The Tactical and Strategic Implementation of Sustainable Nanomaterials

U.S. Department of Energy Advanced Manufacturing Office
Sustainable Nanomaterials Workshop
Washington, DC

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&
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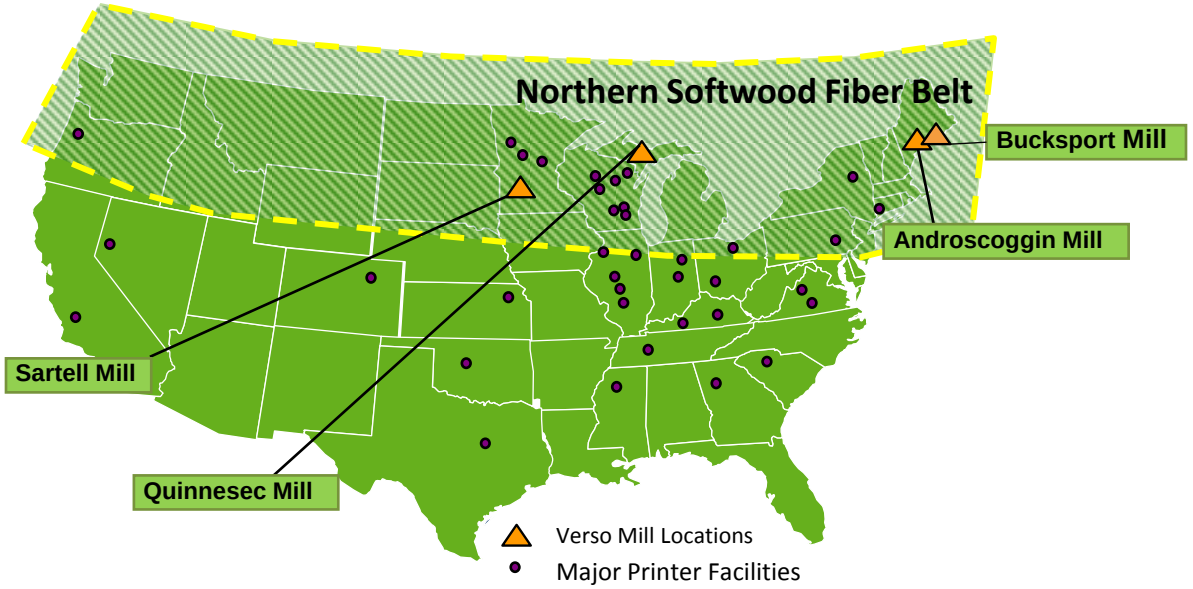
Verso Paper Corp

- Verso is one of North America's Leading Manufacturers of Coated Papers
- Four paper mills with 1.8 Million tons of paper capacity
- $1.72 billion in Net Sales for 2011
- Market Leader in our two end-user segments (Magazines and Catalogs)
- Primary manufacturing sites in Maine, Michigan, and Minnesota



Innovation

According to the recent National Academies Report

Rising Above the Gathering storm, Revisited – Rapidly Approaching Category 5,

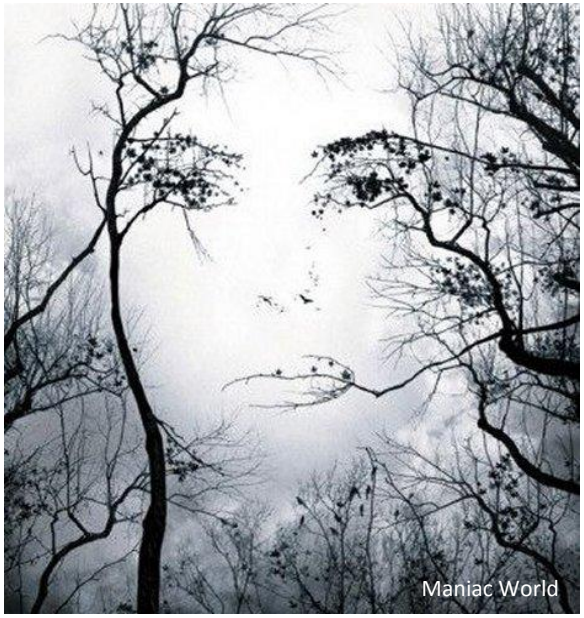
"Innovation commonly consists of being the **first to acquire** new knowledge through leading edge research, being **first to apply** that knowledge to create sought-after products and services, often through world-class engineering; and being **first to introduce** those products and services into the marketplace through extraordinary entrepreneurship."

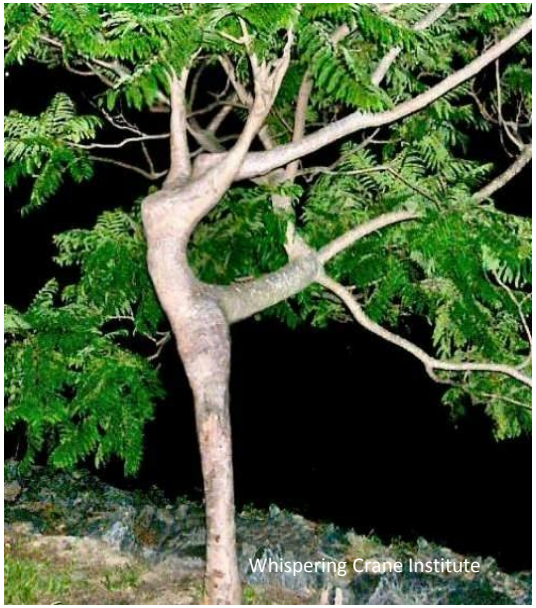
We have been steadily falling behind in "application of knowledge"

Tactical Considerations to Innovation

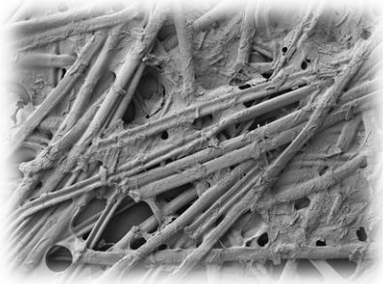
- Open our Mind…
- Can I make money with it?
- Does it fit my foundation model?
- Do I have Buy-In with Leadership?

- Is it a High Risk Technology?
- Can I Reduce the Risk?
- How do I Measure the ROI?
- Do We Know Our Customers?
- Do we have the Proper Resources?

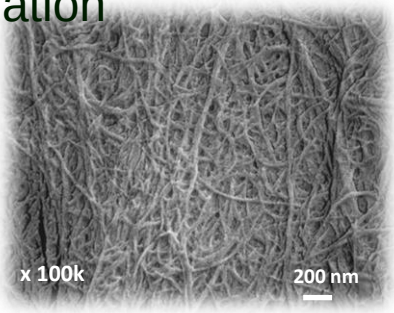




Tactical Implementation

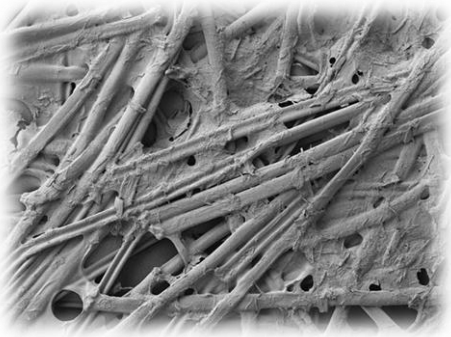


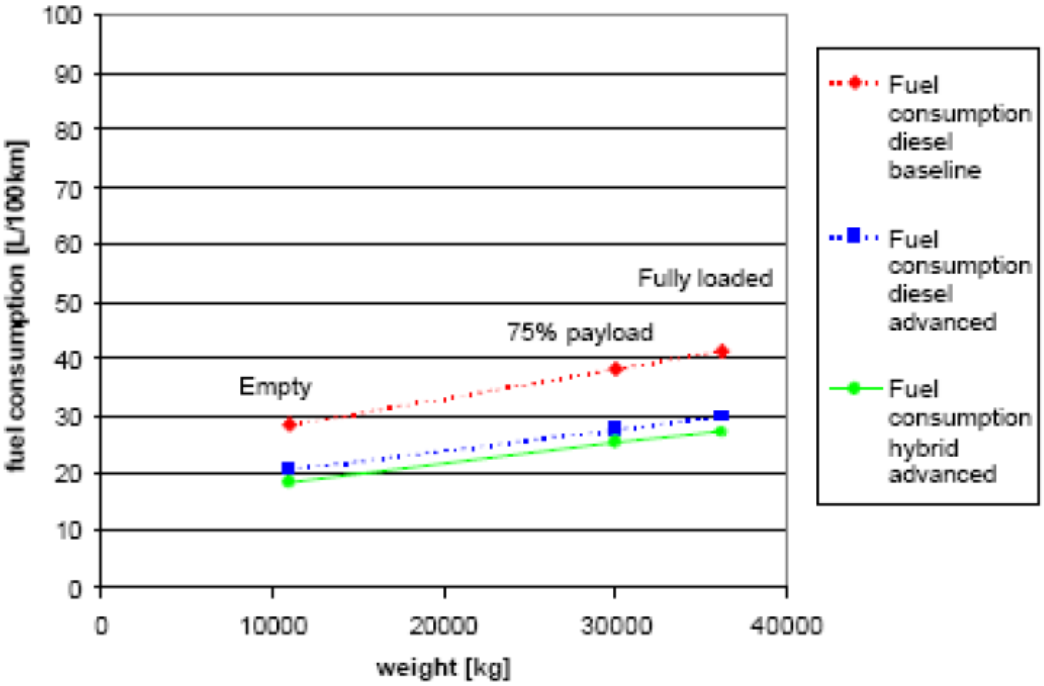
- Have a Plan – Incremental Innovation Strategy
- Ensure Product Safety – Utilize Materials Known to be SAFE.
  - K.I.S.S.
- Remove the Barrier
  - Utilize nanomaterials within current products
    - Gains Buy-In, Lowers Perceived Risk (vice-versa)
  - Creates familiarity with the technology
  - Utilize In-House Resources
- Near Term Successes
  - Ensure Objectives Deliver Results on Timely Basis
  - Make a Profit Quickly – or – “Fail Fast / Fail Cheap”
  - Capitalize on Success
    - Start on next material (Strategic?) studies and utilization
- Creates Motivation for Successful Strategic Framework

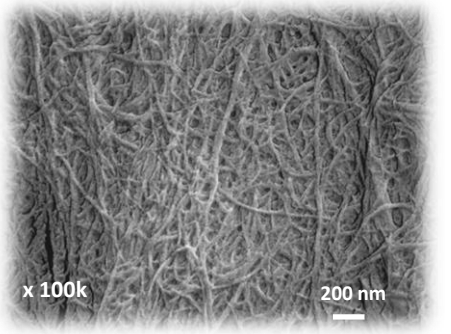


Tactical (Strategic) Implications

- Saves Current Infrastructure, Jobs and U.S. Manufacturing
- A 10% Weight Reduction in Shipping translates to a 6-7% increase in fuel economy.
  - This equates to over 8 Billion Gallons / Year
- Opens the way to alternative powertrains
- 6 lbs of Carbon Fiber in each North American Vehicle would consume the World Supply.



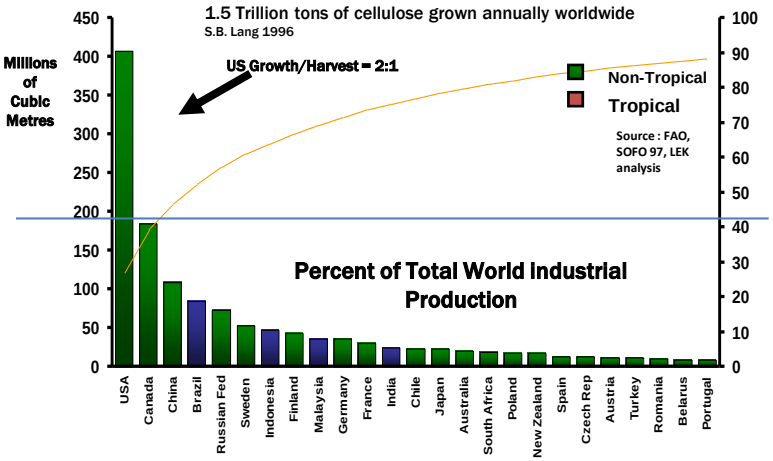




Strategic Considerations to Innovation

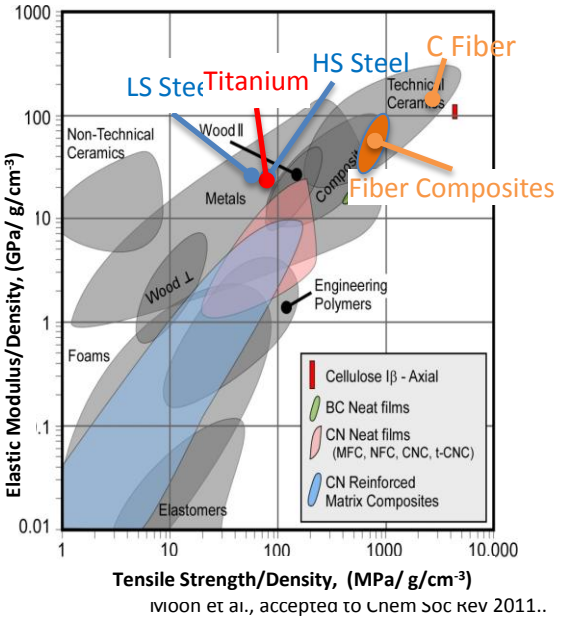
- Is Innovation a Strategic Foundation Strategy?
  - “Disruptive” Technologies
- Does the Innovation Support the Vision?
- Can We Meet the Challenge and Move Fast Enough?

- Dependence on Foreign Oil
  - Every time we fill up our vehicles
    - We Fund BOTH sides of the War
- New Technology Must Haves:
  - Abundant Raw Material
  - Ability to Transform and Secure the U.S. Energy Requirements
  - Infrastructure
  - Distribution



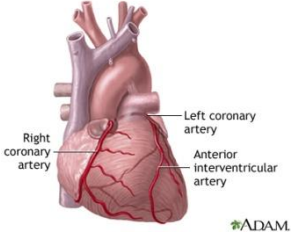
Strategic Implementation

- Have a Plan
- Understand Your Innovation Strategy
  - *Incremental*, **Radical**, **Disruptive**, etc…
- Understand Raw Material Supply and Who Controls It
- Know your NEW Customers Requirements
  - Materials, Business Model, Distribution, Volumes
  - Understand their Value Proposition
- Partnerships
- How do we Implement?
  - Utilize existing Infrastructure
  - Challenge Assumptions, Assets and Capabilities
  - Utilize equipment and methodologies from Incremental Innovation

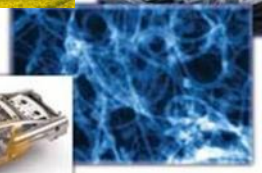


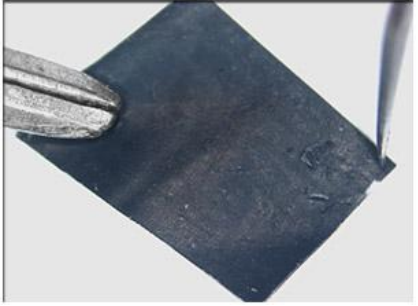
Moon et al., accepted to Chem Soc Rev 2011..

Strategic Implications



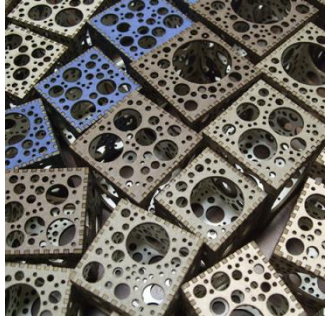
- Automotive – Mass Reduction, Fuel Economy, Alternative Power Sources.
- Wind – Longer Blade Designs, Efficiency, Blade Deflection Improvement
- Oil & Gas – Deep Water Production Enabler, Fracking Technology
- Electronics – Low Mass, Improved Dielectrics, Flexible
- Infrastructure – High Strength Cement/Concrete, Roads and Bridges
- Ship – Structures, Support Equipment Improvements
- Aerospace – Structure and Support Equipment Improvements
- Military – Clear Armor, Wearable Power, Skin Power, Energy Storage





Rensselaer Polytechnic Institute

Thank You



Jared's Photo Stream

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