awareness  
• NCSU Solar Center [www.ncsc.ncsu.edu]  
  - Database of State Incentives for Renewable Energy (DSIRE) [www.dsireusa.org]  
  - Renewable training programs
Questions