Global Dynamics of the Pulp and Paper Industry - 2009

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Actions taken in one part of the world will impact somewhere else

Examples

1. China’s manufacturing output is highly dependent on the purchase of consumer goods in the United States … a recession in the USA has consequences in China
   - Impact: less demand and production of linerboard in China
   - More Chinese linerboard shipped to West Coast USA

2. Russia has imposed tariffs on log exports to Finland
   - Impact: Finland pulp mills will become non-competitive in wood cost and some mills will have to close
   - Impact: world pulp supply will decrease; prices will rise

3. World financial markets and currency exchange rates are fluctuating wildly on the world market
   - Impact: investments likely to be curtailed
• These changes do not occur instantaneously but have major impact in the Long Run
Main Points

1. Demand patterns for paper in the United States signal a permanent shift in consumption
   – Packaging outlook more favorable

2. International competitors have their own problems
   – In some cases their problems will become our problems

3. There are a limited number of solutions to the impending crisis for USA pulp and paper mills
   – And a limited number of survivors
1. Demand patterns for paper in the United States signal a permanent shift in consumption

A. Review Demand trends in the United States

B. What’s behind the change

C. What the consequences of the change will be
Change in Demand of key paper grades

2009 may be down 15 Million tons from 2000

Linerboard down – but holding its own for the moment

Source: AF&PA, RISI
Consumptions trends turned south well before the current recession.

Source: AF&PA, RISI
How Green is Green?

Save Trees. Save Space. Save Time
Do your part. Make your Chubb policy a paperless Chubb ePolicy™ starting today!

Chubb Personal Insurance

Relax. You're insured with Chubb.™

Sustainable Forestry Initiative
Certified Fiber Sourcing
www.chiprogres.org

Recycle

ISO
Postal Patterns

• Mail received during August, 2009
  – ~50 pounds or 600 pounds per year for family of 2
Catalogs

- Approximately 1/3 of total
  - Seldom looked at, never used
Advertisements

• Approximately 1/5 of total
  – *Ironic* is less than 10% is ever opened (only those who are cleverly disguised as a check)
Bills

- 15% of Total
  - Always looked at
  - All paid electronically
Magazine Subscriptions

• Subscribe to 12 monthly or weekly magazines
Legal

• ~15% of total
  – Seldom looked at
  – *Biggest item is 200 pages of life insurance policy boilerplate*
Personal Letters

• One “thank you” note
Fair or not, what I heard is that newspapers are shooting themselves in the foot

90% of newspaper journalists consider themselves “Liberal”

The normally nonchalant Barack Obama looked nonplussed, as Nancy Pelosi glowered behind.

Surrounded by middle-aged white guys — a sepia snapshot of the days when such pols ran Washington like their own men’s club — Joe Wilson, called “Uncle Joe” to hiside, yelped it.

But, fair or not, what I heard was an unspoken word in the air: You lie, boy!
The future of newspapers
(sound here now – color and video to follow)

• Downloaded in less than 1 minute in Siberia
Amazon Kindle

- Electronic readers final nail in newspaper coffin?
- First nail in the paper book publishing coffin?
Print trumps pixels for visual appeal
Price Trumps Color

PRAISE FOR BEACH MUSIC

"Astonishing...stunning...the range of passions and subjects that brings life to every page is almost endless."
—Washington Post Book World

"Incandescent." —Atlanta Journal-Constitution

"Breathtaking...perhaps the most eagerly awaited book of the year...a knockout."
—Charlotte Observer

"Few novelists write as well, and none as beautifully...Conroy’s narrative is so fluid and poetic that it’s apt to seduce you into reading just one more page, just one more chapter."
—Lexington Herald-Leader

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••••• The Help, by KATHRYN STockett
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••••• The Girl Who Played with Fire, by Stieg Larsson

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Book Reader Supply Chain
Where will it end up?
Now 41 Kg per Capita – future most likely at Western European levels ~ 25 Kg per Capita
Where will it end up?

![Graph showing demand history and forecast for different types of paper products from 1991 to 2011. The graph includes the following data points:

- **Coated Mechanical**
  - 1991: 14,000 tons
  - 2000: 15,000 tons
  - 2007: 12,000 tons
  - 2011: 9,000 tons
  - Change: -37%

- **Coated Freesheet**
  - 1991: 12,000 tons
  - 2000: 13,000 tons
  - 2007: 10,000 tons
  - 2011: 8,000 tons
  - Change: -13%

- **Uncoated Freesheet**
  - 1991: 10,000 tons
  - 2000: 11,000 tons
  - 2007: 8,000 tons
  - 2011: 4,000 tons
  - Change: -51%

- **Uncoated Mechanical**
  - 1991: 8,000 tons
  - 2000: 9,000 tons
  - 2007: 7,000 tons
  - 2011: 4,000 tons
  - Change: -56%

The graph also includes a table showing the change in demand and current WE consumption for each type of paper product.

**Change in Demand**

<table>
<thead>
<tr>
<th>Type</th>
<th>Tons (2008 - 2013F)</th>
<th>% Change</th>
<th>Forecast USA Consumption (Short Tons, 000)</th>
<th>Kg per Person</th>
<th>Current WE Consumption (Kg per Person)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coated Mechanical</td>
<td>3,165</td>
<td>-56%</td>
<td>2,468</td>
<td>7.7</td>
<td>16.9</td>
</tr>
<tr>
<td>Coated Freesheet</td>
<td>2,956</td>
<td>-51%</td>
<td>2,849</td>
<td>8.9</td>
<td>19.1</td>
</tr>
<tr>
<td>Uncoated Freesheet</td>
<td>4,629</td>
<td>-37%</td>
<td>7,888</td>
<td>24.6</td>
<td>21.6</td>
</tr>
<tr>
<td>Uncoated Mechanical</td>
<td>839</td>
<td>-13%</td>
<td>5,765</td>
<td>18.0</td>
<td>13.0</td>
</tr>
</tbody>
</table>

Source: Author Projections based on AF&PA, RISI
United States Consumption – Summing Up

A. The problems that paper producers face are minor compared to the problems customers for paper products have.

B. Electronics has grown from being a threat 10 years ago to being the victor today.

C. Corrugated packaging survives today as a superior product, but what will we produce in the United States to package?

D. Some glimmers that paper vs plastic debate swinging back our way but we have generally failed to make our main unique point of Sustainability.
2. International competitors have their own problems

A. Company Returns on Investment are unsatisfactory in general business terms – Canada overall negative

B. Demand trends – especially Western Europe – are beginning to resemble our own

C. Currency exchange rates – in the absence of a new international financial crisis – will protect USA producers from imports over the near term

D. Not likely our cost structure – especially labor costs – will allow the USA to become major exporter
Worldwide Return on Capital Generally Poor
Non-Japan Asia marginally acceptable, Latin American fell in 2008
Canada a disaster

Western Europe P&W Consumption

No growth since 2000

Source: RISI
Currency Rates can influence international competitiveness more than assets can.

Source: www.marketbrowser.com October 1, 2009
Impact of Currency Exchange

The Euro

Expected Long term Rate

Weakest Dollar

Financial Panic

Long Term Decline?
Impact of Imports on Coated Freesheet

*Euro at $0.766*

North American Producers well protected against imports at Q1 2009 Currency Rate
Weaker Euro improves Western European Competitive Position

Euro at $0.95

Cash Cost, Delivered to New York, $ per FST

Cumulative Production, FST per Year (x1,000,000)

North America
Europe

More than half of North American Production slides to 3d Cost Quartile
China Supply – Demand in Balance
Likely to exceed balance in future

Packaging

Paper

5-Year CAGR, %
9.22%  11.4%  6%  9%

Source: RISI
China dependence on imported fiber declining

Source: RISI
The Miracle of China

Tell me again what’s wrong with “Globalization”

<table>
<thead>
<tr>
<th>From Numbers to See the Changes in China</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Year</strong></td>
</tr>
<tr>
<td>Population (million)</td>
</tr>
<tr>
<td>GDP (Billion RMB)</td>
</tr>
<tr>
<td>GDP per cap (USD)</td>
</tr>
<tr>
<td>Foreign Reserve (Billion $)</td>
</tr>
<tr>
<td>Life Expectance (year)</td>
</tr>
<tr>
<td>Students in University/yr (Thousand)</td>
</tr>
<tr>
<td>Paved Road (Thousand KM)</td>
</tr>
<tr>
<td>Import/export (Million $)</td>
</tr>
<tr>
<td>Food produced/year (million Ton)</td>
</tr>
</tbody>
</table>

Seems unstoppable ... until you remember Japan
International Outlook – Summing Up

• Only China (Paper + Packaging) and Latin America (Pulp) have economically sustainable Forest Products Industry

• The United States has the largest customer base and seems adequately protected by Freight and by Currency (at present)

• Looking Forward at the Forest Products Sector ...
  – *Worsening conditions for Western Europe*
  – *Potential collapse for Canada*
3. There are a limited number of solutions to the impending crisis for USA pulp and paper mills

A. USA producers in an unsustainable financial condition
B. “Corporate Strategy” is important, but which one?
C. New Products unlikely to change the game
D. Nor is Bioenergy
E. Manufacturing strategy must change from Capital Orientation to Operational Improvement
USA Industry in unsustainable financial condition

\[
\text{Capital Turnover} = \frac{\text{Revenue}}{\text{Capital Employed}} \times \frac{\text{After Tax Profit}}{\text{Revenue}} = \frac{\text{After Tax Profit}}{\text{Capital Employed}}
\]

Source: AF&PA 2008 Annual Statistics
Two Companies – Two Strategies

WEYERHAEUSER
- 2001 – Built Cedar Rapids, IA, recycled board mill
- 2002 – Bought Willamette Industries
- 2007 – Sold Paper Mills to Domtar, formed Catchlight Bioenergy Company
- 2008 – Sold containerboard business to IP
- 2009 – sold Trus Joist to Atlas

INTERNATIONAL PAPER
- 1999 – Merged with Union Camp
- 2000 – Purchased Champion
- 2003 – Sold Veratec Non Wovens and Scitex Imaging
- 2004 – Sold Weldwood Canadian Pulp Mills and Bought Box USA
- 2005 – Purchased Moroccan Packaging Business, Sold Carter Holt Harvey New Zealand Forest Products Company
- 2005 – 2009 Sold Forestlands and Wood Products Plants
- 2006 – Formed Joint Venture with Sun Paper China, exchanged Brazilian Plantations to Votorantim for Luis Antonio Pulp and Paper Mill
- 2007 – Formed Joint Venture with Ilim Group Russia, sold Arizona Chemical Company
- 2008 – Purchased Weyerhaeuser Containerboard Business
- 2009 – Merged with Union Camp
Forest Products Industry

Substitute New

Wood Products Plant

Forests
Super trees

Pulp Mill

Printing Papers
94 % Brightness Copy Paper

Liquid Packages

Diapers
Absorbent and soft single-ply tissue
Superabsorber enabled thin diapers

TCF Pulp

Copy Paper

Paperboard Juice Cartons

Oriented Strand Board

Chip Mill

Corrugated Boxes
Rigid – when - wet

Lumber Mill
LVL

Plywood Mill

Paper Mill

Lumber Mill

LVL

Plywood Mill

Oriented Strand Board

Chip Mill

Paper Mill

Lumber Mill

LVL

Plywood Mill

Oriented Strand Board

Chip Mill

Paper Mill

Lumber Mill

LVL

Plywood Mill

Oriented Strand Board

Chip Mill

Paper Mill
New Product Development

Corrugated Box in 1900 supplanted Wooden Boxes
All products exhibit a life cycle

Classic Product Life Cycle

- **Slow Introductory Phase**
- **Rapid Growth Phase**
- **Stagnant Mature Phase**
- **Declining Obsolete Phase**

**Volume**

**Time**
Bioenergy

• Forest Products Industry not well positioned to participate in Bioenergy Industry ... more likely to be a victim
  – Most forest products companies (Weyerhaeuser notable exception) have sold their forestlands
  – More than 30 states have legislated Renewable Portfolio Standards (RPS) ... Power Companies have first choice on paying for biomass
    • Wood Pellet plants right behind, shipping “Renewable Fuel” to European consumers

• Opportunity may exist to “Repurpose” failed kraft pulp mills to produce biofuels
Conventional Bleached Kraft Mill

- **Forest**
  - Residues to Hog Fuel Boiler

- Roundwood or Chips
  - Woodyard
  - Kraft Cooking
    - 75% Sodium Hydroxide (NaOH)
    - 25% Sodium Sulfide (Na2S)
  - Brownstock Washing
    - Evaporation
  - Bleaching
    - Bleaching Chemicals
  - Pulp Refining
  - Paper Mill
  - Waste Treatment

- Lime Kiln / Calcining
  - Recausticizing
  - Hog Fuel Boiler
    - Power Generation
      - Natural Gas
      - Fossil Fuel
Main Challenge with USA Paper Mills

How to achieve acceptable level of profitability?

• Supply will continue to decline to match decline in Demand
  – Implies product pricing stability

• Only lowest cost producers will survive
  – And “Low Cost” must be achieved without major capital

• Relatively well positioned against imports
  – Unless currency rates change to stronger dollar

• Illustration with model “Average Cost” Paper Mill
Currency and Freight becoming major barriers to global trade of pulp and paper products

Source: IP presentation, September 16, 2008 to UBS Global Paper and Forest Products Conference
Must take a realistic view of “Viability”

Linerboard Speed vs Width

- Look for Specialty
- Endangered Species
- Long Term Survivors
- Speedup Opportunities
The shape of the cost curve is important

*Newsprint ~ 50% of capacity with $50 per Ton*

Delivered Cost to New Jersey
USA Uncoated Freesheet Cost Curve

Rolls, Delivered to New York

“Carolina Pulp and Paper”

Source: FisherSolve™
Base Case

**Finished Tons per Year**

**Price per Ton, Sheets**

**Price per Ton, Rolls**

**Free Cash Flow**

**Return on Investment**

**Capital Turnover**

% After Tax Margin
### Scenarios for Success

<table>
<thead>
<tr>
<th></th>
<th>Run for Cash</th>
<th>Modest Cost Reduction Capital</th>
<th>Same + WCP</th>
<th>Same + WCR</th>
<th>Same + Higher Payback</th>
</tr>
</thead>
<tbody>
<tr>
<td>Productivity, %</td>
<td>0.2%</td>
<td>0.2%</td>
<td>0.5%</td>
<td>0.5%</td>
<td>0.5%</td>
</tr>
<tr>
<td>Annual Output</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Improvement</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cost of Reliability, % of RAV</td>
<td>3%</td>
<td>3%</td>
<td>3%</td>
<td>2%</td>
<td>2%</td>
</tr>
<tr>
<td>Cost Reduction</td>
<td>0 % RAV</td>
<td>0.5% RAV</td>
<td>0.5% RAV</td>
<td>0.5% RAV</td>
<td>0.5% RAV</td>
</tr>
<tr>
<td>Capital Investment, % of RAV</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Payback Years</td>
<td>N/A</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>2</td>
</tr>
</tbody>
</table>

RAV = Replacement Asset Value: the cost in current dollars to build a facility today “as is / where is”

WCP = World Class Productivity: 0.5% per year increase in output

WCR = World Class Reliability: 2% of RAV spent to be Reliable Operations
Scenario Analysis

**Basic Productivity + Basic Reliability**
- + 0% Capex
- + 0.5% RAV Capex

**WC Productivity + Basic Reliability**
- + 0.5% RAV Capex

**Graphs**
- Free Cash Flow over years from 2008 to 2018
- Lines represent different scenarios:
  - Run for Cash
  - 0.5%/3Y
  - WCP + 0.5%/3Y
  - WCP + WCR + 0.5%/3Y
Summing Up – Saving the USA Pulp and Paper Industry

- Doing what is now being done is the right thing
  - Will lead to significant (~50%) loss of production over the next 10 years
- Must eventually commit strategic capital to the Best Mills
- Do not abandon New Product Development
  - Functionality to displace glass, metal and plastic in packaging
  - Move more printing paper grades into high impact color graphics applications
  - Shamelessly sell our Sustainability – fight against the “Treeless” opportunists
- Pick the mills / machines with the “Technical Right to Succeed”
  - Reliable operations sprinkled with Low / No Capital Cost investments
  - Reliability will provide the advantage over the competition
  - And prevent imports from taking share away from our best mills
- Don’t count on Bioenergy Salvation ...
  - ... Unless you shut the mill down
- In the end, there is sustainability
# Change in Industrial Forest Ownership


<table>
<thead>
<tr>
<th></th>
<th>2002 Acres</th>
<th>2007</th>
<th>2007 Acres</th>
</tr>
</thead>
<tbody>
<tr>
<td>IP</td>
<td>8.57</td>
<td>Plum Creek</td>
<td>8.20</td>
</tr>
<tr>
<td>PC</td>
<td>8.12</td>
<td>Weyerhaeuser</td>
<td>5.64</td>
</tr>
<tr>
<td>WE</td>
<td>7.52</td>
<td>Resource Mgmt</td>
<td>2.70</td>
</tr>
<tr>
<td>MW</td>
<td>2.94</td>
<td>Campbell Gp</td>
<td>2.61</td>
</tr>
<tr>
<td>HT</td>
<td>2.38</td>
<td>Hancock Tm</td>
<td>2.40</td>
</tr>
<tr>
<td>TLI</td>
<td>2.21</td>
<td>GMO-RR</td>
<td>2.25</td>
</tr>
<tr>
<td>RN</td>
<td>2.16</td>
<td>Rayonier</td>
<td>2.18</td>
</tr>
<tr>
<td>SP</td>
<td>1.53</td>
<td>Forest Group</td>
<td>2.15</td>
</tr>
<tr>
<td>PL</td>
<td>1.15</td>
<td>Forest Capital</td>
<td>2.10</td>
</tr>
<tr>
<td>RMK</td>
<td>0.91</td>
<td>FIA</td>
<td>1.90</td>
</tr>
</tbody>
</table>

**Note:** Acreage in millions. Color denotes ownership category. Red represents industrial owners, blue represents REITs, and Green represents TIMOs.
United States Forest Dynamics

304 Million Ha Total Forest Area

317 Million M³ Excess Growth
35 Million M³ Harvest Residue
93 Million M³ Harvest Residue

757 Million M³ Annual Growth
440 Million M³ Growing Stock Removals
160 Million M³ “Other Removals”

424 Million M³ Roundwood Products
46 Million M³ Other Products

447 Million M³ “Available”

202 Million BDt “Available”

2.6 Quad BTU Thermal Energy
15.5 Billion Gallons of Ethanol

= 2.6 % of USA Consumption
= 8.2 % of USA Gas Consumption

Source: Calculated from 2007 RPA
Can the USA Forest Support a Bioenergy Business?

- Too much energy consumption
- Not enough planted forest
- Biomass grows too slow

USA Corn Ethanol Crop
~10 MM Ha

Wood – Corn Equivalence
North Carolina Forest Characteristics

**North Carolina Privately Owned Timberland is among the largest timber areas in the United States**

<table>
<thead>
<tr>
<th>USA Rank</th>
<th>Total State</th>
</tr>
</thead>
<tbody>
<tr>
<td>29</td>
<td>Area</td>
</tr>
<tr>
<td></td>
<td>31.1 MM Ac</td>
</tr>
<tr>
<td></td>
<td>12.6 MM Ha</td>
</tr>
<tr>
<td>16</td>
<td>Forestland</td>
</tr>
<tr>
<td></td>
<td>18.4 MM Ac</td>
</tr>
<tr>
<td></td>
<td>7.5 MM Ha</td>
</tr>
<tr>
<td>10</td>
<td>Timberland</td>
</tr>
<tr>
<td></td>
<td>17.9 MM Ac</td>
</tr>
<tr>
<td></td>
<td>7.2 MM Ha</td>
</tr>
<tr>
<td>8</td>
<td>Planted Forest</td>
</tr>
<tr>
<td></td>
<td>3.4 MM Ac</td>
</tr>
<tr>
<td></td>
<td>1.4 MM Ha</td>
</tr>
<tr>
<td>7</td>
<td>Privately Owned</td>
</tr>
<tr>
<td></td>
<td>9.8 MM Ac</td>
</tr>
<tr>
<td></td>
<td>4.0 MM Ha</td>
</tr>
</tbody>
</table>
Growth less Removals, Bone Dry Tons (BDT)

Regions 1 and 5 Account for 65% of Excess

<table>
<thead>
<tr>
<th>Region</th>
<th>BDT</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 40 Years</td>
<td>(2,675,316)</td>
</tr>
<tr>
<td>&gt; 40 &lt; 100 Years</td>
<td>4,714,353</td>
</tr>
<tr>
<td>&gt;100 Years</td>
<td>155,513</td>
</tr>
<tr>
<td>Total NC</td>
<td>2,194,550</td>
</tr>
</tbody>
</table>

< 40 Year Old Stands are intensively harvested

> 40 <100 Year Old Stands major Opportunity
Model of Current North Carolina Bioenergy Potential

**Base Case**

- **Forest Products Removals**
  - Graph shows the growth of million Btu per year from model years 0 to 10.

**Base Case**

- **Millions of Acres Harvested**
  - Graph indicates harvest levels in acres.
  - Categories: Timber Stands < 40 Years, Timber Stands > 40 < 100 Years, Timber Stands > 100 Years.
  - Values: 0.77, 0.07, 0.60.

**Base Case**

- **% of Total Timber Harvested**
  - Graph details the percentage of timber harvested from different age classes:
    - Timber Stands < 40 Years: 8.9%
    - Timber Stands > 40 < 100 Years: 0.9%
    - Timber Stands > 100 Years: 0.8%

**Base Case**

- **% of NC Fossil Fuel Power Generation**
  - Graph illustrates the model year percentage of power generation.

**Level Growth – Under Utilized Middle Age – Minor Power Potential**
Untapped Potential of Slow-Growing older Timbers Stands

10 x Base Case Harvest - Regrow at 3 X

10 X power generation from Base Case – Out Year Growth
Outlook for Forest Bioenergy Potential

- USA Forestland and productivity is more than adequate to meet current demand
  - *Best evidence is the shrinking stumpage prices*

- Current Forestry practices can likely achieve < 10% fossil fuel replacement
  - *If we keep doing what we currently do*

- Middle-age Timber stands can double the available biomass for bioenergy
  - *Can do so sustainably with disciplined replanting strategy*
Bioenergy Landscape is Complex

Technologies very Capital Intensive

Biomass

Thermal
- Direct Combustion
  - Steam
  - Power
- Direct Pyrolysis
  - Biodiesel
- Pre-Drying
- Pelletizing
- Pre-Drying
- Pelletizing

Thermochemical
- Chemical Pulping
  - Chemicals
- Extraction
  - Ethanol
- Pretreatment
  - Steam
  - Power

Chemical
- Reforming
  - Catalysis
  - Chemicals
- Gasification
  - Gas Turbine
  - Steam
  - Power
- Pretreatment
  - Fermentation
  - Distillation
  - Ethanol

Direct Combustion
- Steam
- Power

Direct Pyrolysis
- Gasification
- Steam
- Power

Pre-Drying
- Torrefaction
- Steam
- Power

Pelletizing
- Pre-Drying
NC State University

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Raleigh, North Carolina 27695

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