DMS Defense & Maritime Solutions
Empowering Technologies





FEBRUARY 2011

Offshore Wind Supply Chain

SAIC® From Science to Solutions

Virginia Offshore Wind

- **Virginia Coastal Energy Research Consortium (VCERC)**
  - Identify and develop new coastal energy resources through research
  - 9 universities, plus state agencies and industry partners
- **Virginia Offshore Wind Task Force (VOWTF)**
  - Federal, State, and local officials to represent and coordinate offshore interests
- **Virginia Offshore Wind Coalition (VOWC)**
  - Developers, manufacturers, utilities, localities, business and environmental groups, and other organizations and individuals with offshore wind interests
- **Virginia Offshore Wind Development Authority (VOWDA)**
  - Appointed by the Governor to facilitate and support the development of wind-powered energy facilities located off Virginia's coast
- **Outreach to North Carolina / Maryland**
  - State Economic Development Partnerships
  - Universities
  - Utilities

Marinization

- Commercial R & D
- University focused research

- **Corrosion**
  - Cathodic protection
  - Coatings
- **Waves and currents**
- **Scouring of foundations**
- **Lubrications**
  - Leaks and spills
  - Salt water mix
- **Marine fouling**
  - Above waterline
  - Sub-sea foundation
- **Salt water and fresh water solutions**

Maritime Requirements

- Green / brown field availability
- Marine heavy lift capability
- Vessel maintenance capability
- Deep draft / air draft access
- Manufacturing capability
- Convenient land transportation
- Qualified worker pool
- Intermodal transport for assembly and staging
- Maritime legal and finance
- Naval architecture and marine engineering

Hampton Roads Maritime and Ports Capacity Report
www.vcerc.org

Installation Vessels

- **Purpose-built jack-up rigs**
- **Vessel conversion**
- **Barges / tugs**
- **Cable vessels**
- **Maintenance**
  - Install response
  - Post-install
- **Seawaymax**

Mammoet Van Oord's *Jumping Jack*

MPI Offshore's *TIV MPI Resolution*

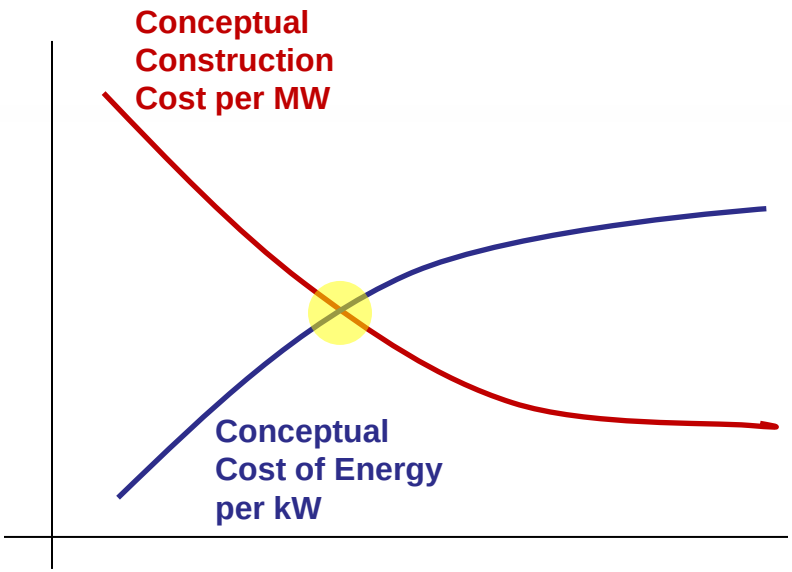
Global Marine System's *Cable Retriever*

Maintenance

- **Requires special lifting equipment**
- **Access via boat can be limited by sea state**
- **Access via helicopter can be limited by visibility and wind**
- **Purpose-built vessel concept**
  - Can one vessel design do it all?
  - How much ‘territory’ can a maintenance effort cover? (Regional maintenance similar to telecom)
- **Regional maintenance solution**

Can we innovate to reduce O&M?

Sustainable Industry

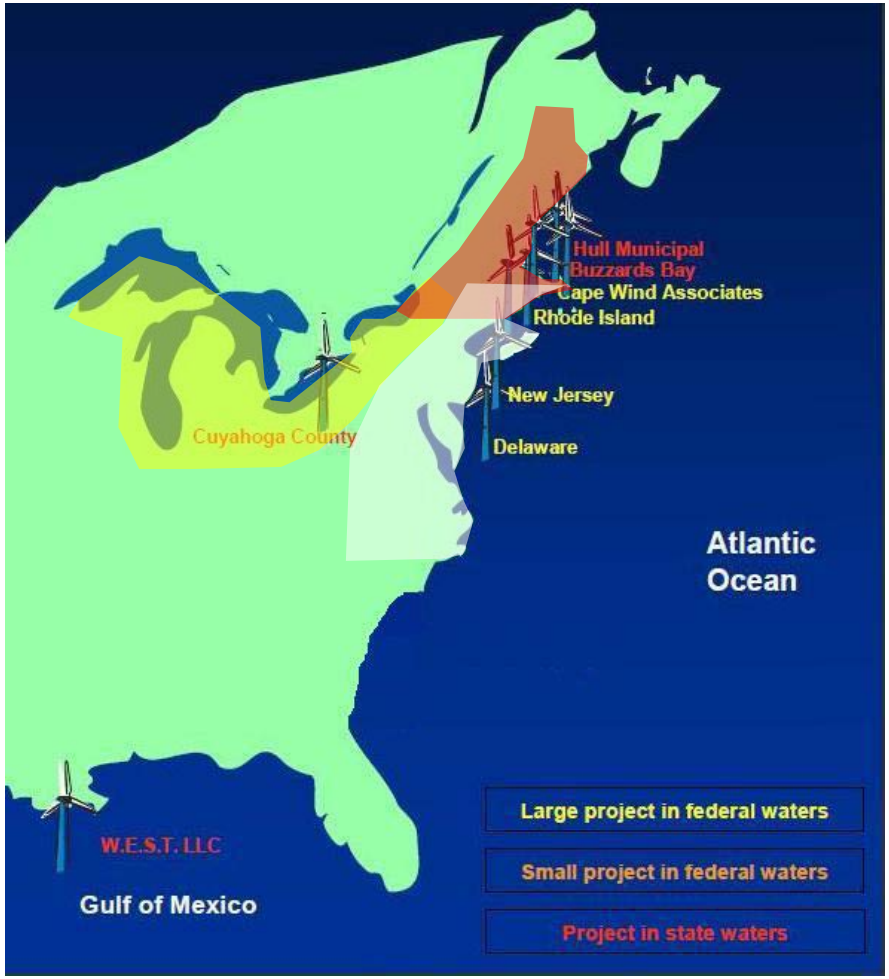


- **Fixed inputs**
  - Labor
  - Costs of materials

- **Optimized inputs**
  - Innovation in design
    - Foundations
    - Blades
    - Generators
    - Control systems
    - Power conditioning
  - Facilities
  - Materials used
  - Efficient installation
  - Innovation in maintenance

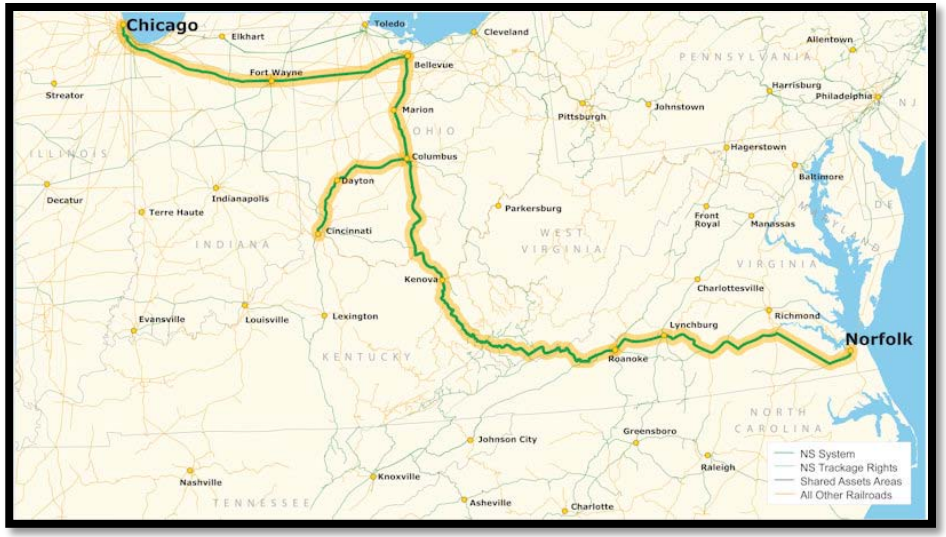
Can we find cost reductions here?

Regional Solutions

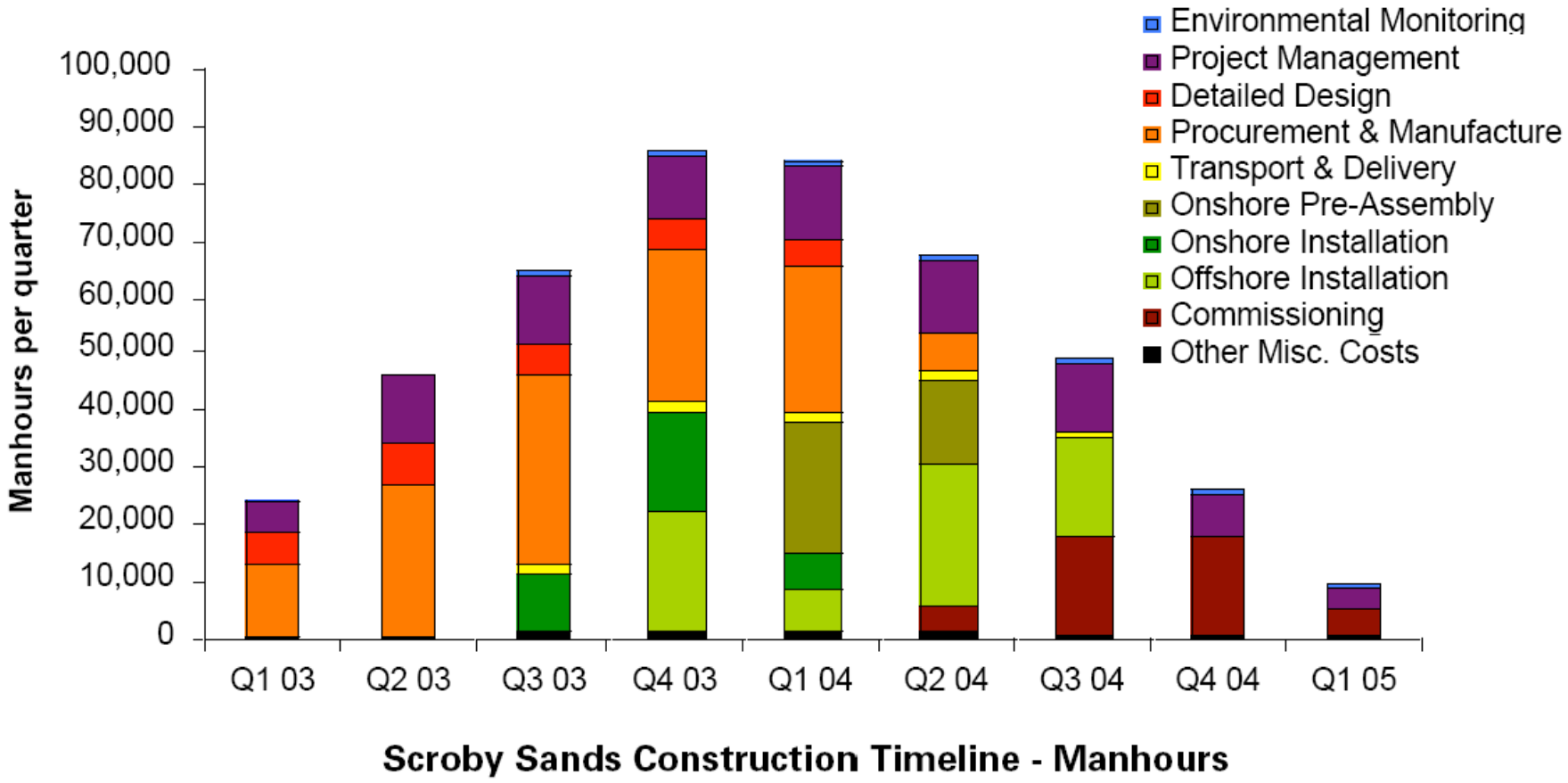


- Manufacturing
- Shipping
- Assembly
- Installation
- Maintenance

Norfolk Southern's Heartland Corridor

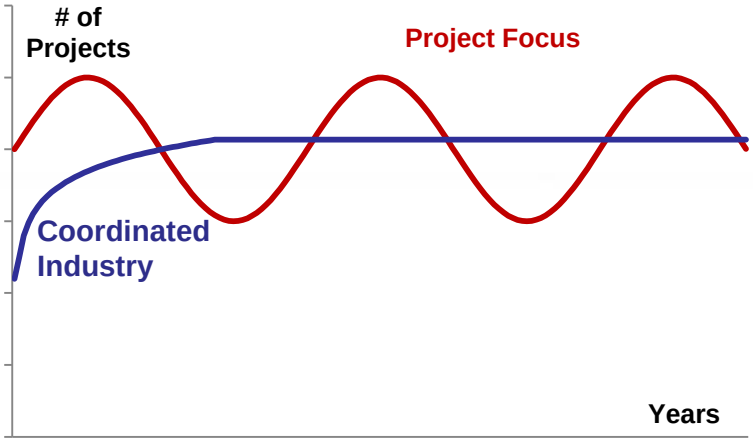


Project Manpower Distribution

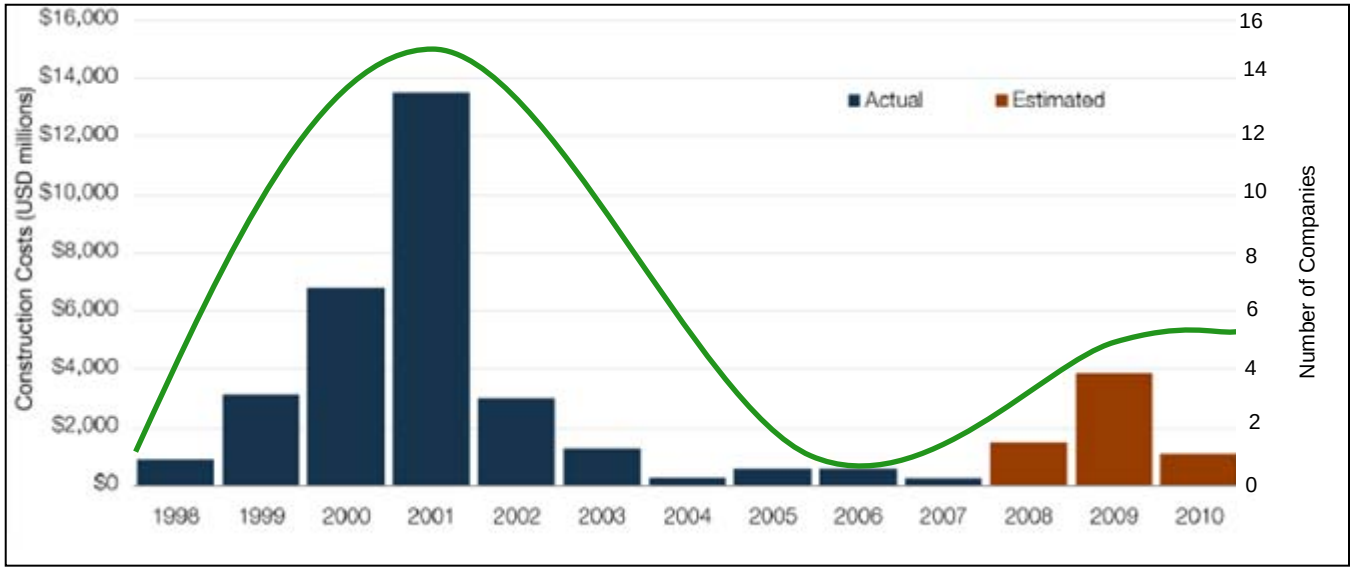


Boom-Bust Installation Cycle

Ocean Energy Industry (Theoretical)



Submarine Telecommunications Industry Construction Spending



Conclusion

- **Project Economics**
  - We need to find ways to level load the industry to avoid economic turmoil
- **Regional Solutions**
  - Regional solutions require cooperation between states, companies, and regulators
- **Maritime Environment**
  - The maritime infrastructure must be developed to reduce cost and increase efficiency across projects