



The Forest Sector in Transition: An Economic Perspective

**Global Issues in Governance of Natural Resources:
New Leadership for New Challenges
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Outline

- **Context**
- **Is Forest Products a “Sunset Industry”?: Demand Outlook**
- **Key Issues:**
 - **Wood Costs**
 - **BioEnergy**
 - **Convergence of the Markets for Food, Fuel, Feed and Fiber**
- **Observations for the Future**



The Global Landscape

*Even before the onset of the recent financial crisis ~ The global forest sector was experiencing some of the most fundamental changes in markets and public policies *since the end of the Colonial Era.**

For example:

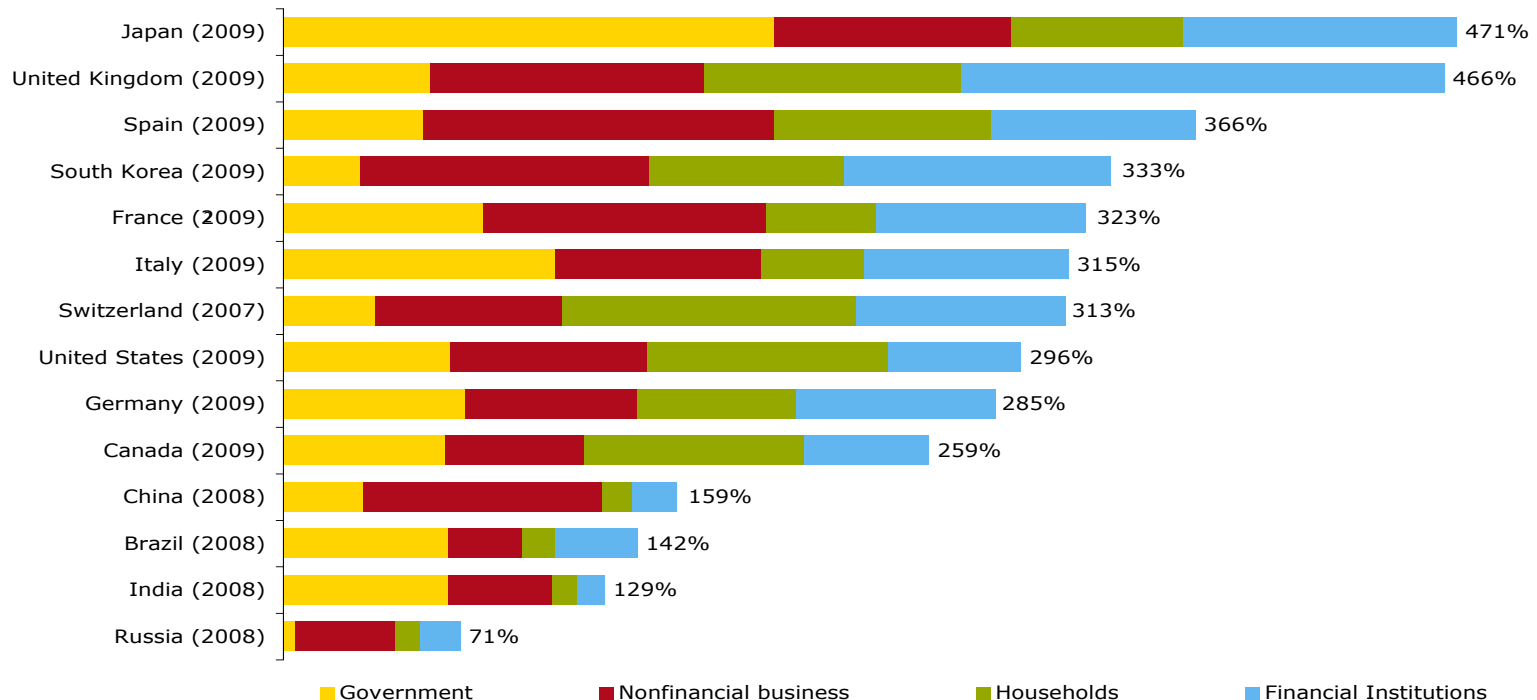
- ❑ Explosion of the Asian wood deficit...
- ❑ Fundamental forest tenure reforms in Russia, China, India...
- ❑ Revolution in electronic communication...
- ❑ Expansion of the bioenergy sector...
- ❑ Prospective pricing of carbon...



National Debt

- The global recession of 2008/9 was the worst in over 70 years. In response, massive debt was incurred.
- Debt reduction will be a high priority in Europe, Japan and the United States. "Let there be no doubt that the first overwhelming priority of the government has to be to get the deficit down", Chris Huhne, UK Energy and Climate Change Secretary (December 2010)
- The "BRIC" countries are less constrained by debt, but they also have to invest much more in social infrastructure.
- In general, governments will not have a lot of money to spend on the forest sector.

Total Debt as % of GDP (Latest Data Available)¹



Source: McKinsey Global Institute (MGI), "Debt and deleveraging: The global credit bubble and its economic consequences," January 2010.

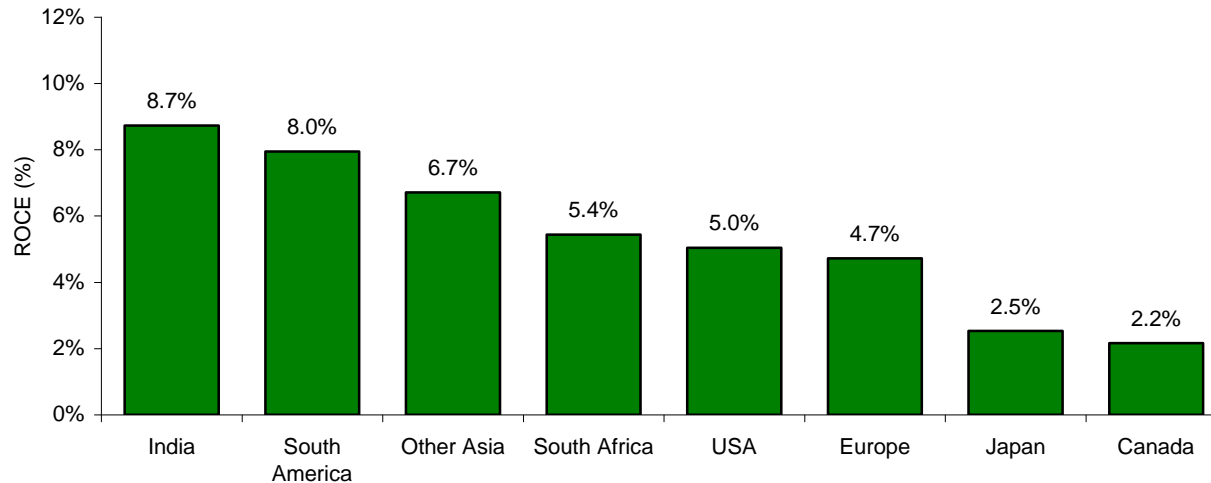
¹ Latest data available as at date of McKinsey report in January 2010.

² Including asset backed securities (ABS) is not a good idea as they are not really debt. Asset backed securities are not really debt as they are backed by underlying mortgages and other loans are already included, so it would reflect a duplication within the data, according to McKinsey. Other data sources, including the FT, The Economist and Morgan Stanley, do include ABS in total debt figures.



Historical Return on Capital

Average Return on Capital Employed (ROCE) in the Forest Products Industry, By Region (1999-2009)



Source: PricewaterhouseCoopers, CIBC World Markets

Return on Capital Employed is the most comprehensive measure of financial performance for a capital intensive industry like Paper & Forest Products. Given the cyclicity in the markets, it is best to look at the average ROCE metric over a period of time.

Some individual companies have generated acceptable financial returns. However, at the national level, even the best performing countries in the world have not covered their cost of capital (which is ~ 11%)

The traditional business model in the global forest industry has not generated an acceptable financial return. If it does not change, it will not be able to attract sufficient capital to sustain itself.



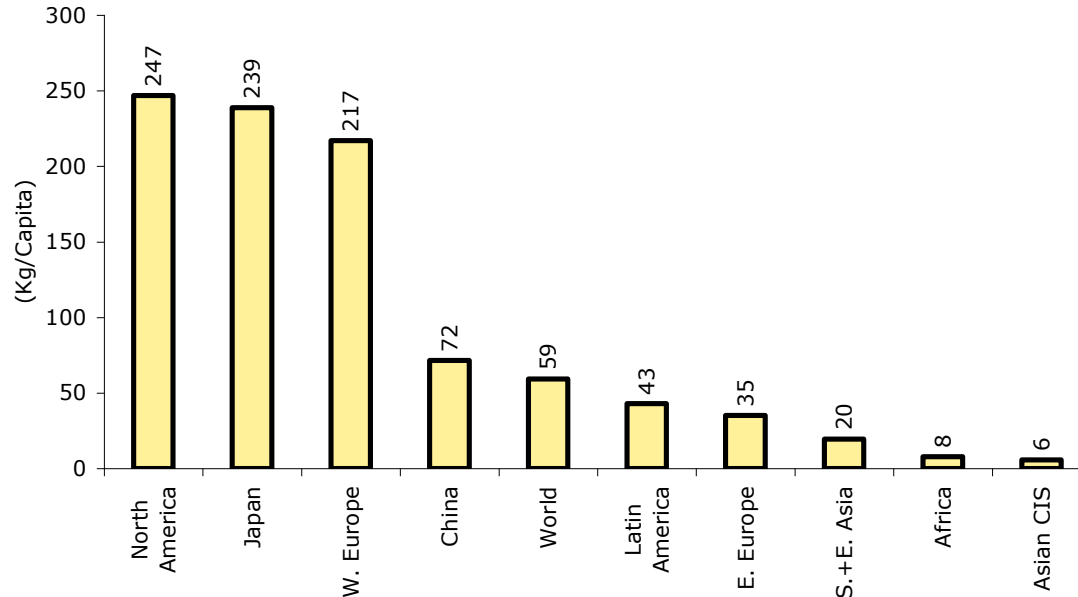
Is Forest Products a Sunset Industry?

What is the outlook for the demand for forest products?



Basis for Global Growth

Per Capita Consumption of Paper & Board (2010)



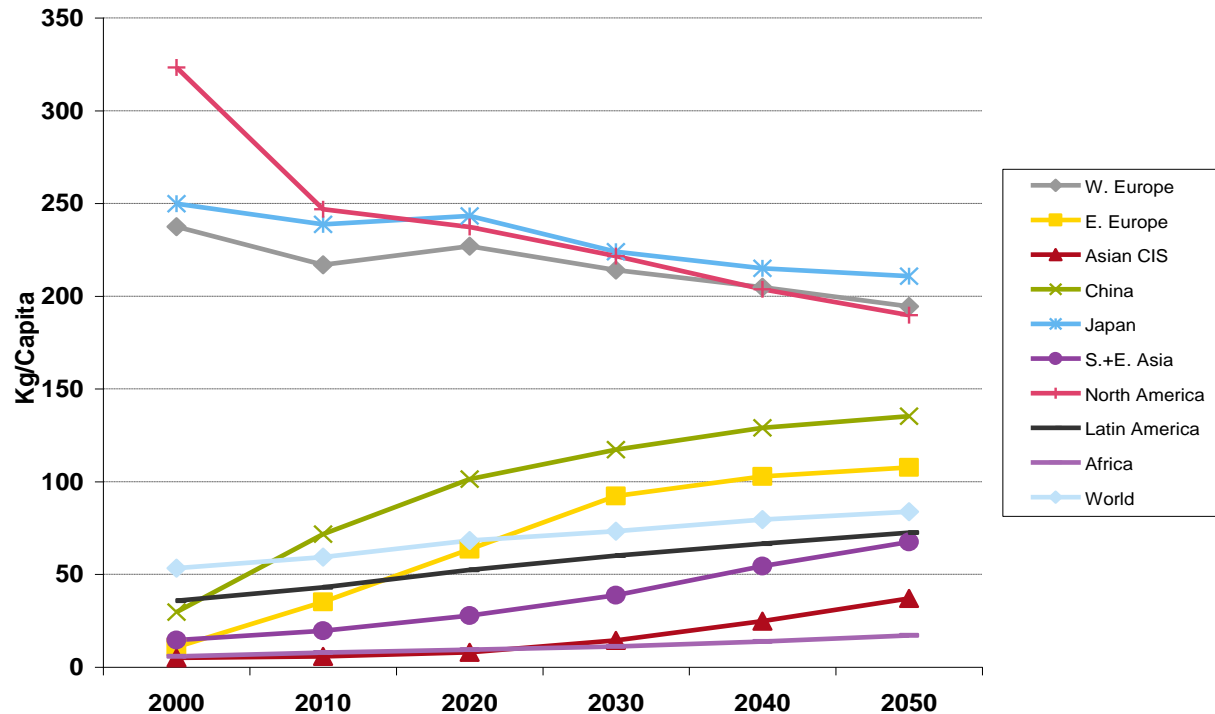
Source: FOEI

The regional differences in consumption of Paper & PaperBoard are dramatic, but the gap is continuing to narrow.



Basis for Global Growth

Per Capita Consumption of Paper & Board (2000-2050E)



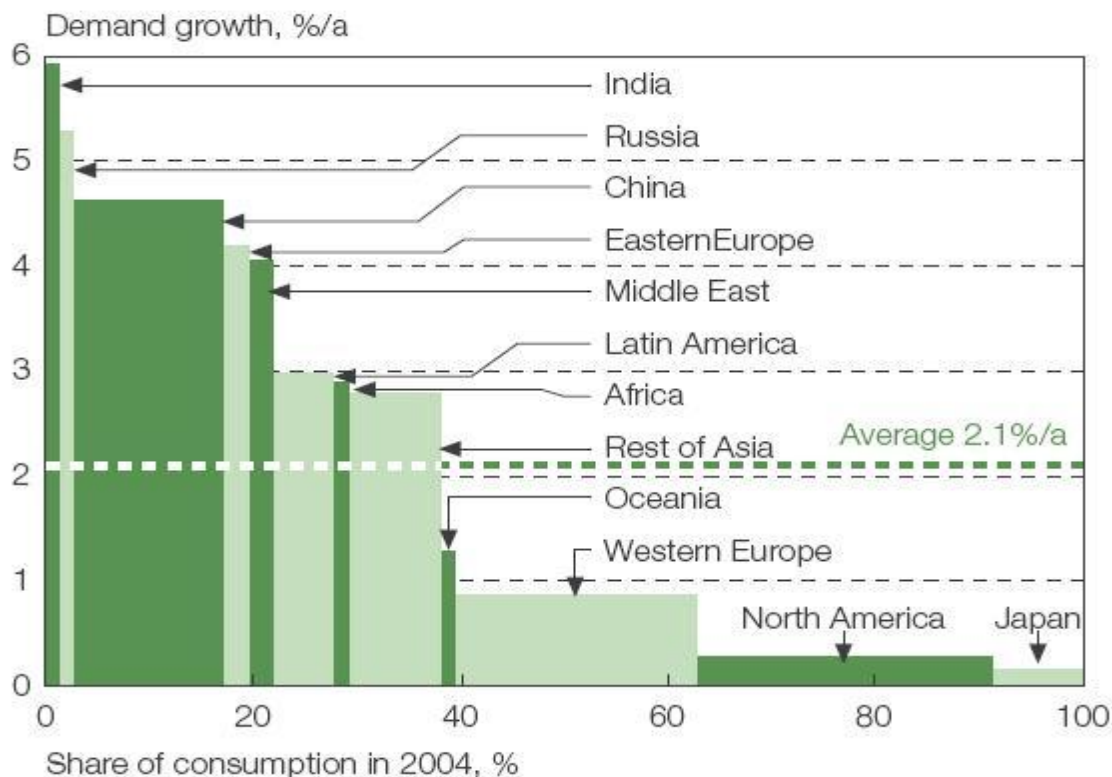
Note: 2010-2050 are forecasts
Source: FOEI, CIBC World Markets Inc.

Per capita consumption is falling in the developed world, but still rising in the developing world. This, combined with population growth, suggests relatively good growth in the demand for Paper & Paperboard



Global Demand for Paper & Paperboard

Paper and Paperboard Demand Growth By Region Through 2020

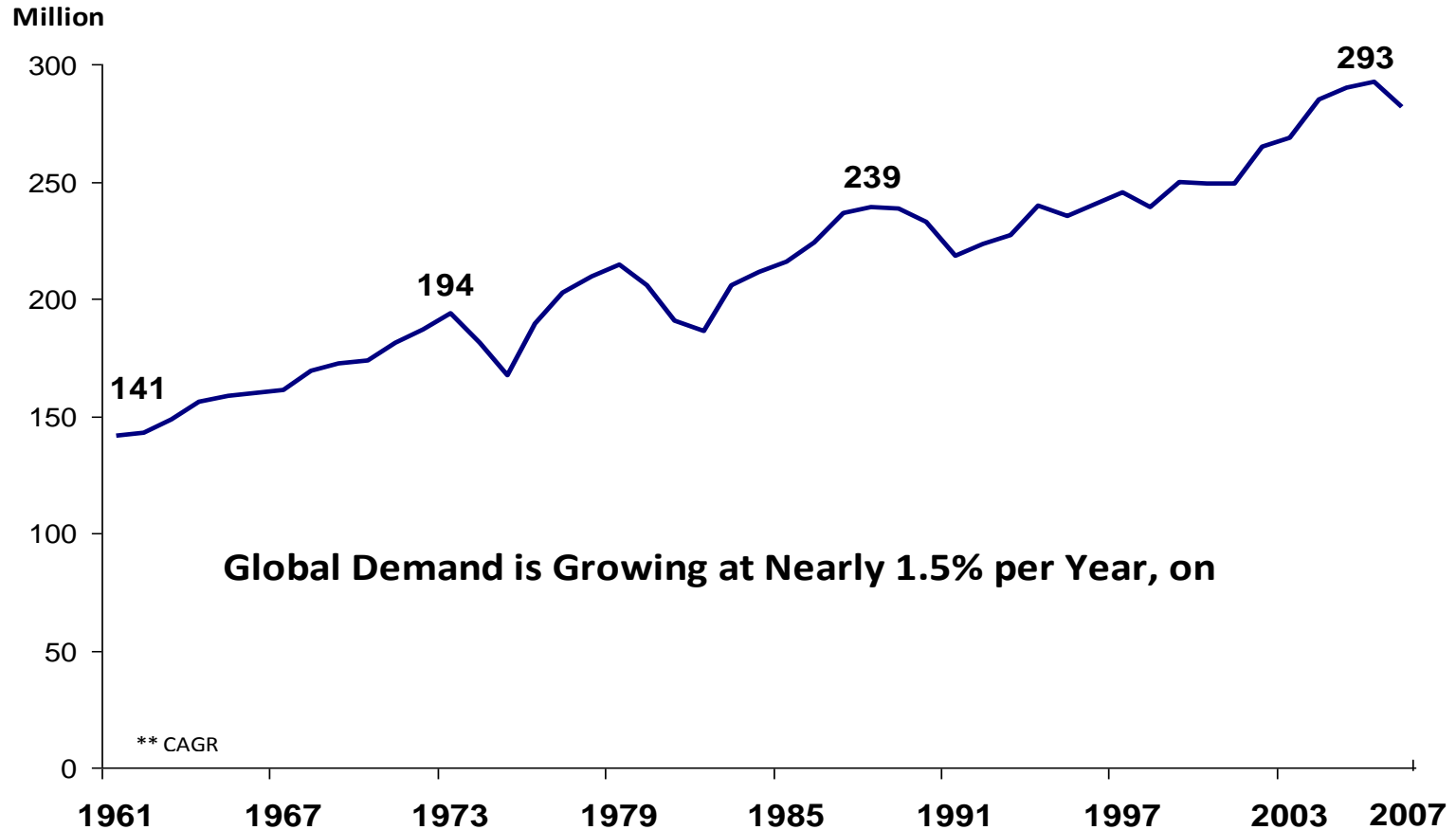


Source: Pöyry Consulting

Although its base is smaller, China's expected annual growth in paper & paperboard demand is roughly 15x greater than that of North America.



Global Demand for Softwood Lumber (Excluding Russia and Eastern Europe)



WOODBRIDGE

Data source: FAOSTAT

**Global demand for lumber is also growing – especially in China.
If carbon is priced, expect even faster growth.**



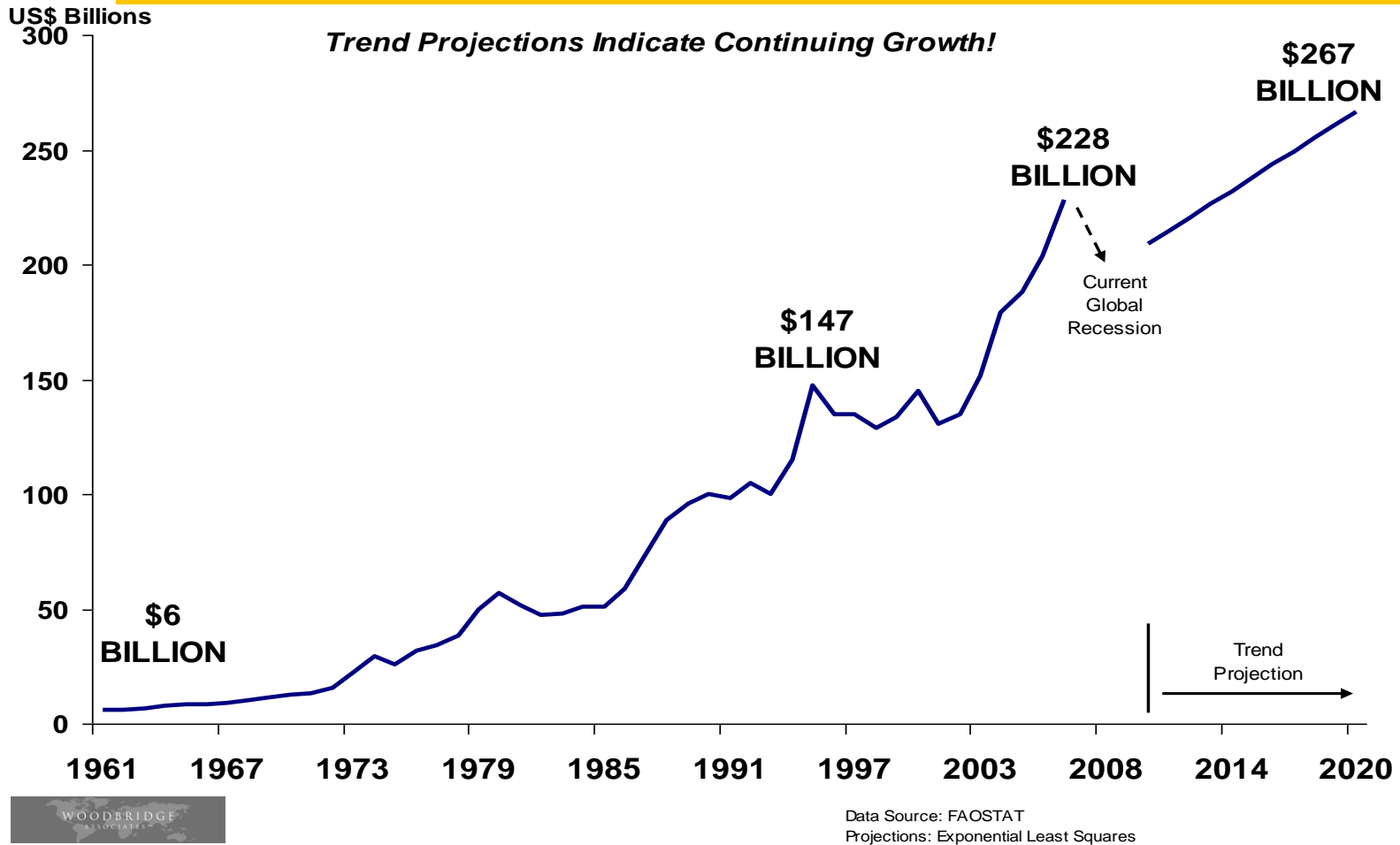
Commodity Outlook - 2011

Sectors	Long-term Outlook
Newsprint	Poor
Printing and Writing Papers ²	Better than newsprint, but still poor
Market Pulp ³	Reasonable for larger mills, but need to move toward a bio-refinery model
Packaging Paper and Board	Reasonable
Tissus	Quite good
Panelboard	Mediocre overall; OSB must be large, MDF must increase value-added; particleboard poor
Sawmills	Larger sawmills good, especially if they integrate with bio-energy
Veneers, posts and others	Good for LVL, also transmission poles in selected developing countries
Cogen and Pellets	Poor for stand alone CHP, and small & large pellet plants. Better for torrefied pellets and pyrolysis oil, especially if integrated with sawmill.

Conclusion? Due to growing global demand, Forest Products is NOT a “Sunset Industry”. However, the outlook for specific regions and commodities is mixed.



Value of World Exports of Forest Products - Growing at 8.5% per Year



Global exports are growing faster than demand because demand is growing fastest in countries that are not self-sufficient in forest products.

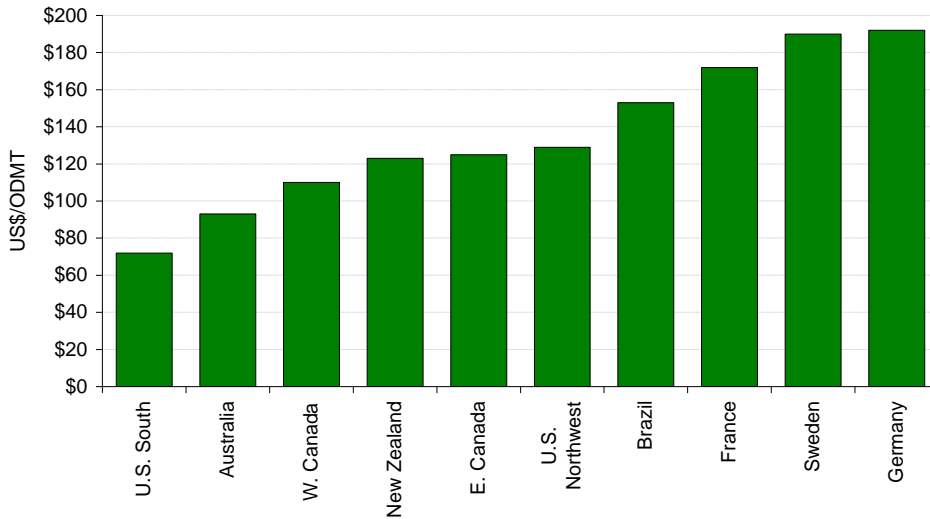


Wood Costs

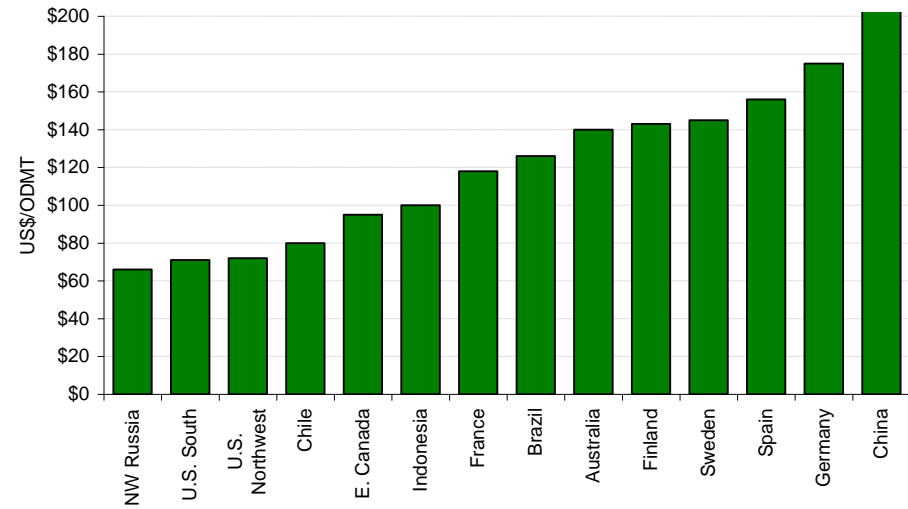


Pulpwood Fiber: Global Cost Comparison

Average Delivered Conifer Chip Fiber Prices Q2/2011



Average Delivered Non-Conifer Roundwood Fiber Prices Q2/2011



Source: Wood Resources International, CIBC World Markets Inc.

There are large differences in the cost of pulpwood around the world – the lowest cost regions are 1/2 to 1/3 that of the highest. As a result, it matters where you invest..

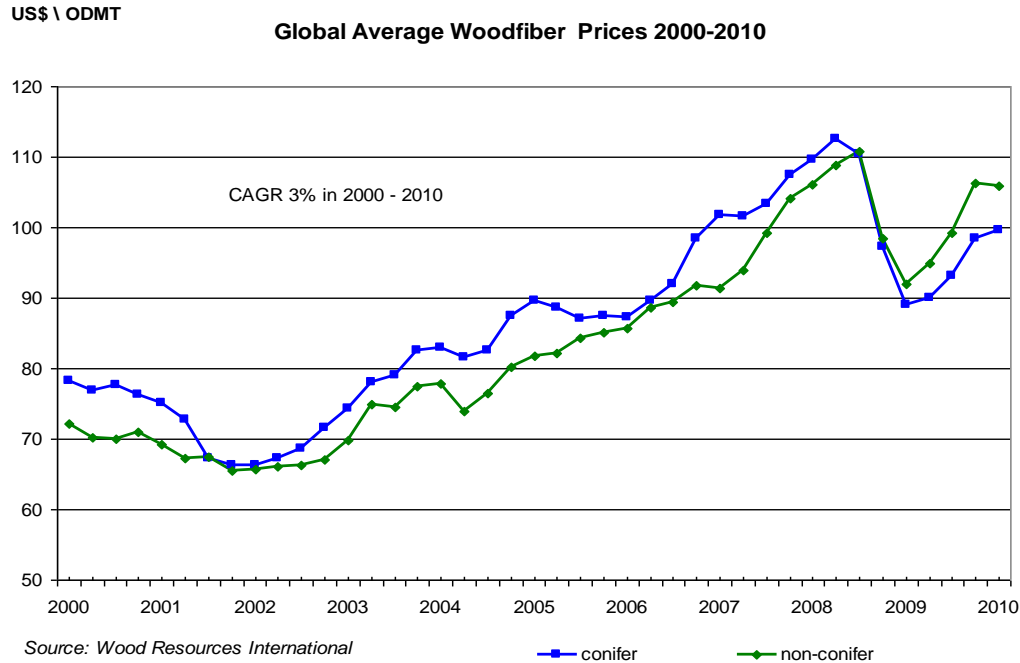
Europe and China face the highest costs, while the U.S. South and N.W. Russia face the lowest.

Brazil is no longer a low cost region.



Wood Prices

Global Average PulpWood Prices¹ (2000 - 2010)



¹ Source: Wood Resources International.

Global wood fiber prices have already been on an upward trend (despite weakening in 2008 with the global recession).

What is driving this upward trend?



What is Driving the Upward Trend in Wood Prices?

Increasing wood demand due to:

- **Growing fiber deficit in Asia.**
- **Developing bio-energy sector.**

Decreasing wood supply due to:

- **Reduction in supply of illegal logs.**
- **Insect infestations in Western Canada, U.S., and Russia**
- **Competing land use**

Despite better growth & yields, expect rising real wood prices through 2030 (subject to cyclical swings).

The good news is that what you are managing is increasing in value.



Asian Wood Deficit

It is almost impossible to exaggerate China's importance to the global forest product markets.

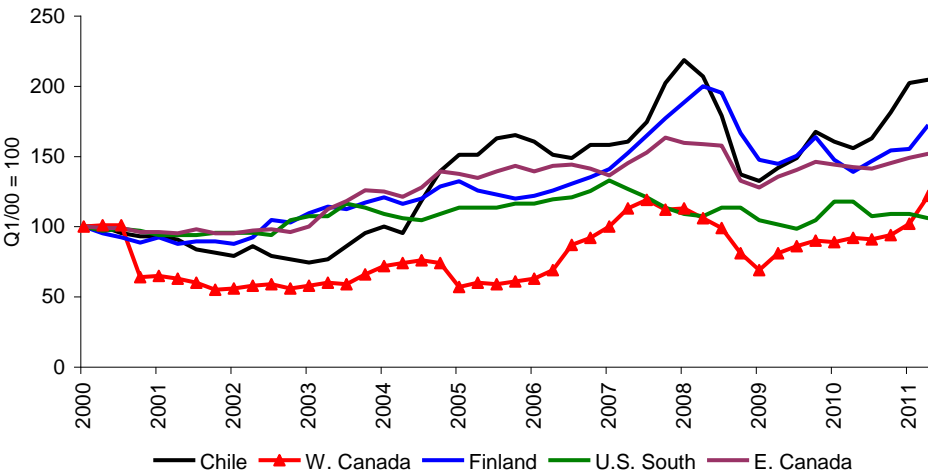
The expansion of China's forest products capacity has been made possible due to very large and increasing imports of fiber.

China is now the world's largest importer of logs, wood pulp and recovered paper.

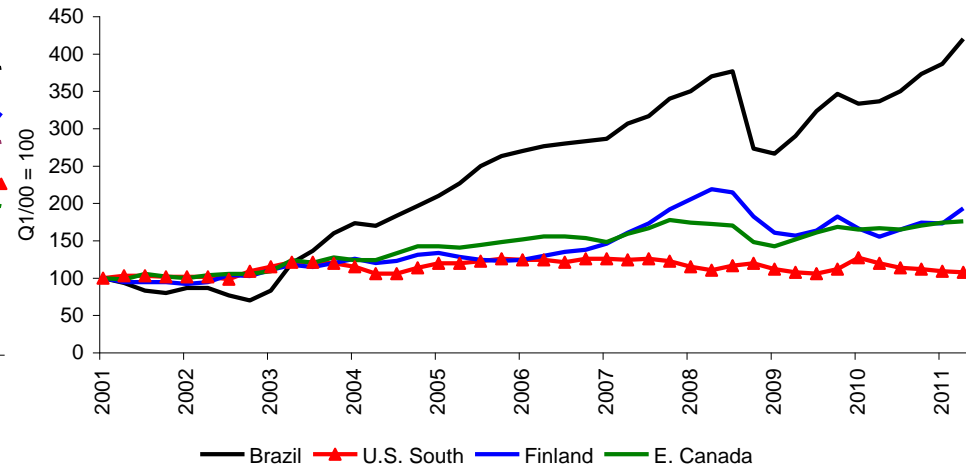


Regional Trends in Pulpwood Costs

Nominal US\$ Price Indexes of Conifer Pulpwood: Regional Comparison



Nominal US\$ Price Indexes of Non-Conifer Pulpwood: Regional Comparison



Source: Wood Resources International, CIBC World Markets Inc.

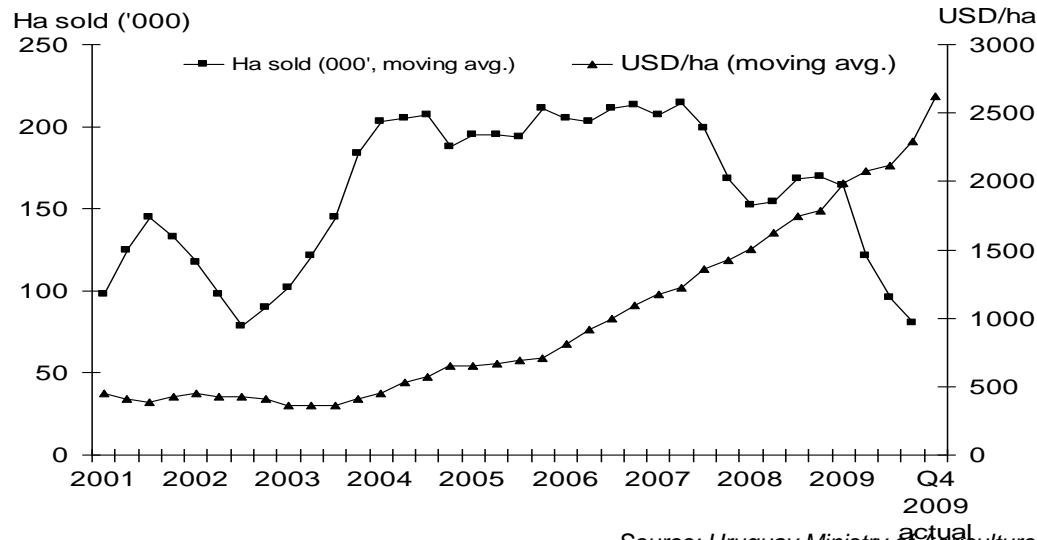
“Low cost producers” in S. America have been experiencing a significant increase in their relative cost of market wood since 2003/4. This is true for both softwood in Chile and hardwood in Brazil, and reflects stronger currencies and higher land prices.

The U.S. South has steadily improved its competitive position due to the falling \$US and lower demand pressure – will both be transitory?



Increasing demand and rising land prices: S. American Case Study

Uruguayan land prices (unplanted)



Source: Uruguay Ministry of Agriculture, CIBC World Markets Inc.

- The marginal cost of pulp wood in **Uruguay** is already at parity with the Scandinavia marginal cost when you consider the price of bare land.
- Land prices in Uruguay increased by 5x during the last 10 years.
- Good quality forest land with deep soil sold for USD 500/ha in 2000 and similar land with shallower soils are now selling for USD 2,500 to USD 3,000/ha in Eastern Uruguay



Bioenergy



What Drives The Economics of Bio-Energy?

Five key variables shape the economics of investing in bio-energy:

- 1. The price of fossil fuels (the main substitute)**
- 2. The price of carbon**
- 3. The conversion technology**
- 4. The cost of the feedstock (50%-80% of the variable cost)**
- 5. Public Policy**

At present, all five of these variables are in a state of flux – and this discourages private investment.

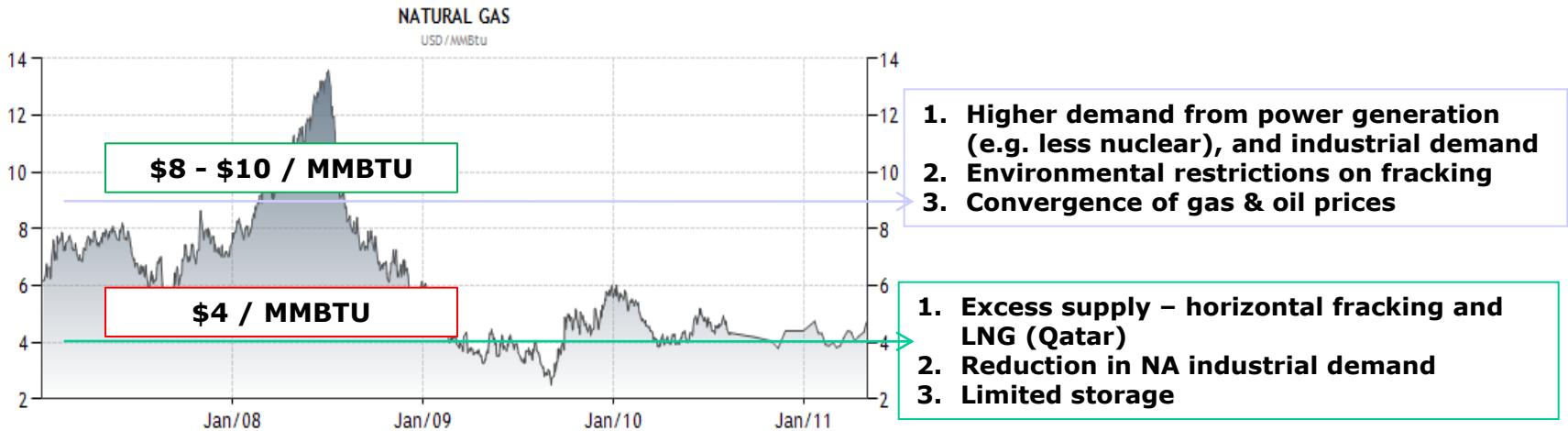
It is also important to view bio-energy in a broader context.



Natural Gas: The Main Substitute for Bio-Energy

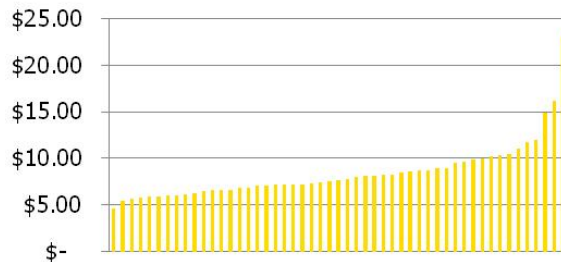
In North America and Russia, all sources of renewable energy are challenged by low natural gas prices.

Natural gas spot price very volatile with conflicting views on outlook...



... and prices vary depending on distribution costs and geography

Industrial Nat Gas Price By State, Jan 2010



Cost of Nat Gas Relative to USA

Canada:	90.5%
Taiwan:	161.9%
France:	140.9%
Japan:	154.5%
Russia:	26.1%
Brazil:	205.3%

Public Policy

■ Europe

- Binding targets for 2020:
 - 20% reduction of CO2 emissions
 - 20% energy from renewable sources
 - 20% improvement in energy efficiency
 - 10% biofuels in transport.
- If target is binding, estimated that EU will have to import ~200 m3 of biomass in 2020 (greater than the annual harvest in Canada).
- EU expects to add ~13 GW of biomass-based capacity over the next 10 years, which would roughly double its current capacity.
- Co-firing in modified coal plants is the most favored technology, which is ~ 1/10th the capital cost/MW of dedicated biomass combustion plants.



Public Policy

■ Europe

- Most countries in the EU missed their non-binding 2010 targets (eg., renewable energy 18% vs 21%).
- If the 2020 targets are to be met, the European Commission estimates that the annual capital investment would have to increase from the current average of €35 bn to €70bn.
- Given the fiscal pressures, we expect the EU will relax its renewable energy targets.



Public Policy

■ China

- The Chinese Government is now leading the world in supporting the Renewable Energy and Clean Technology sectors.
 - Over \$50 Billion invested in 2010.
 - China Development Bank alone lent ~\$35 billion to the clean energy and other “green sectors” in 2010 (up 30% from 2009)
 - Number of national climate change policies in China is twice as large as that of the U.S. at the federal level.
 - Special focus on incentives and mandates, that are supported by investment and enabling legislation.
 - Stringent capacity requirements by sector, with clear interim targets
 - More than half of the major policy initiatives in the 12th Five-Year Plan target some aspect of clean energy, energy efficiency or environmental improvement.
 - Discussing gradual establishment of a national carbon trading scheme (but expect nothing until the CDM scheme expires in 2012).



Public Policy

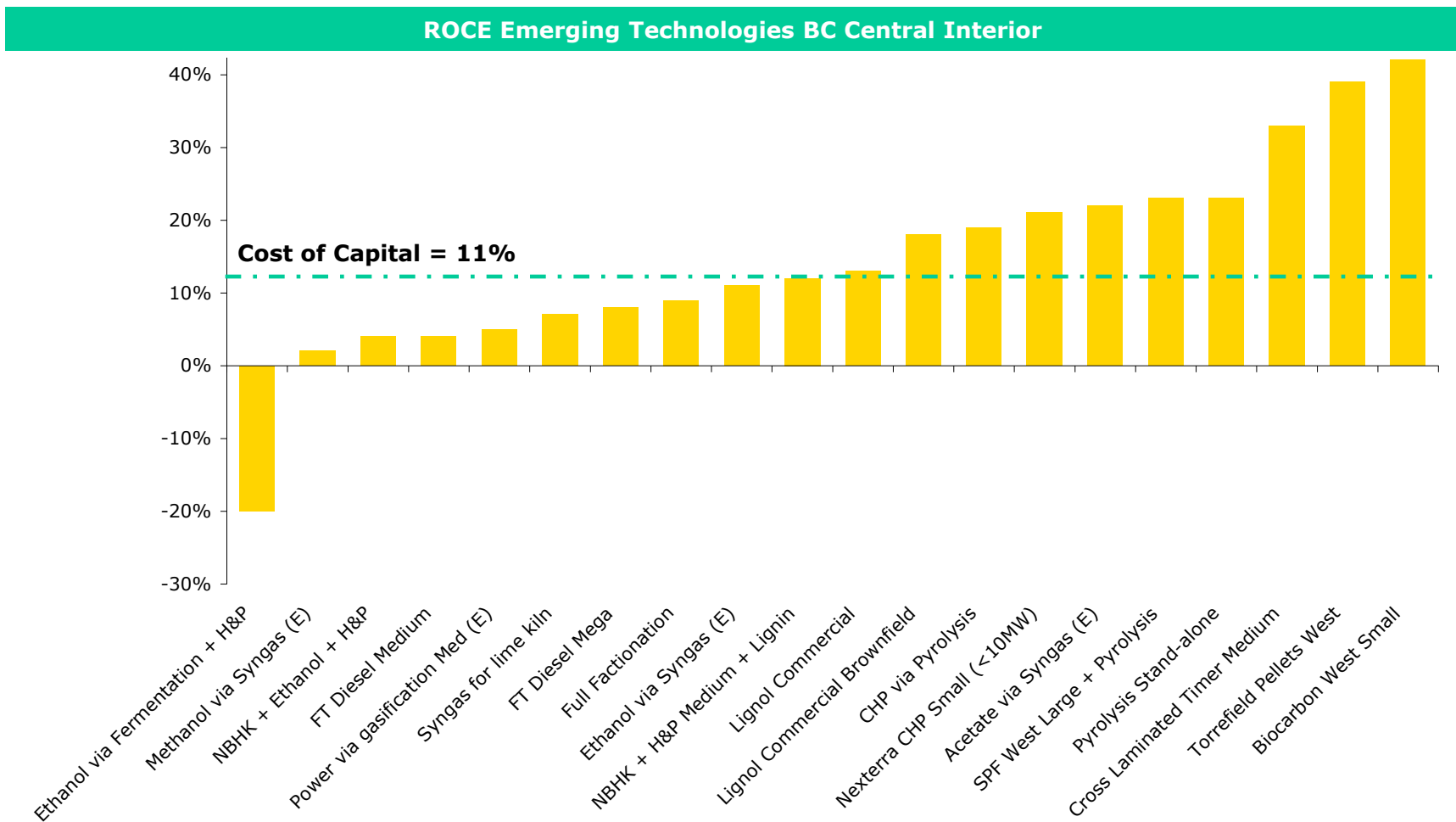
■ China

- NDRC target of 30 GW of biomass and waste-to-energy power by 2020 – up from 7.0 GW in 2010.
 - From 5.5 to 24 GW of agri & forestry powered biomass power
 - From 1.0 to 3.0 GW of bio-gas power
 - From 0.5 to 3.0 GW of waste-to-energy power
- Most of the projects are currently either straw-fired in the north, or bagasse-fired in the south.
- NDRC has a national pellet target of 50 million ODMT - up from 2 million tpy in 2009
- There are concerns related to collection costs and long-term soil productivity resulting from the increased use of agri-biomass for energy.
- China will have great difficulty meeting its bio-energy targets with its own biomass.



Emerging Bio-technologies: How Competitive Are They?

- Estimated “Normalized” Return on Capital of Emerging Technologies Using Forest Biomass
 - Results from the Canadian Future Bio-Pathways Project – some good/some bad



-
- Initial conclusions regarding emerging technologies:
 - Some of the emerging bio-products suggest attractive economic returns, but many do not. Those with the highest returns (eg., biocarbon, torrefied pellets) are highly dependent on government support.
 - The associated technological and regulatory risk varies by technology.
 - Bio-energy plants integrated with traditional forest product operations offer a more attractive risk/reward trade-off than do stand alone bio-energy plants.
 - Higher financial returns are correlated with less capital intensive technologies.



Conclusions Re Bioenergy

- If we look at the “best” of both the traditional and emerging biomass-based technologies in terms of ROCE, nine of the top ten produce some form of bio-energy/bio-chemicals.
 - Many of the traditional users of wood will “lose the auction” for fiber (eg., MDF, newsprint, smaller scale pulp mills).
 - We think solid wood mills which also produce some form of energy are the most interesting types of forest product complexes.
 - In terms of emerging bio-energy technologies, we are most interested in:
 - Fast-pyrolysis
 - Small scale gasification
 - Torrefaction

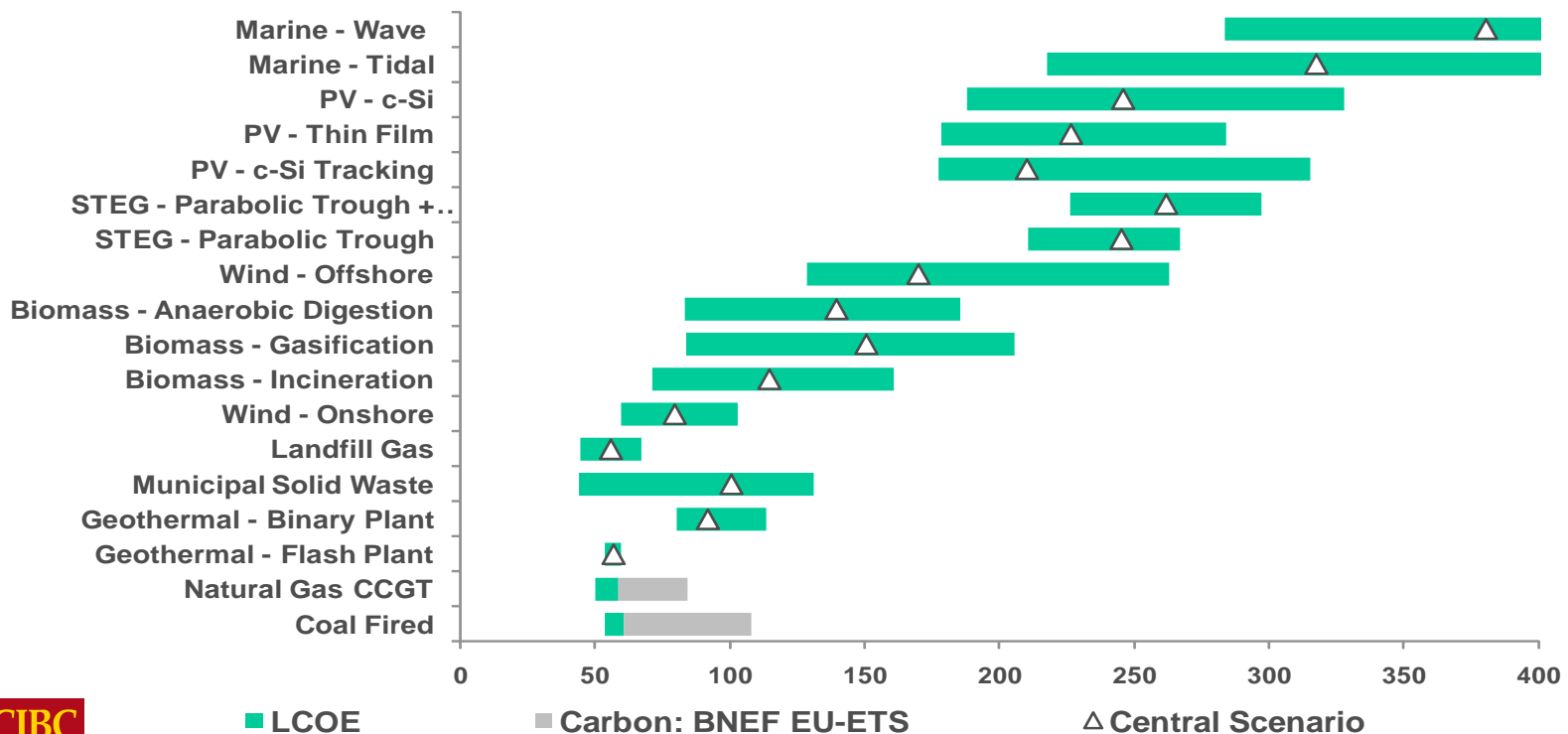


Cost of Electrical Power

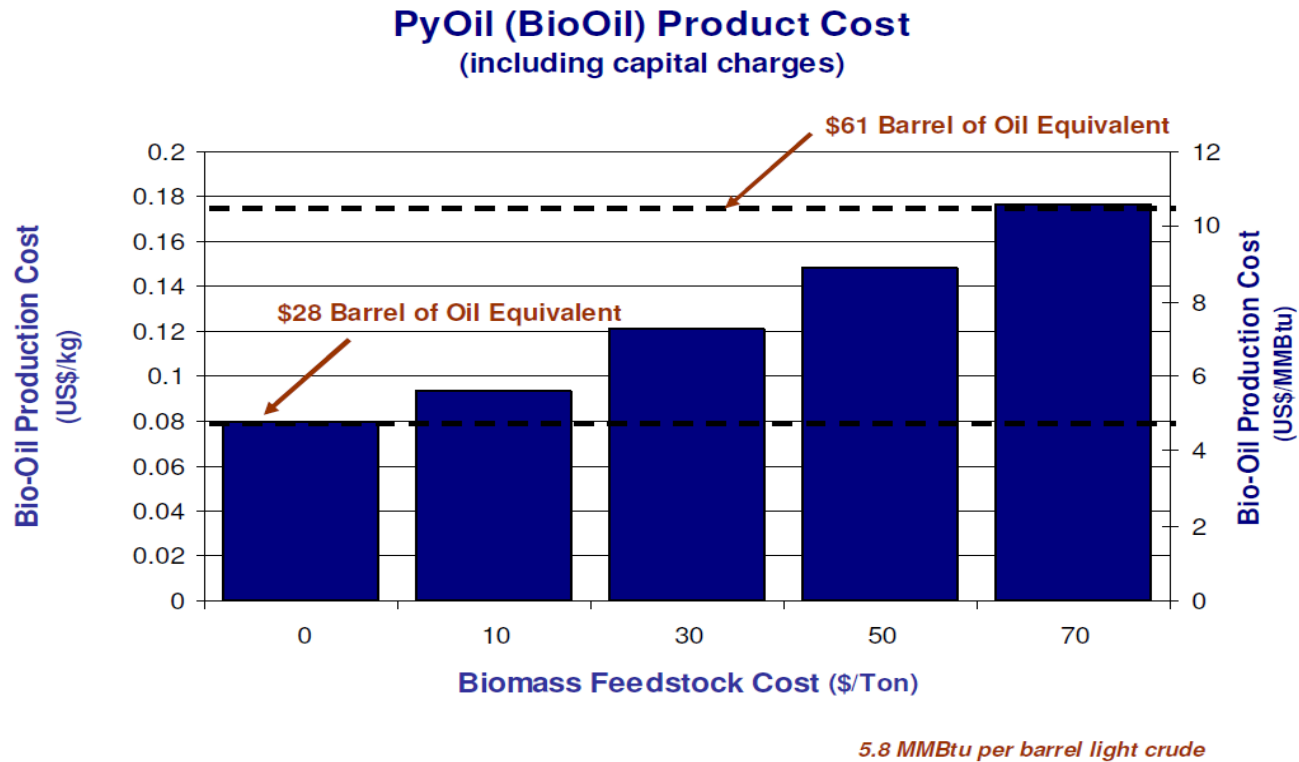
Competitive Position of Bio-Mass – Cost of Energy

- Although there are a few exceptions, most forms of renewable energy require government assistance in order to be cost competitive
- For each form of renewable energy, there is a range of cost estimates which reflect differences in technology, scale and location.
- Based on current commercial technologies, bio-energy is in the middle of the cost curve for generating electricity. Without new technologies, its position will likely get worse.

Levelised Cost of Energy: \$/MWh (Q3/2010)



Economics of Pyrolysis Oil For Generating Electricity



- **With lower cost biomass, PyOil can be a relatively low cost source of electricity.**
- **However, PyOil can also be used to produce transport fuels and bio-chemicals.**

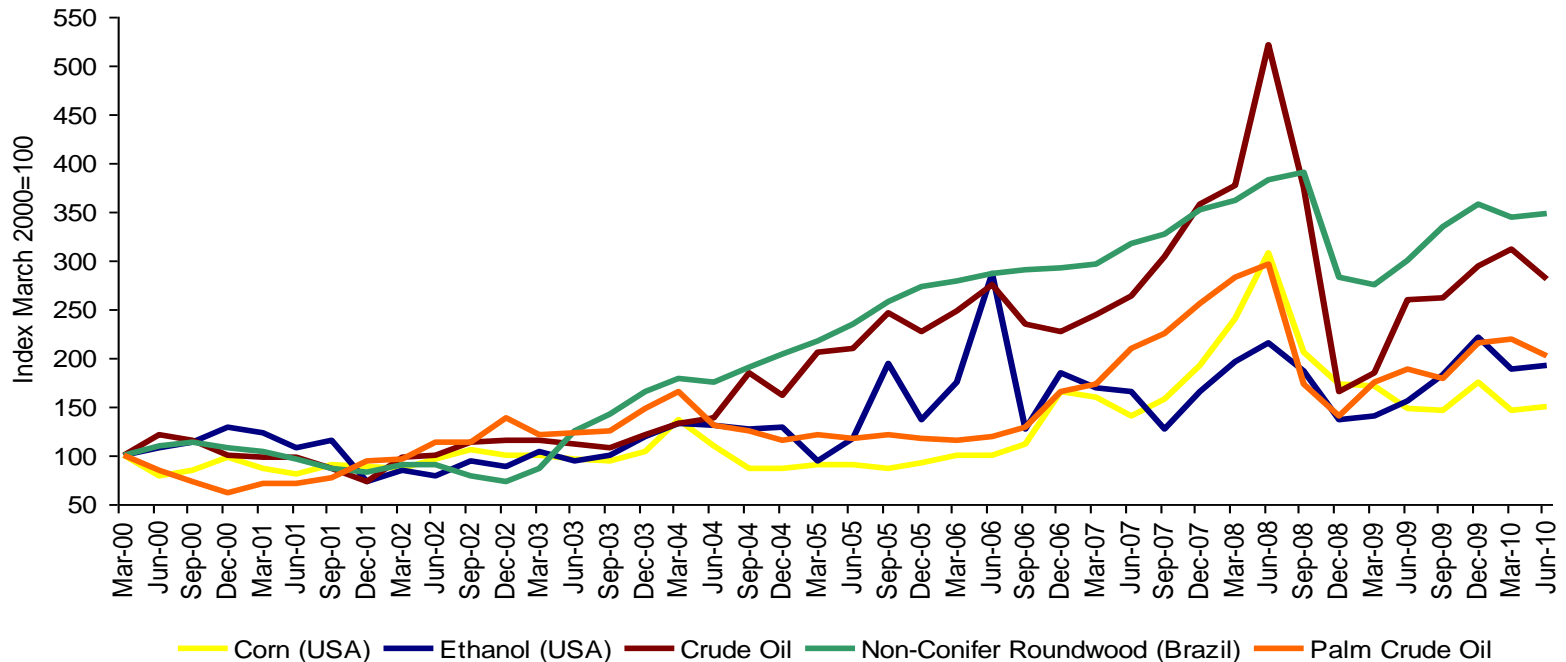
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- **Depending on the local conditions, it can make sense to produce electricity from biomass.**
 - **However, do not just limit yourself to producing “commodity electrons”.**
 - **Exploit biomass’ unique features:**
 - **Dispatchability (peak pricing, complement intermittent sources like solar and wind)**
 - **Optionality (transport fuels, green chemicals)**
 - **Explore the combination of bio-energy with wind or solar farms to develop a renewable energy complex.**
 - **If you are in the forest industry and you are not involved in the production of bio-energy, you are not maximizing your profit.**



Convergence of the Markets for Food, Fuel, Feed and Fiber (Wood)



Food, Fuel and Fibre Prices (Q1/00-Q2/10)



Our thesis is that the markets for food, fuel and fiber will converge in the sense that the feedstocks will trade on the basis of their energy equivalency. (eg., The first oil/rapeseed financial swap was recorded in August 2010.)

The price of oil is expected to become a support price for cereals, oilseeds and lower-quality wood.

All these prices spiked in 2007/8, and then fell with the financial crisis. They have since partly rebounded. This is consistent with the convergence thesis, but it doesn't prove it.



Convergence of the Markets for Food, Fuel and Fiber

Implications of the Convergence:

Expect greater land-use conflicts in many regions due to rising demand for land relative to potential supply. Pressures are expected to rise the most in the S. Hemisphere.

Current users of fiber will need to adopt a business model that enables them to fully capture the economic value of the energy component to remain competitive

Jurisdictions which fail to adopt policies that provide the framework for industries to realize the value from biomass will be placing those industries at a significant competitive disadvantage.



Link Between Bio-Energy and Food Prices?

IIASA study by Fisher et al in 2009 is amongst the most rigorous to assess the link between bio-energy and food prices:

- **Base case assumes bio-energy production remains at 2008 level.**
- **Given the mandates and targets announced by the large countries are implemented, crop price increases are estimated to be ~30 % higher than in the base case.**

Message?

If government's follow through with their aggressive bio-energy targets, we can expect:

- **Meaningful upward pressure on the prices of key food stuffs.**
- **This will stimulate increased agricultural production, and**
- **Put upward pressure on the demand for better quality pasture land and timberland.**



Observations for the Future

- **The cost competitiveness of many emerging forest product countries is expected to deteriorate over time in response to increased land, wood and labor costs and appreciating currencies.**

- **The traditional product mix in the forest industries in the developed, northern hemisphere must change – most are not financially sustainable.**

- **There is a business case for maintaining a healthy forest industry.**
 - **The secular outlook for the lumber segment is strong, and it provides the cornerstone for a competitive forest and bioenergy industry.**
 - **The pulp & paper segment has the potential to be transformed under a biorefinery scenario (i.e. it would produce pulp, paper, energy, chemicals).....and to generate acceptable financial results.**
 - **Almost all bio-energy and bio-chemical options are more economically attractive when integrated with forest industry operations.**



Observations for the Future

- **Productive land (with water) is going to be an increasingly scarce resource for most countries.**
- **If land is going to stay in forestry, it will either be because:**
 - **Governments “put a fence around it”, or**
 - **It can offer better economic returns than competing uses.**

Rising demand for bio-energy can either help or hurt the relative financial returns from forestry – it depends on how it is managed.



Three Underlying Messages

- **The forest sector is undergoing its most fundamental changes in over 200 years. You are not the only person who is confused.**
- **The traditional business model needs to change in much of the global forest industry – it is not financial sustainable. However, even though most forests are owned by governments, governments will generally have limited money to spend on forests.**
- **Especially now, you can influence what happens through rigorous analytical work.**
 - **Play a role in “raising the level of debate” regarding technologies and policies.**
 - **Adopt a “systems approach”, and think outside your traditional silos:**
 - **Outside you sector**
 - **Outside your discipline**
 - **Outside your country**
- **How can YOUR ORGANIZATION be a “thought leader” in managing the forest sector’s transition?**



Appendix A: Bio of Don Roberts

- Mr. Roberts is a Vice Chairman and Managing Director with the investment bank CIBC World Markets. He leads the firm's Renewable Energy and Clean Technology Group, and provides senior coverage for the Forest Industry. He is frequently described as a "thought leader" in the both the global forest products and bio-energy industries. From 1992-2008 he led a team of equity research analysts in advising financial institutions (e.g., pension/mutual funds) on their investments in the global paper & forest products industry. In institutional investor surveys he was consistently ranked among the top in the industry.

- In addition to his work with CIBC World Markets Inc., Mr. Roberts is also
 - An Adjunct Professor in the Department of Forest Resource Management at the University of British Columbia (Vancouver);
 - On the Board of Executives of the Sloan Center for Paper Business and Industry Studies at the Georgia Institute of Technology (Atlanta, Georgia);
 - On the Board of Directors of the Rights & Resources Institute (Washington, D.C.) and
 - Serves in an advisory capacity for a range of government, industry, and NGO groups.

- Mr. Roberts has a Bachelor's degree in Agricultural Economics from the University of British Columbia, a Master's degree in Forestry Economics from the University of California at Berkeley, and both an MBA and doctoral studies in International Finance and Economics from the University of Chicago. He is also a Certified Board Director with the Institute for Corporate Directors.

