



CLEMSON UNIVERSITY

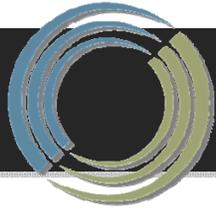
RESTORATION INSTITUTE

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*Offshore Wind Power*  
*An Opportunity for South Carolina*

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*Dr. Nicholas C Rigas*  
*Director Renewable Energy - CURl*  
*Clemson University Restoration Institute*



## *Historically independent drivers*

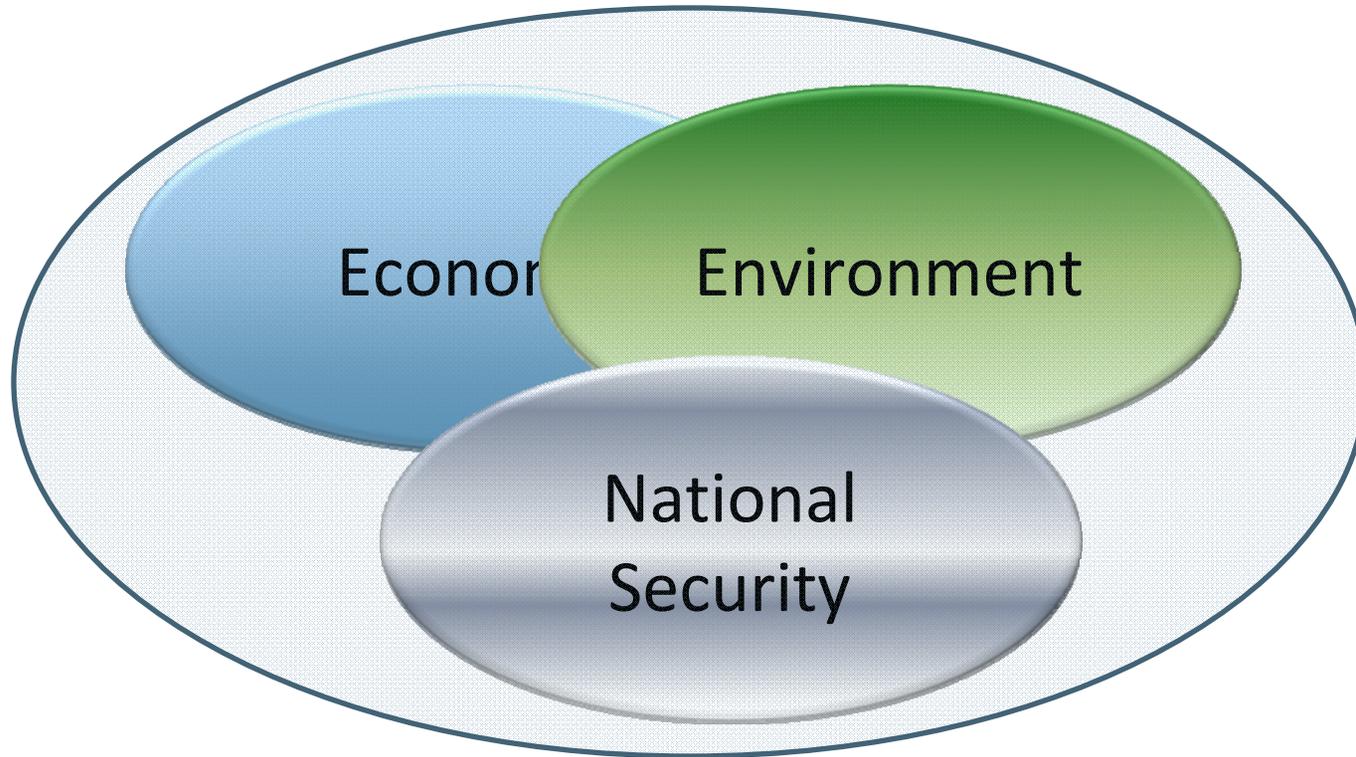
Economy

Environment

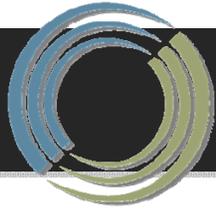
National  
Security



*.. have merged to drive new thinking*



Integrated Energy Policy  
Opportunities for Economic Development  
Innovation



## *What are the drivers behind the 'Green Economy' ?*

- Diversify energy supply
- Energy security
- Reducing imports
- Environmentally responsibility
- Sustainability
- Economic development
  - Innovation / Research
  - Manufacturing
  - Operations
  - Installation
  - Maintenance



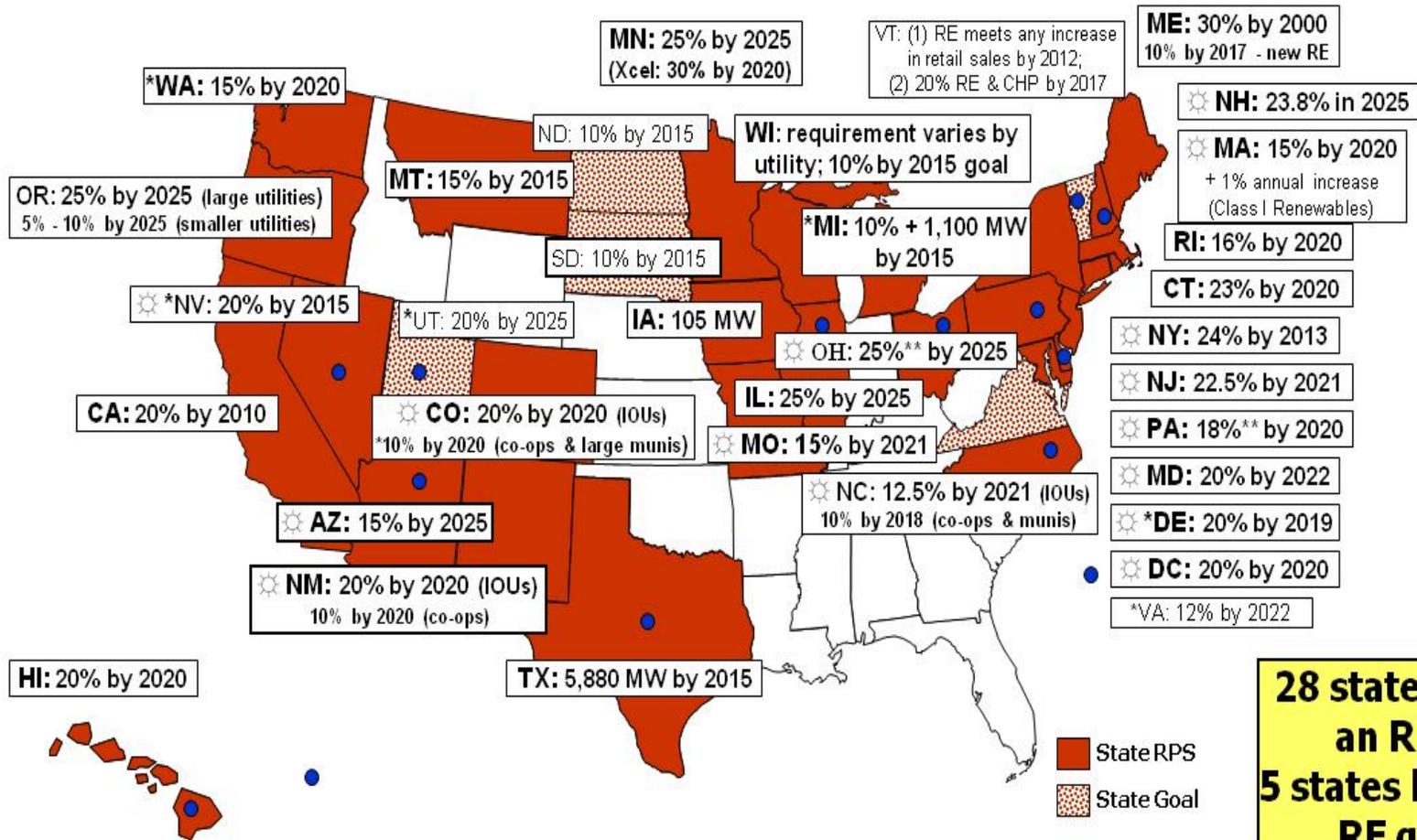


# State RPS stimulate 'Green Economy'

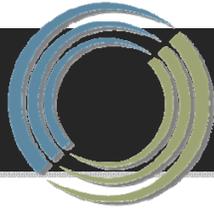
DSIRE: [www.dsireusa.org](http://www.dsireusa.org)

February 2009

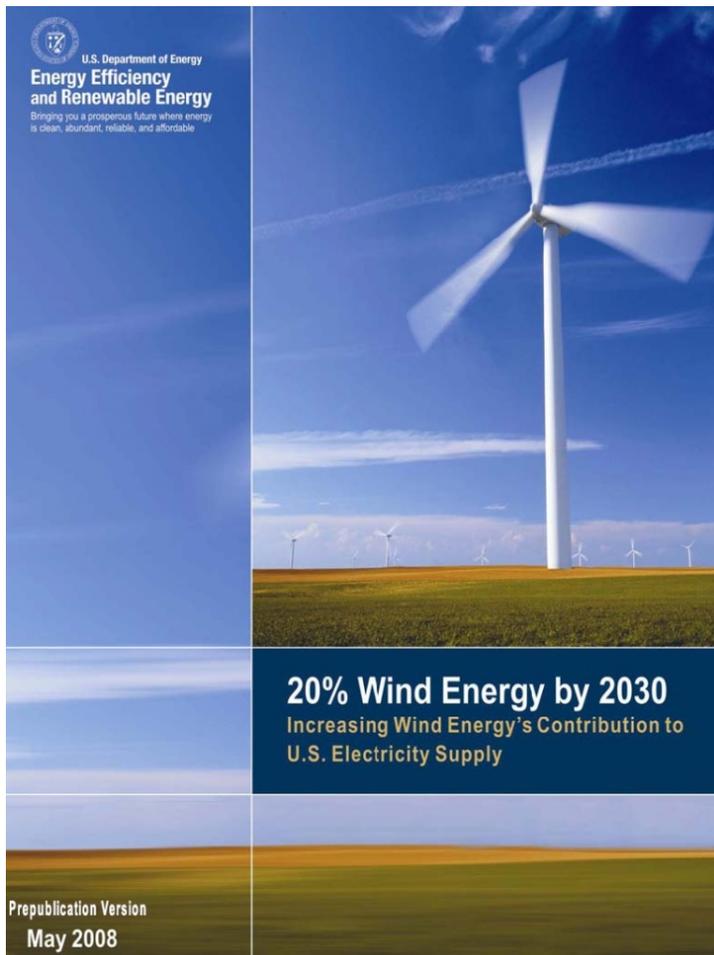
## Renewables Portfolio Standards



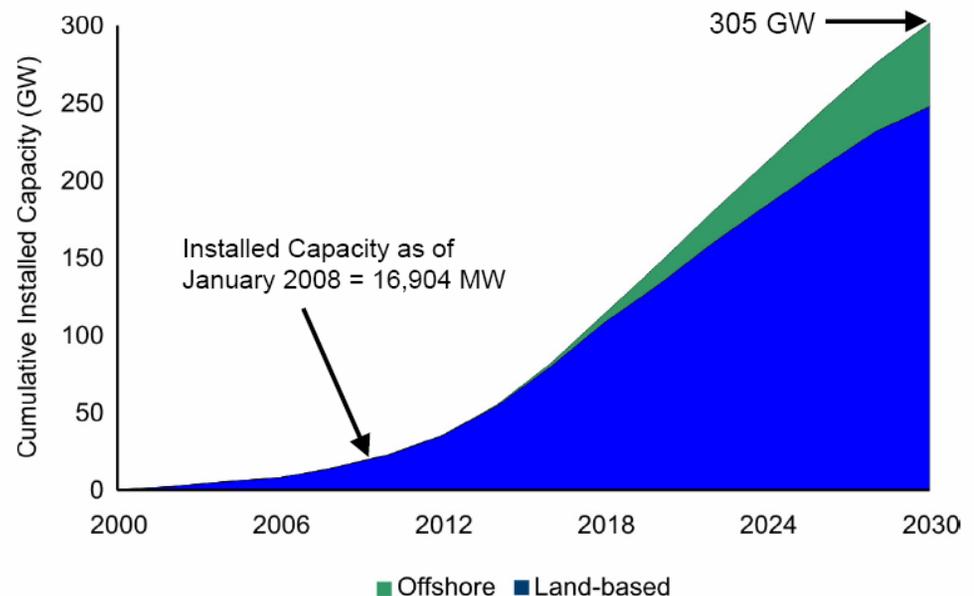
**28 states have an RPS;  
5 states have an RE goal**

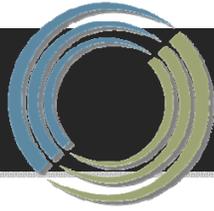


# DOE outlines a plan for 20% wind power by 2030

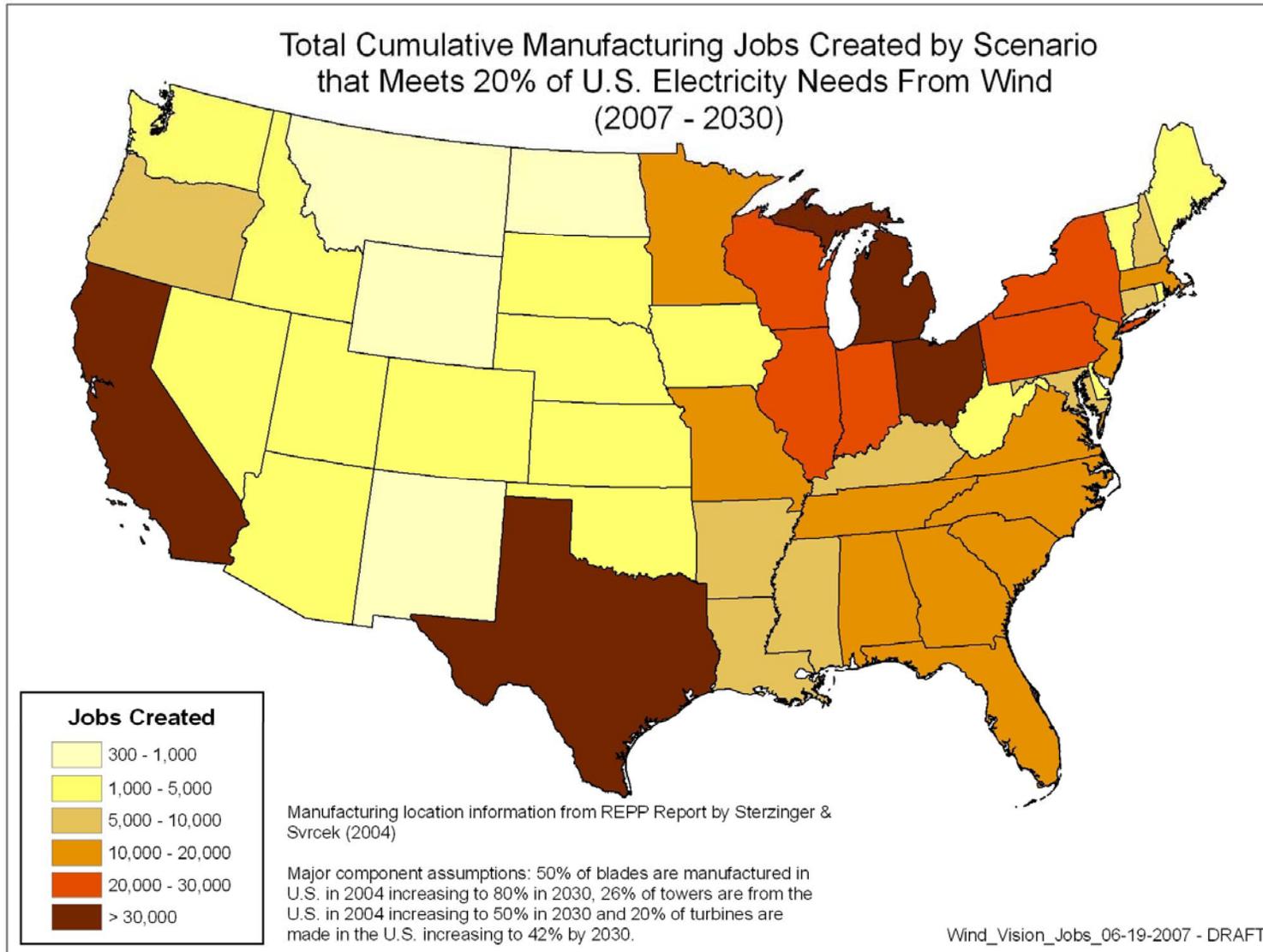


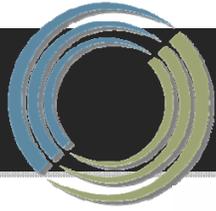
- Requires 290 GW of new wind to reach goal
- 50 GW of offshore along NE and SE
- >\$175Bn in investment
- SC potential identified at 1-5 GW offshore
- Technology and infrastructure improvements
- GHC reductions and water savings
- Economic development





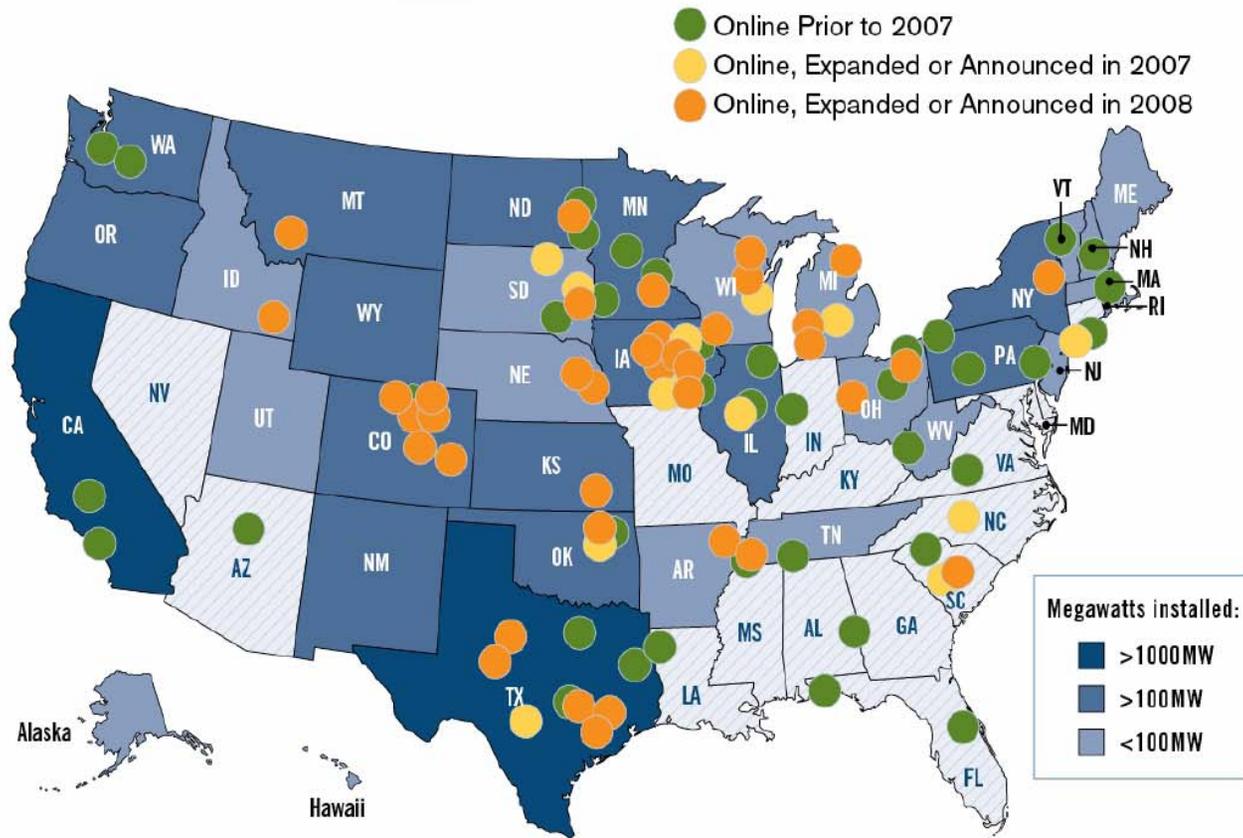
# SC Stands to Gain 10-20,000 New Jobs



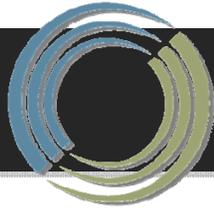


## Market demand spurs growth

# Over 50 U.S. Manufacturing Facilities Opened, Expanded or Announced Since January 2007

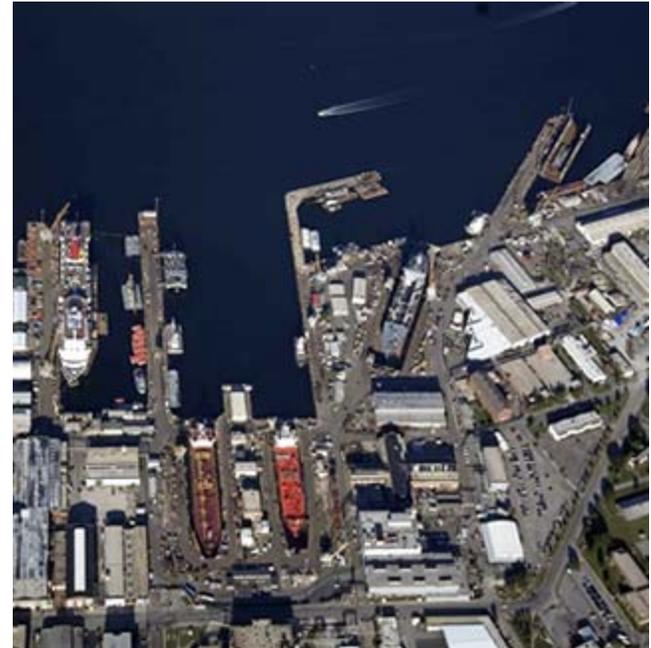


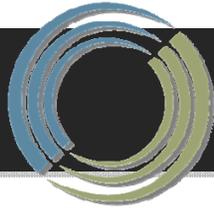
Source: AWEA, Sample of Manufacturing Facilities, November 2008



## *Strengths of South Carolina*

- Outstanding port facilities and rail
- Large scale ship rebuilding facilities
- Low cost manufacturing
- Company friendly environment
- Excellent research institutions
- Raw material providers (steel)
- Key industry players
  - GE Energy
  - Fluor
  - Ilgin
  - Timken
- Entrepreneur spirit





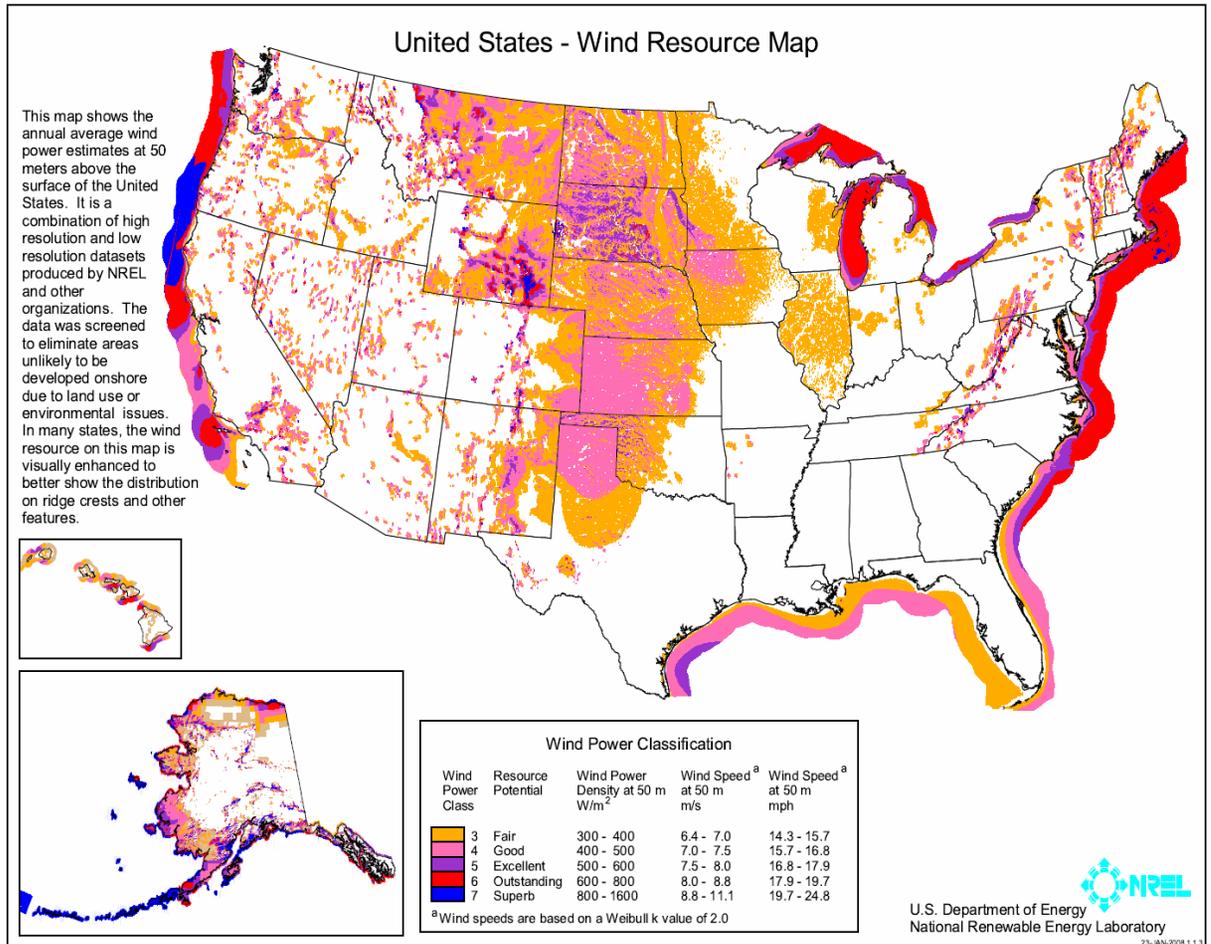
# Offshore wind resources near demand centers

28 Coastal States consume over 78% of the electrical demand in the United States.

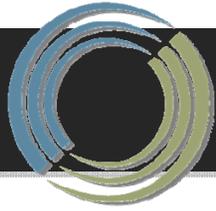
Only 6 have significant land-based wind resources.

26 of the states have offshore wind resources to meet 20% scenario.

Offshore environment offers higher and more consistent winds with no land constraints.

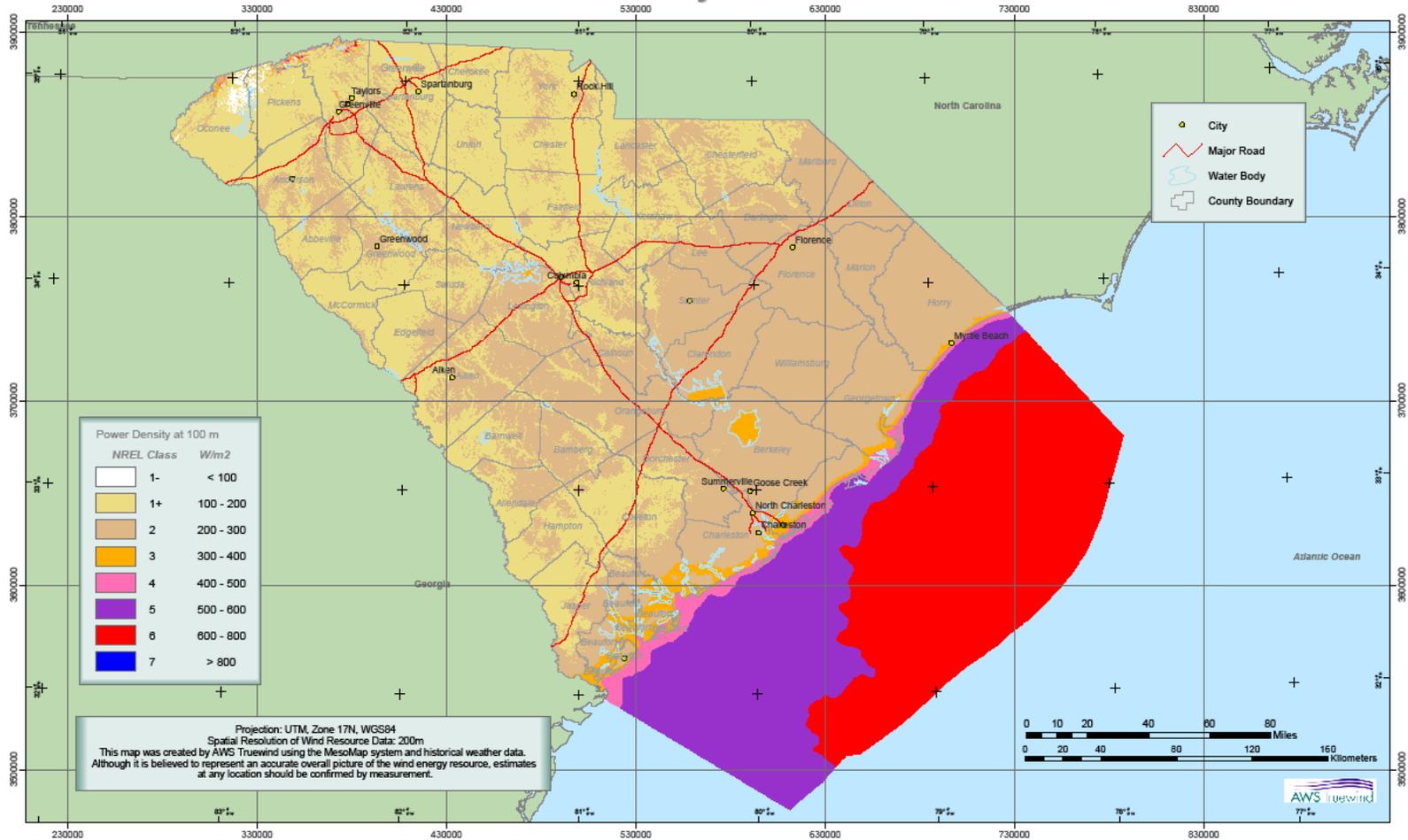


## Markets (demand centers) near the resource



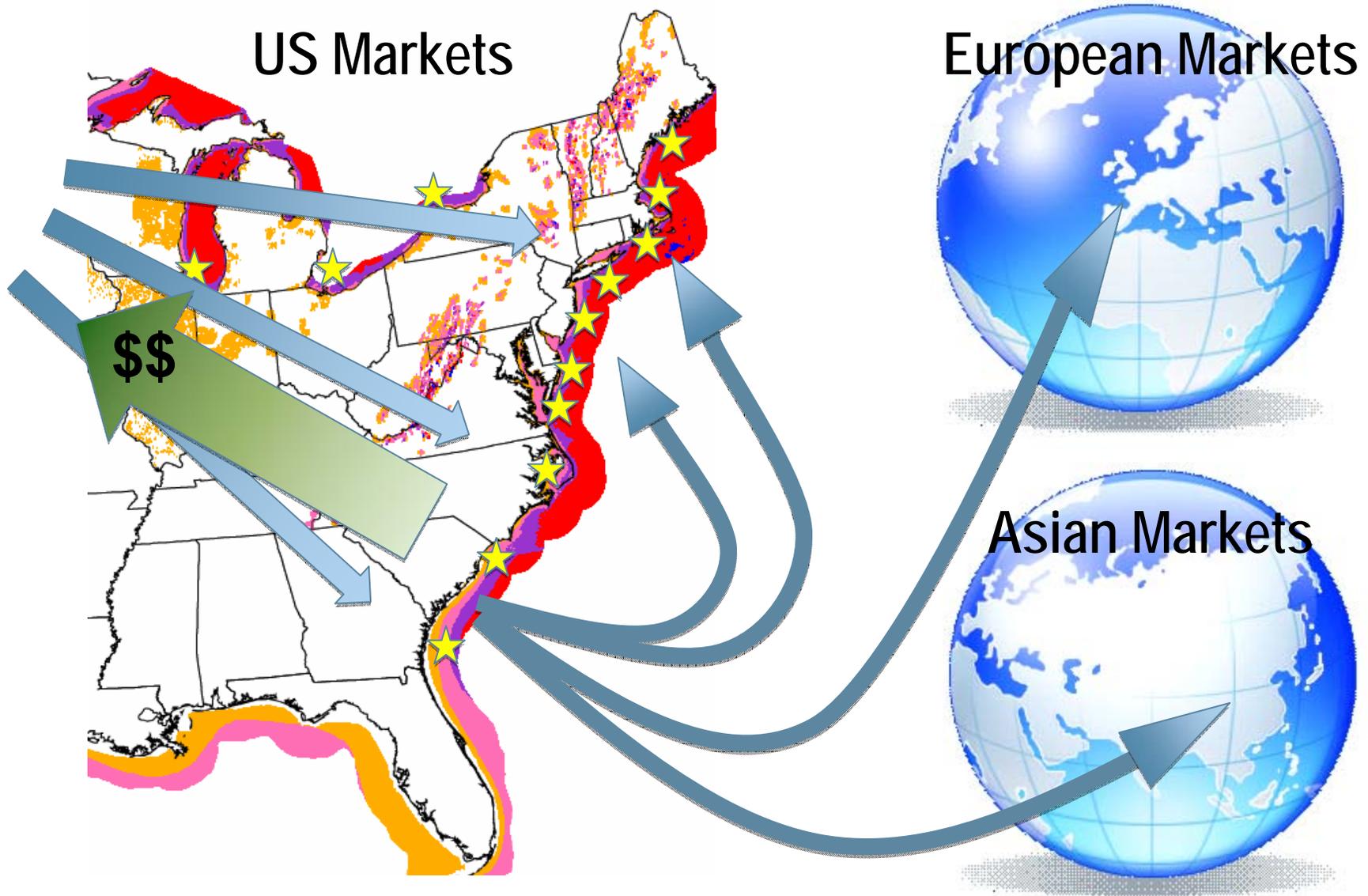
# Natural Resources – Offshore Wind Power

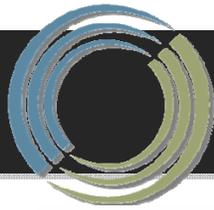
## Mean Annual Wind Power Density of South Carolina at 100 Meters



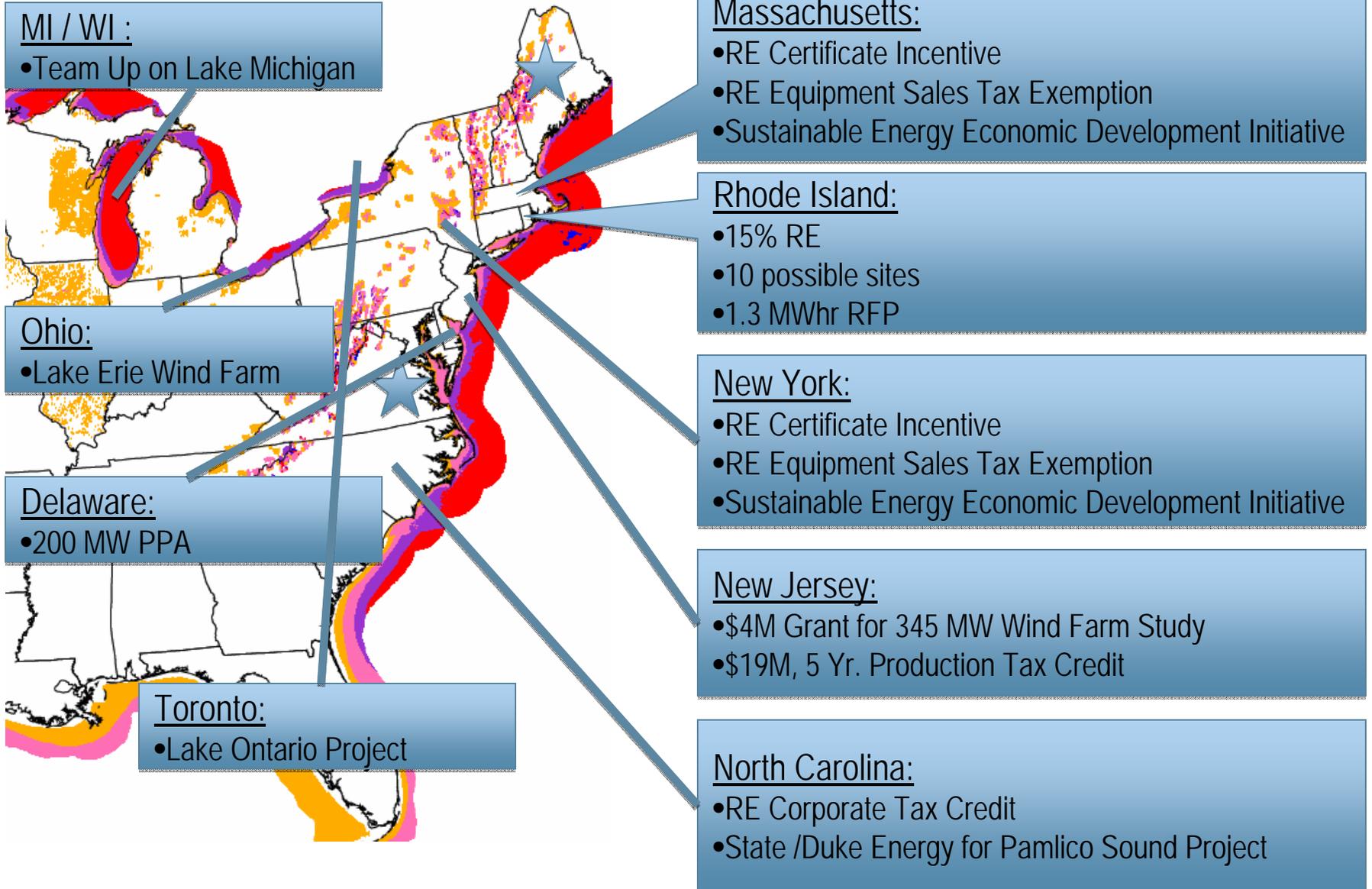


# *SC Manufacturing Cluster to service markets*



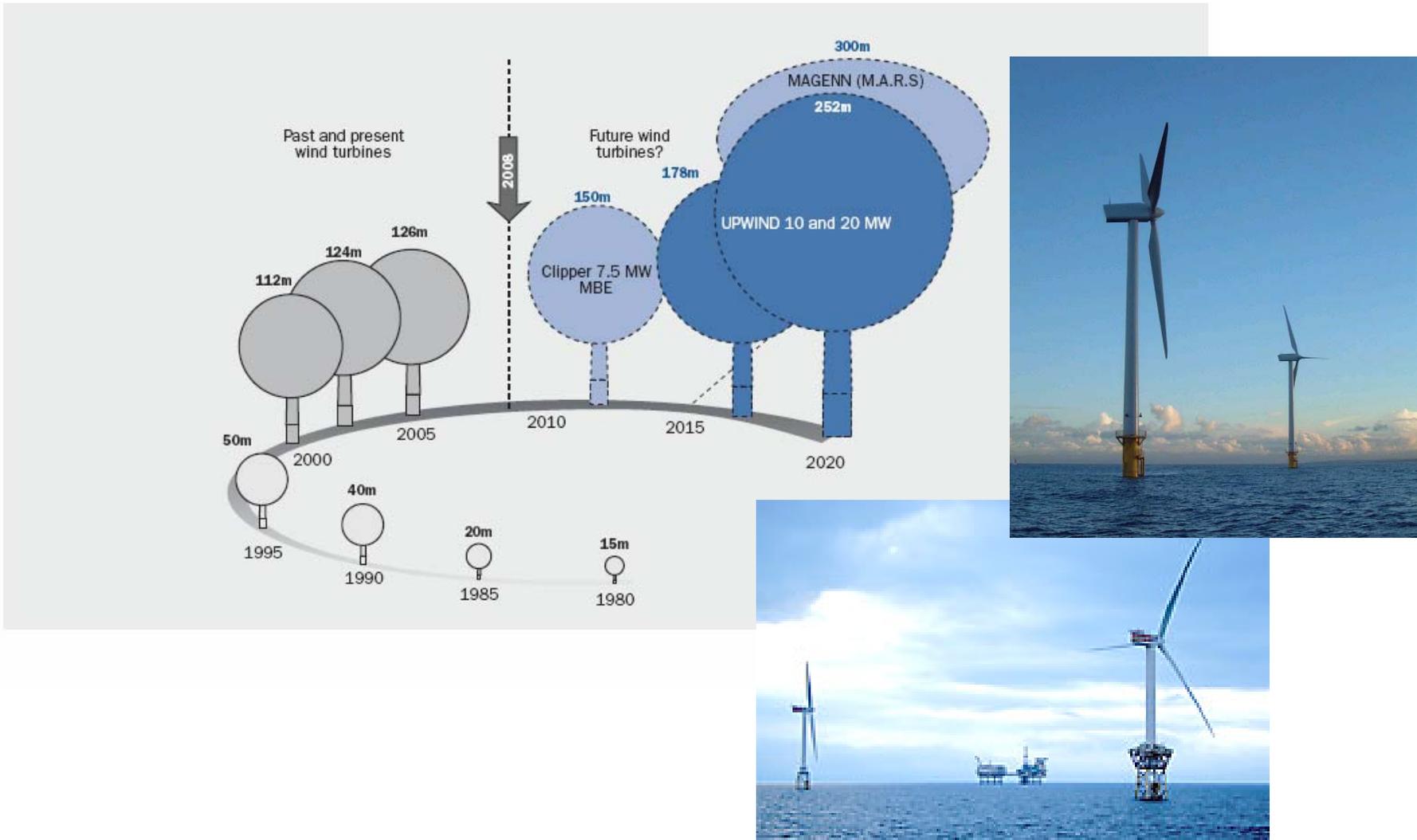


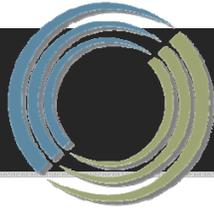
## State Programs





# Technology continues to evolve





*Global economy requires strategy for global competition*

Innovation

Markets

Transfer

Job Training

Incubate New Enterprises

Competitive Advantage



# Clemson DTFF - Project

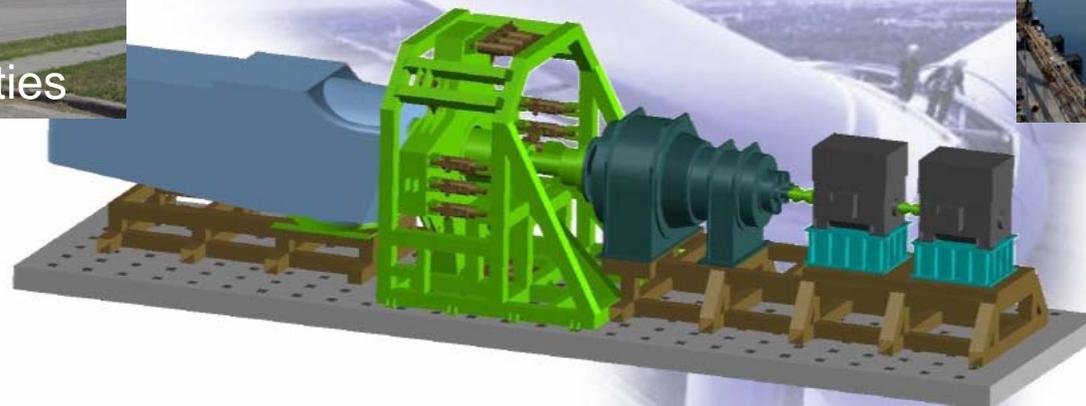


Existing Facilities

- Innovation driven
- Industry focused



Existing Infrastructure



CHARLESTON NAVAL  
COMPLEX RDA

FLUOR

SC PORT AUTHORITY

SCE&G

SRNL

NORTH CHARLESTON

PRIVATE DONORS

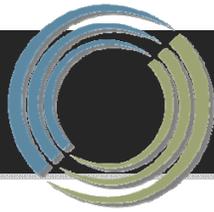
CMMC

CHARLESTON

SC PUBLIC RAILWAYS

STATE OF SOUTH CAROLINA

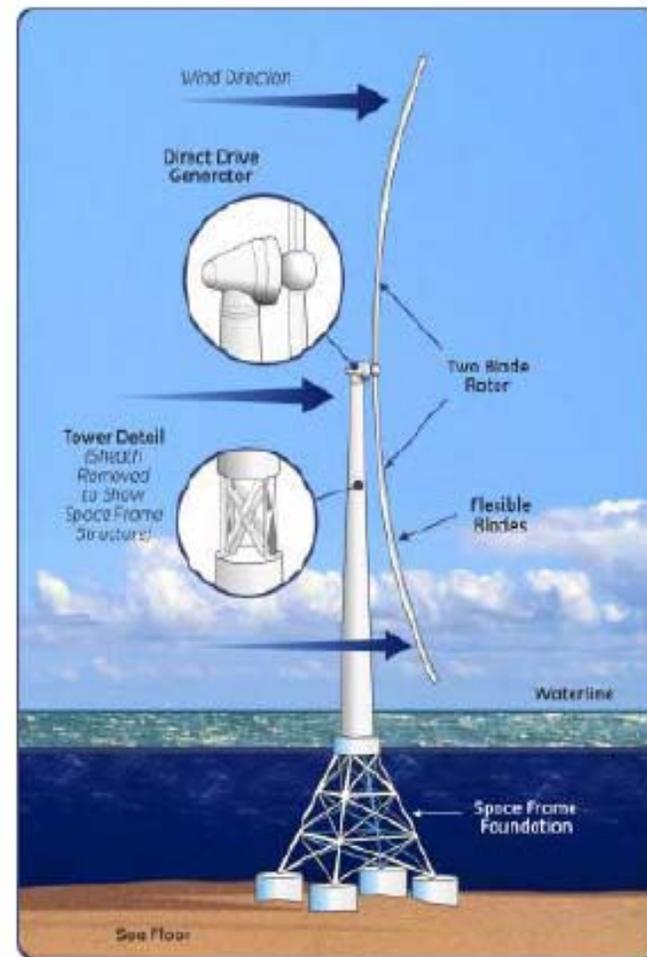
RENK LABECO



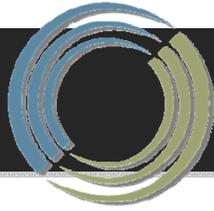
*Equipment logistics was key*



Technology is massive



..getting bigger and more complex



# Offshore Wind Turbine Manufacturing and Services Cluster

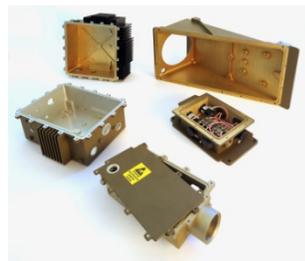
Tower Fabrication



Cable Laying



Turbine Assembly



Component Manufacturing

South Carolina serves as the manufacturing hub



Logistics



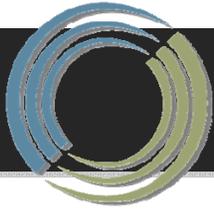
Blade Manufacturing



Construction



Foundation Fabrication



## *In Summary*

### For South Carolina to be successful:

- Compete globally
- Innovative
- Build on existing infrastructure
- Work force development
- Sustainable public policies



## *In Summary*

*..the 'Green Economy' train is leaving or may have already left the station, the **key** is whether **South Carolina** helps to drive that train, is on board for the ride or is left at the station.*