



Forest Markets, Bioenergy and the Economic Meltdown: What Has (and Has Not) Changed?

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Outline

- **Current Chaos – and Looking Out**
- **Implications for:**
 - **Traditional Forest Sector?**
 - **Bio-Energy and the Convergence of the Markets for Food, Fuel & Fiber?**



The Current Context

*Even before the onset of the current 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.**

Take A Look

- ❑ Explosion of the Asian wood deficit...
- ❑ Revolution in electronic communication...
- ❑ Wildly escalating energy costs...
- ❑ Prospective pricing of carbon...
- ❑ Fundamental forest tenure reforms in Russia, China, India...



The Current Chaos

The macro-economic crisis that started in 2008 has created additional uncertainty. For example:

- Dramatically shifting cost structures – both within and across regions. Driven by changing currencies, prices and volumes.
- Changing transportation patterns.
- Disruptions in supply chains due to insolvency/bankruptcy.
- Evolution in public policies wrt energy pricing and carbon.
- Potential rise of protectionism.
- Re-assessment by governments of the forest industry's "social contract".
- Evolving role of government in general.



The Current Chaos

- *Worst economic slowdown in over 70 years.*
- *Truly global in nature.*
- *At the same time, we are seeing an unprecedented level of co-ordinated fiscal stimulus in the major economies*
 - *\$325 billion in the European Union – 2.5% of GDP*
 - *\$789 billion in the US – 6% of GDP*
 - *\$725 billion in China – 16% of GDP*



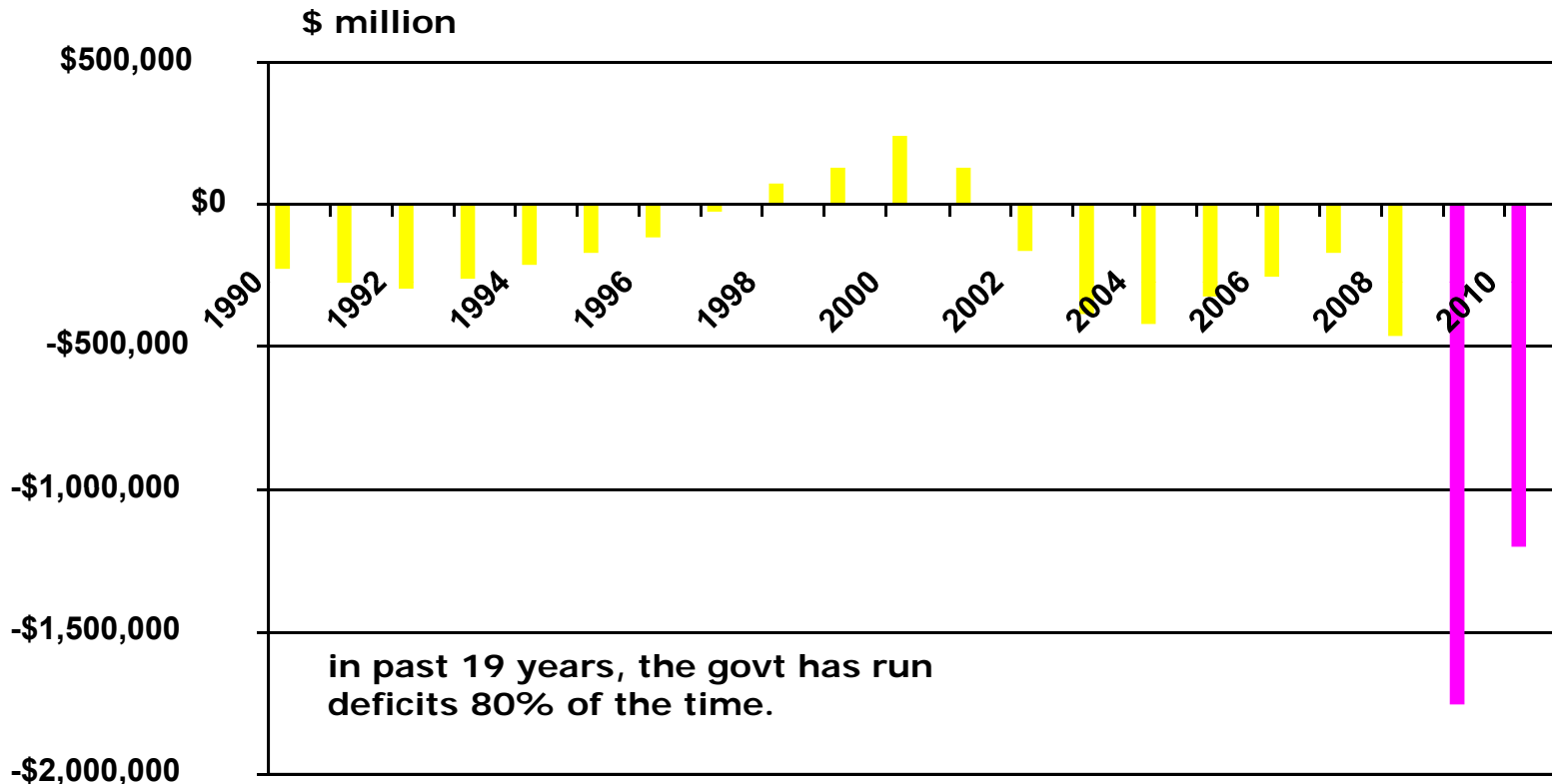
The Current Chaos

- Still lots of macro-economic unknowns:
 - Historically, peak-to-trough changes in employment & house prices take ~5 years after a severe financial crisis (recovery by 2012?).
 - *Could we be facing a “lost decade” of growth like Japan experienced?*
 - What will happen when the public spending stops, and gov’t debt and deficits must be reduced?



The Federal Budget Deficit outlook is getting worse

Deficits can't go on indefinitely - Sometime, we're going to have inflation, higher taxes, and fewer services.

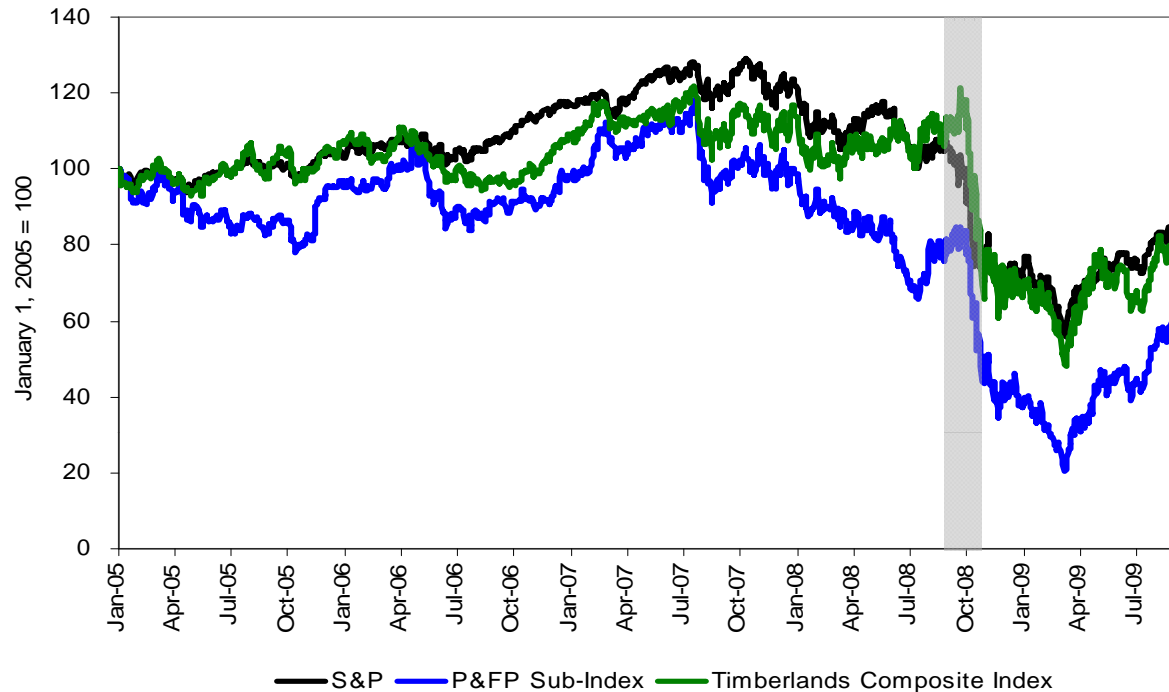


Source: Federal Reserve

~250% increase in the deficit from 2009 to 2010.



Stock Performance of the Forest Industry



Note: Timberlands Composite Index members: Deltic Timber, Potlatch, Plum Creek Timber, Rayonier, TimberWest and Weyerhaeuser.

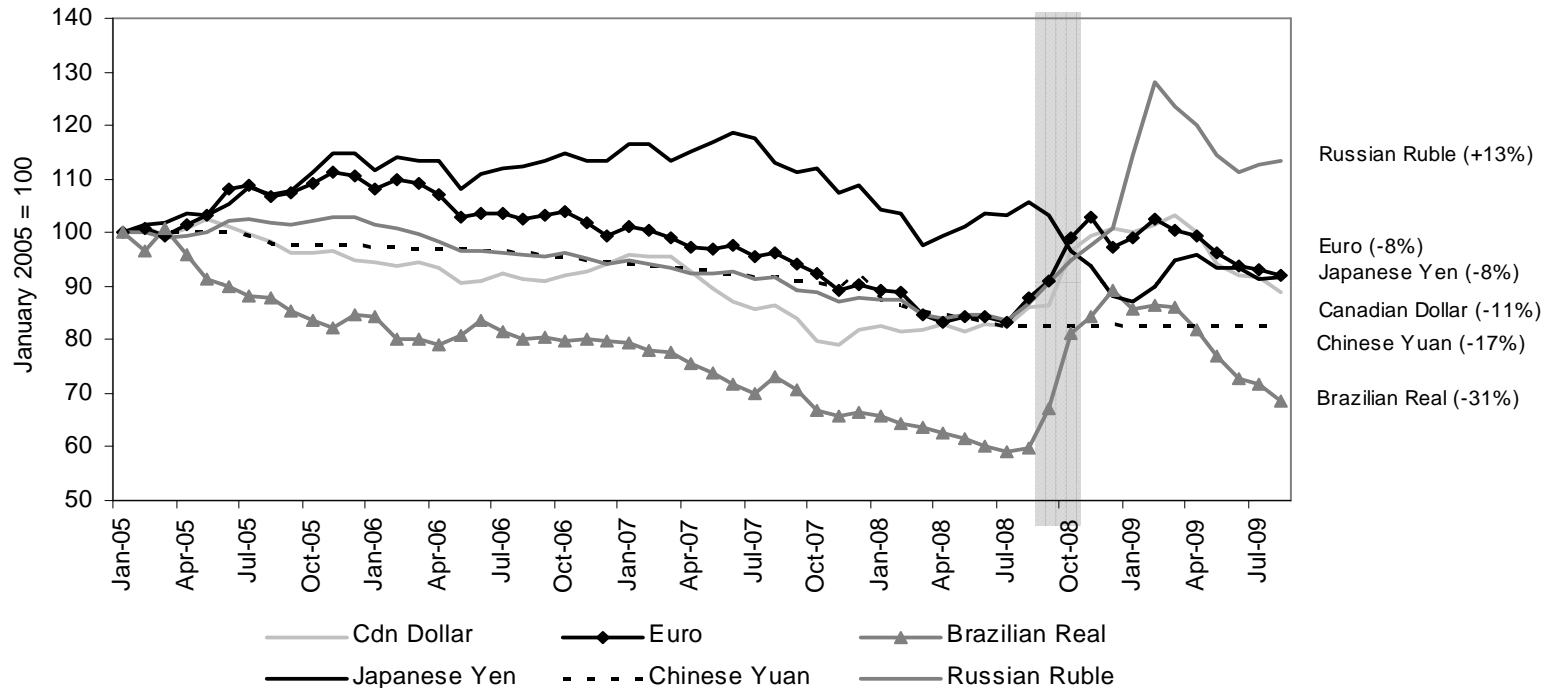
Source: Bloomberg and CIBC World Markets Inc.

- The stock market reflects the outlook for profitability, and it reacts quickly to new information.
- From the start of the crisis to the bottom, the overall market fell ~40%, the Timberland stocks fell ~55%, and the Paper & Solidwood manufacturing stocks fell ~75%.
- All three indexes bottomed in March, and have since reflected improving perceptions.
- With January 2005 = 100, the S&P is currently at 88, Timberlands Index at 83, and the P&FP Sub-Index at only 66.



The Current Chaos

World Currency Movements (Against the US\$)
January 2005 = 100



Source: Bloomberg and CIBC World Markets Inc.

- The lower the number, the weaker the US\$ against the foreign currency.
- In the early stages of the crisis (*see grey bar*), the US\$ strengthened rapidly...causing a sudden decline in the competitiveness of the U.S. forest industry.
- In most cases, this initial strength in the US\$ has been given up. Of the major forest country currencies, only the Russian Ruble is still far weaker.



The Current Chaos

- ❑ The Baltic Freight Index is interesting for 2 key reasons:

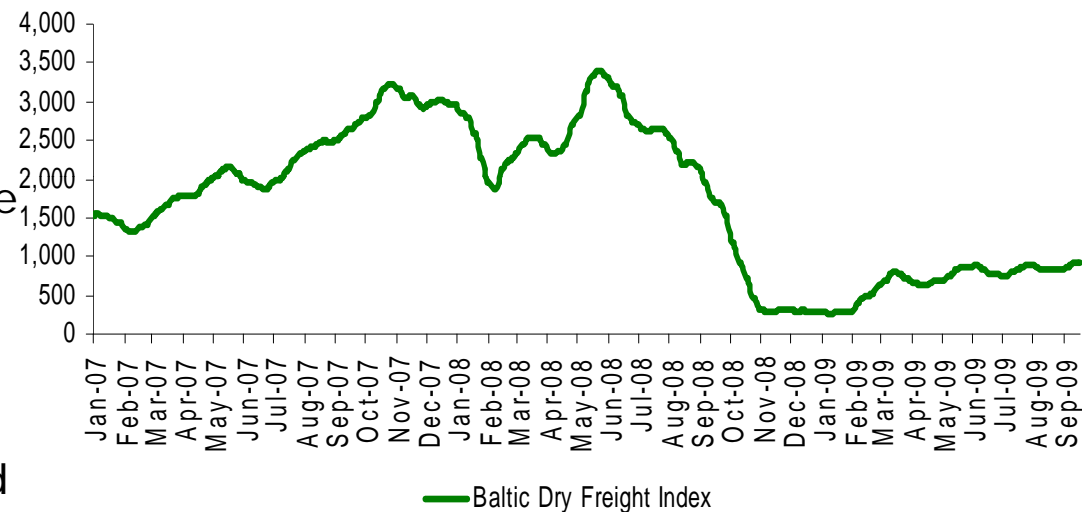
- ❑ Barometer of the state of international trade in commodities;
- ❑ Transport costs are typically 20%-30% of the total delivered cost of forest products.

- ❑ Due to the crisis, the Index fell through the floor reflecting declining trade and oil prices.

- ❑ Index down from ~3400 in May 2008 to ~600 in March 2009.

- ❑ Rebounded to 950 in Sept. 2009, but still less than 30% of peak.

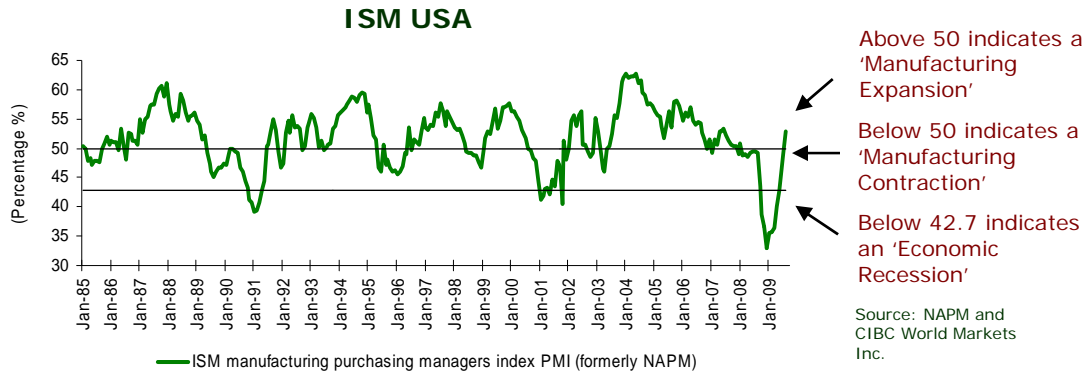
Baltic Dry Freight Index



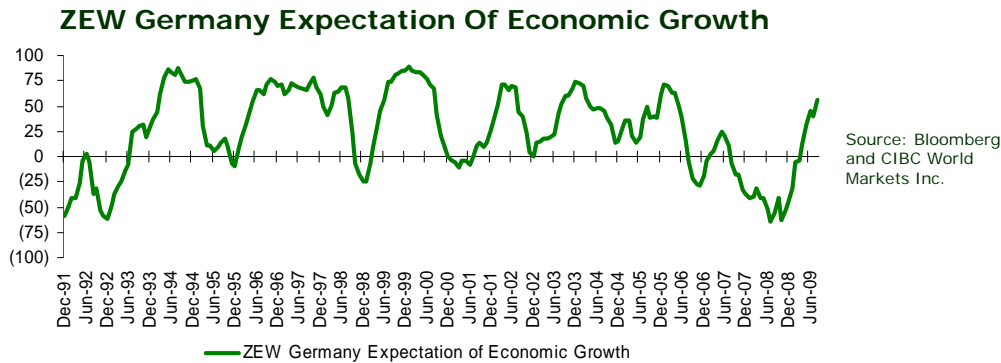
Source: Bloomberg and CIBC World Markets Inc.



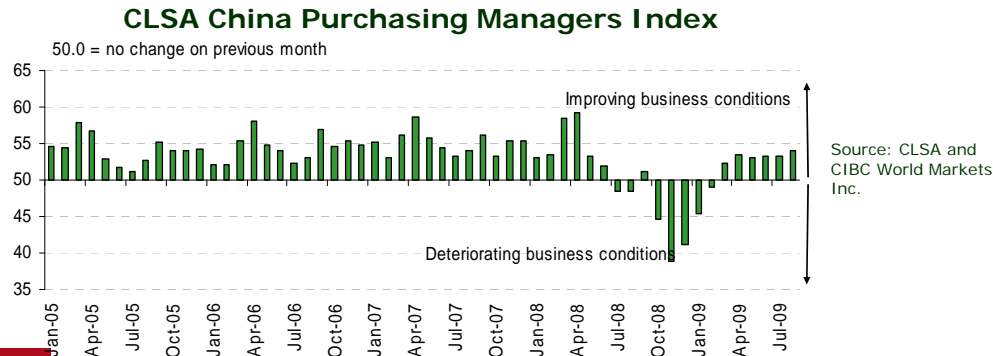
Macro Environment – Leading Indicators



- The ISM Purchasing Managers Index for the U.S. has strengthened to 52.9 in July. This was the highest level recorded since June 2007, and it appears poised to shift from a contracting indication to an expanding one.



- German investors confidence shot past a recent three-year high reached in June at 44.8, and currently stands at 56.1. However, recent reports of strong activity in Germany and France has not eased concerns that economic activity in the European Union may remain weak well into 2010.



- Statistics on China are a problem, but the CLSA PMI index is a good source of non-government macro data.
- The index came in at 54.0 in August 2009, and continues to point to improving economic conditions. The trough was observed in November 2008, when it bottomed at 38.8.



Macro Environment – Forecasts

GDP Forecasts

Global ¹	2006A	2007A	2008A	2009E	2010E
CIBC Economics	5.10	5.00	3.20	(1.50)	2.70
IMF	5.10	5.00	3.20	(1.30)	2.90
World Bank	5.10	5.00	3.20	(1.70)	2.80
Average	5.10	5.00	3.20	(1.50)	2.80

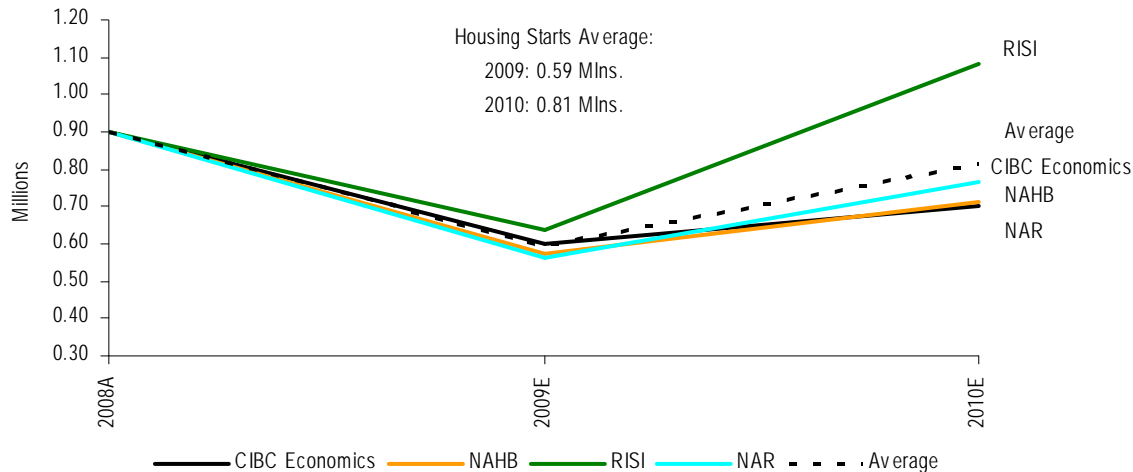
U.S.	2006A	2007A	2008A	2009E	2010E
CIBC Economics	2.67	2.14	0.44	(2.40)	1.50
IMF	2.67	2.14	0.44	(2.90)	0.80
RISI	2.67	2.14	0.44	(2.70)	2.10
World Bank	2.67	2.14	0.44	(3.00)	1.80
OECD	2.67	2.14	0.44	(2.80)	0.90
Average	2.67	2.14	0.44	(2.76)	1.42

(1) PPP Weights - 2000 dollars

Source: CIBC World Markets Inc., NAHB, RISI, NAR and WMM.

- GDP and housing starts are the two most important economic indicators for the forest products sector.
- At the global level, GDP is expected to fall in 2009, before recovering to about 2.8% in 2010.
- In the U.S., the trend is the same, but growth will be more muted.
- Housing starts are only expected to average 0.59 million in 2009. This is 72% below the peak of 2.07 million in 2005 and 35% below the level of 0.90 million in 2008.
- Consensus estimate for 2010 is 0.81 million.

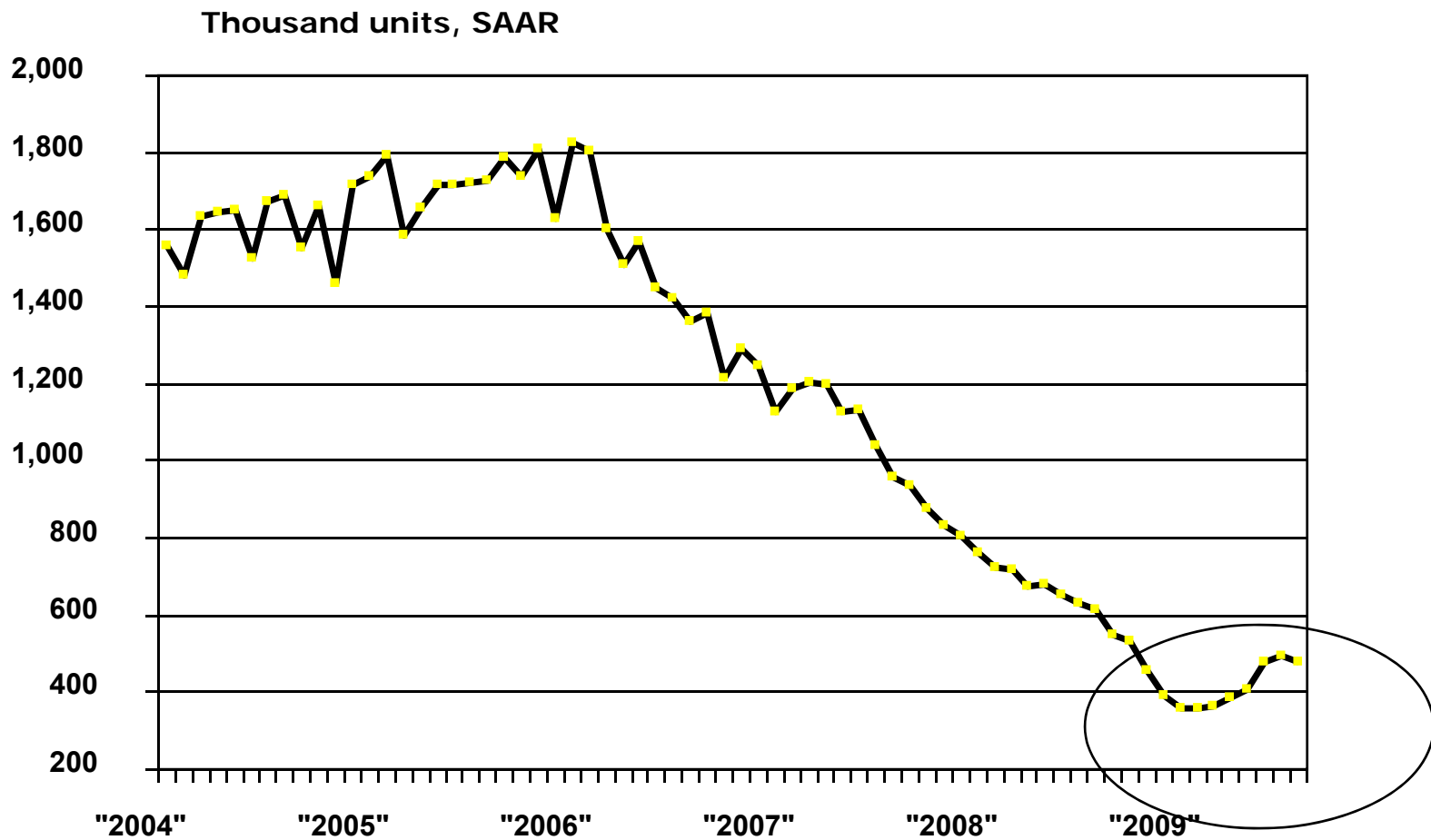
U.S. Housing Start Forecasts



Source: CIBC World Markets Inc., NAHB, RISI, and NAR.



Single Family Housing Starts have Stabilized but, they are still down 73% from the peak (Jan 2006)

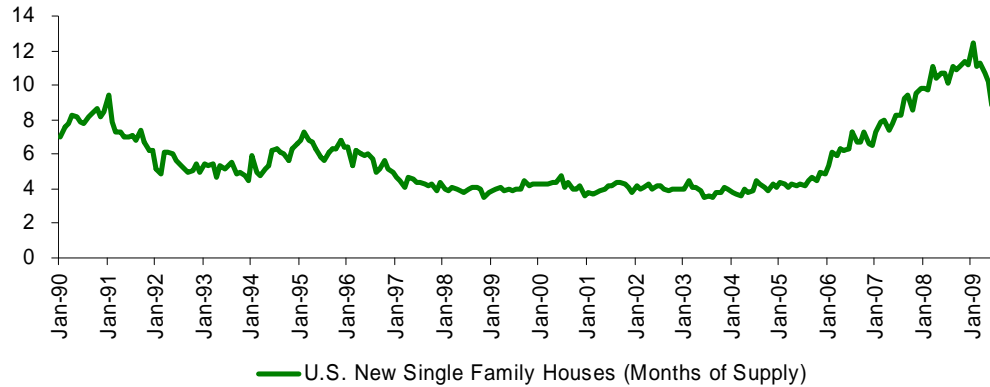


Source: Census



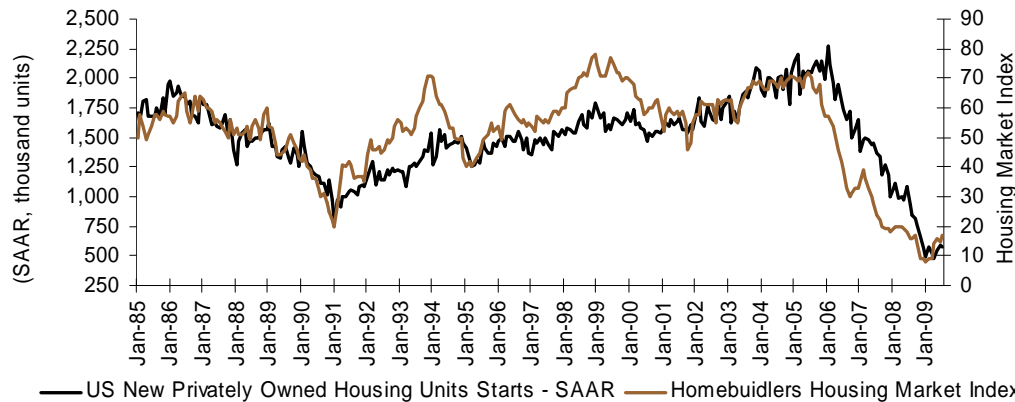
Wood Products Overview

U.S. New One Family Houses (Months Of Supply)



Source: Pulp & Paper Week and CIBC World Markets Inc.

Housing Starts Vs. NAHB "Builders' Confidence Index"



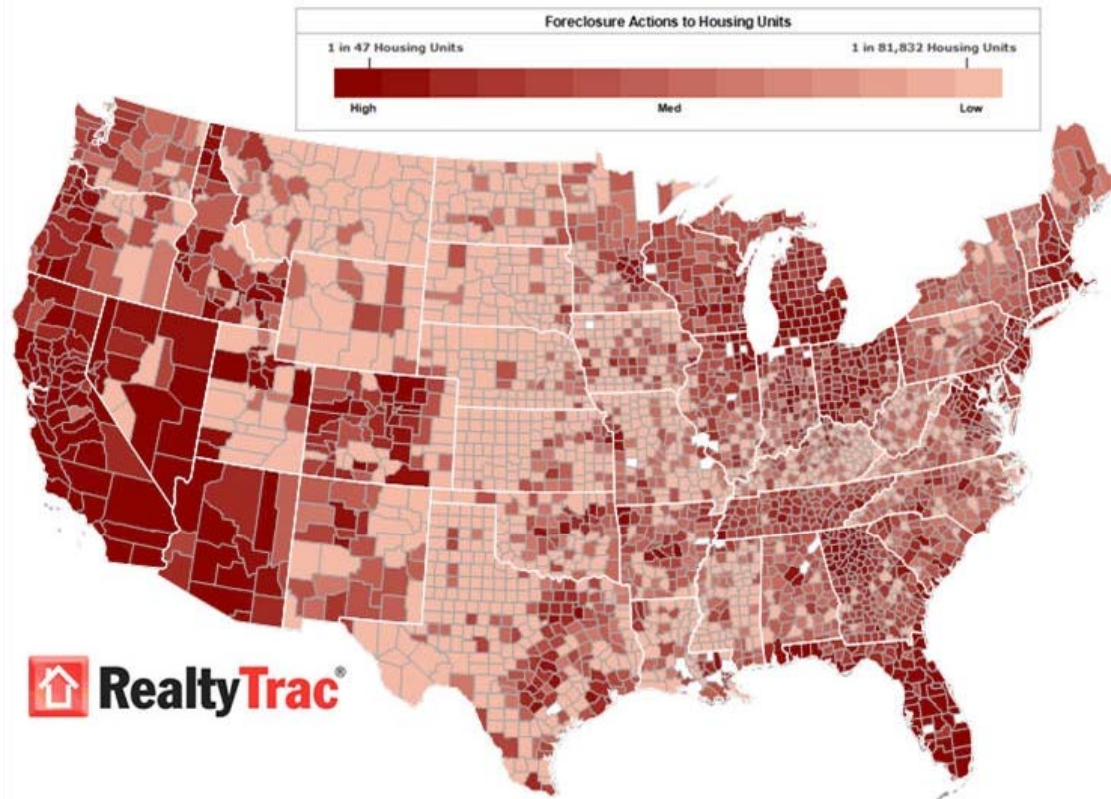
Source: Bloomberg and CIBC World Markets Inc.

- To get a sustainable rally in lumber prices, we think housing starts must move closer to 1 million units/year.
- Currently, there is still too much supply in the market, in the form of existing houses for sale – bankruptcies are only adding to the problem.
- Builders' sentiment currently stands at 19, up from its 32-year low in January 2009 of 8, but remains severely depressed (<50 means more builders view market conditions as poor rather than good).
- Lenders have made it more difficult for borrowers to qualify for mortgages and foreclosures remain an unwanted source of supply.



Wood Products Overview

U.S. Home Foreclosure Stats – August 2009



Source: RealtyTrac Inc. and CIBC World Markets Inc.

- While affordability levels have improved, a big part of the supply problem is the number of foreclosed homes entering the market.
- August 2009 statistics showed 358,000 properties were in some state of foreclosure. This is down 0.5% from the previous month, which marked a record level of U.S. foreclosure activity.
- This level represents about 60% of the number of new homes that entered the market during July.
- The darkest areas on the map indicate that one in every 47 houses were subject to foreclosure filings.



Chaos in the Housing Market

*Home prices have already come down substantially, and interest rates are low
~ affordability is the best in over 15 years*

However, going forward, the key problem facing the housing *markets is*
foreclosures ~ and they could delay a sustained US housing recovery until
2012

- Over the past two years, most of the default/foreclosure problems came from the Sub-Prime category

- Over the next 3-4 years we could well see more of the same due to the reset of two other categories of mortgages ~ ALT A and Adjustable ARMS
 - Sub-Prime mortgages were issued to people with *poor credit history/FICA scores < 600*)

 - ALT A and Adjustable ARMS were made to people with good credit history/FICA scores ~ *but with some interesting twists*



Chaos in the Housing Market

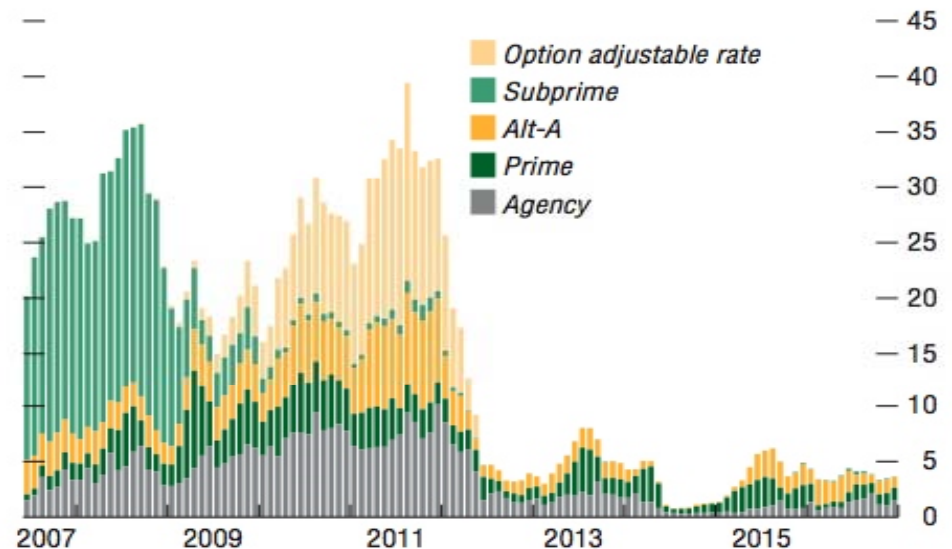
- ALT A refers to loans given to people who were not required to show or prove income or ability to pay off the loan.
- Adjustable/Option ARMs refers to home loans where the consumer gets a rate on the loan that starts out low and he/she can also choose how much they want to pay each month.
- These two categories are sometimes called “NINJA loans” ~ no income, no job, no assets.
- Over time, these loans “reset” ~ and this is where the problem begins...



Chaos in the Housing Market

- Sub-Prime totals about \$1 trillion; ALTA A \$1 trillion; and Option ARMS about \$600 million.
- Resets on most of the ALTA A and Option ARMS *are still ahead of us* (and even some more Sub-Primes to come).
- *Housing problems could continue well into 2012* if the current efforts fail to deal with the upcoming foreclosures stemming from resets to the ALT A and ARMS.

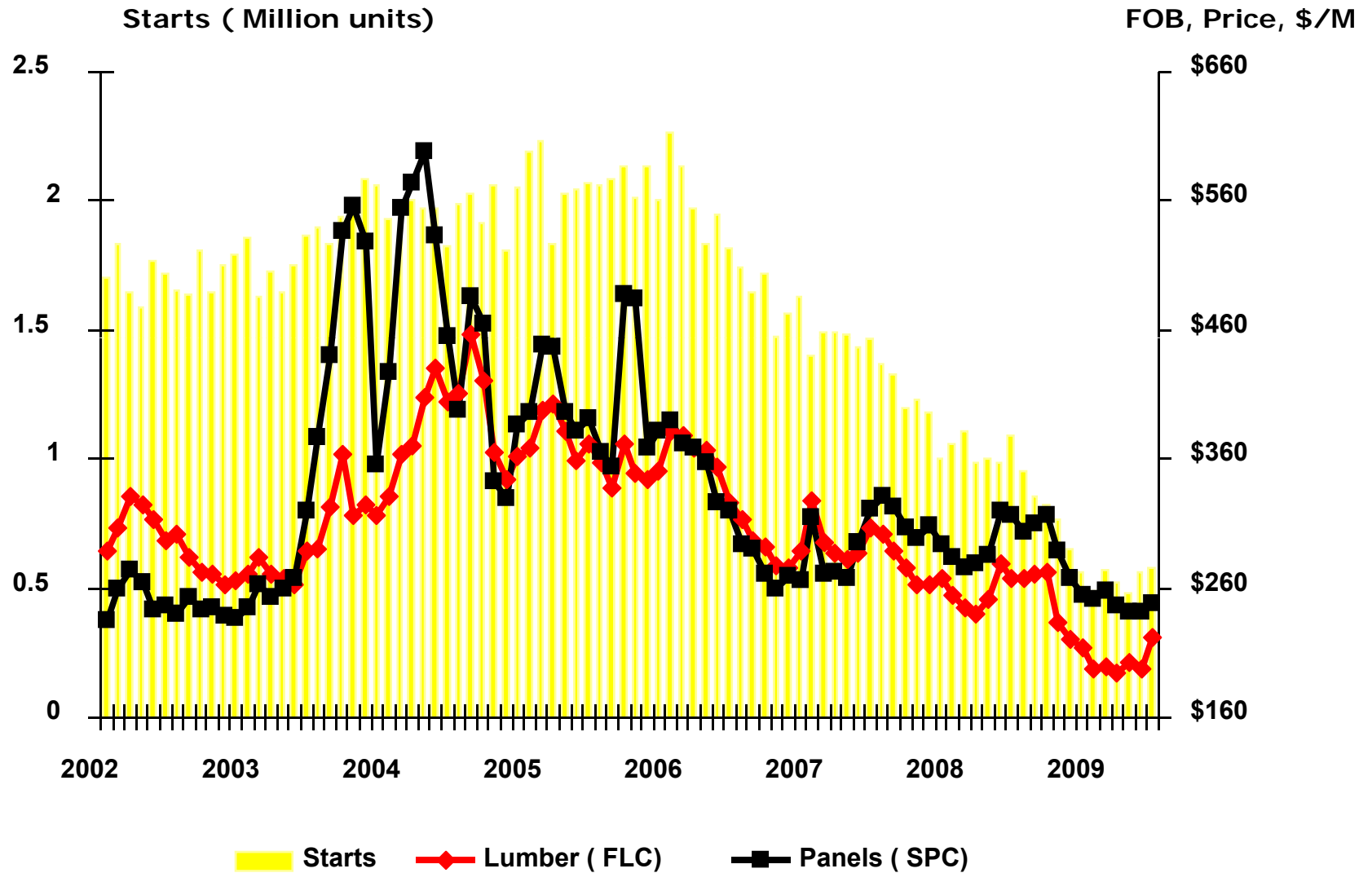
Figure 1.7. Monthly Mortgage Rate Resets
(First reset in billions of U.S. dollars)



Source: Credit Suisse.



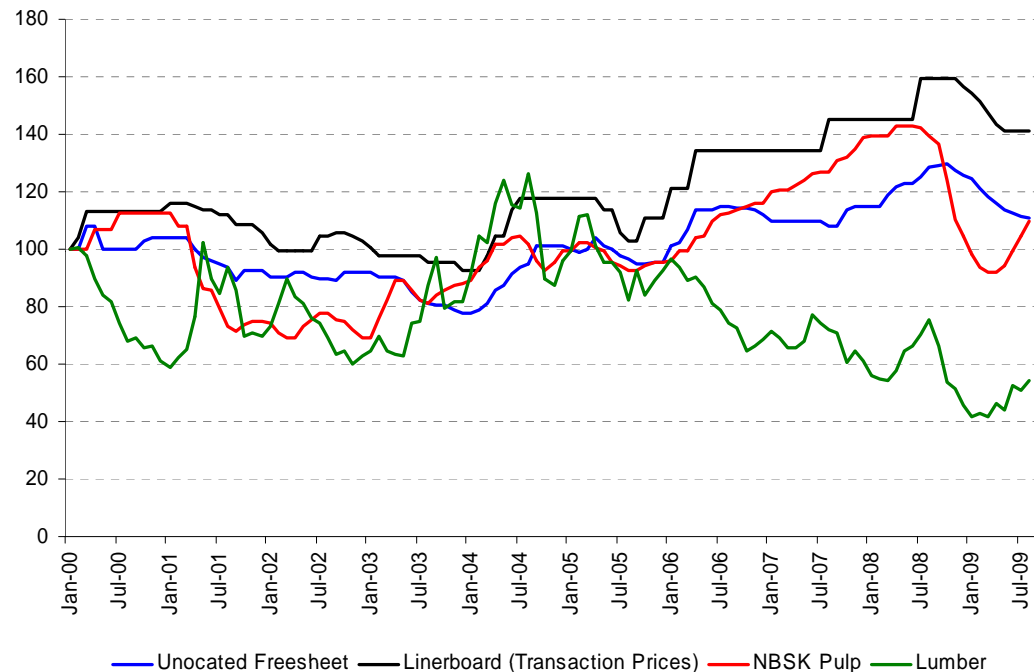
Lumber and Panel Prices Follow Housing Between 2005 – 2008: North American lumber production down 31% (23 BBF), prices down 31% ; structural panel production down 12.4 BSF, prices down 29%



Forest Product Commodity Prices

- Commodity prices in the forest industry have performed very unevenly, but all were impacted by the crisis
 - Lumber was already unsustainably low, and still bouncing along the bottom.
 - Pulp quickly went into free-fall, but then rebounded in March in response to inventory rebuilding in China (due to stimulus package)
 - Key paper grades have fallen from their peaks, but have likely now bottomed.

Commodity Prices (January 2000 = 100)



Source: RISI, Random Lengths and CIBC World Markets Inc.

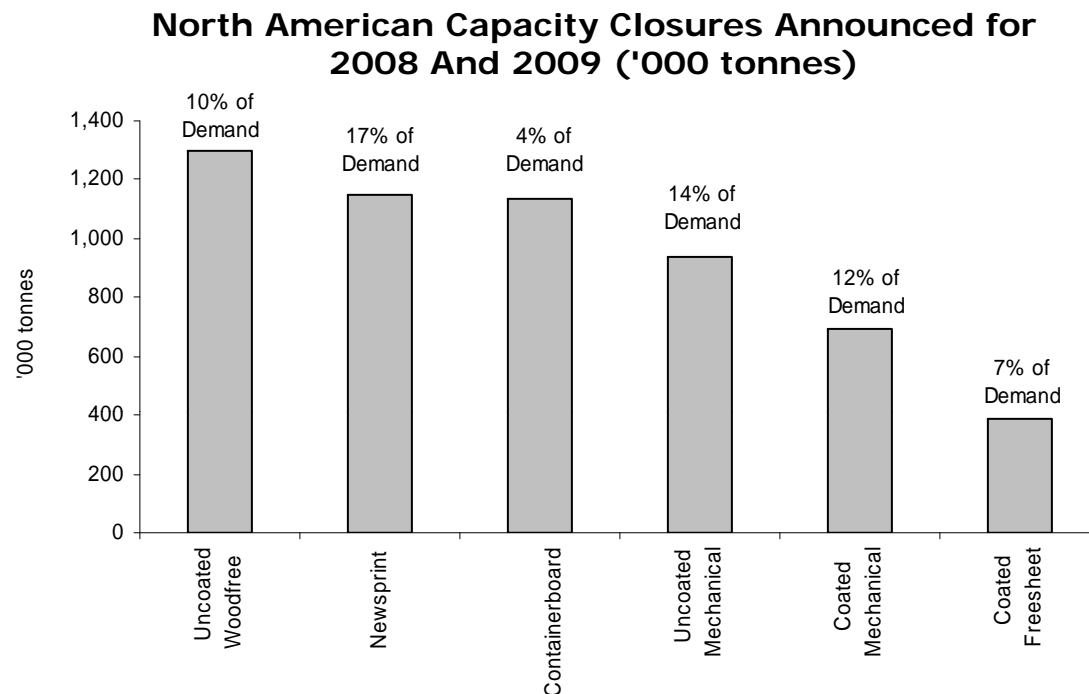


Paper Product Overview

- Since 2000, the growth in NA demand for paper & paperboard *has been anemic at best.*
- *From Jan 2001-July 2009, the CAGR of N. American demand has been:*
 - *-9% for newsprint*
 - *-4% for uncoated free sheet*
 - *-4% for coated groundwood*
 - *-4% for coated free sheet*
 - *-1% for uncoated groundwood.*
- *Cyclical contraction now reinforcing secular decline, with July 2008 - July 2009, N.A. demand down:*
 - *-9% for uncoated freesheet*
 - *12% for coated groundwood*
 - *20% for uncoated groundwood*
 - *23% for newsprint*
 - *25% for coated freesheet*
- *Fortunately, the secular growth in global paper demand is still positive ~2%.*



Paper Product Overview



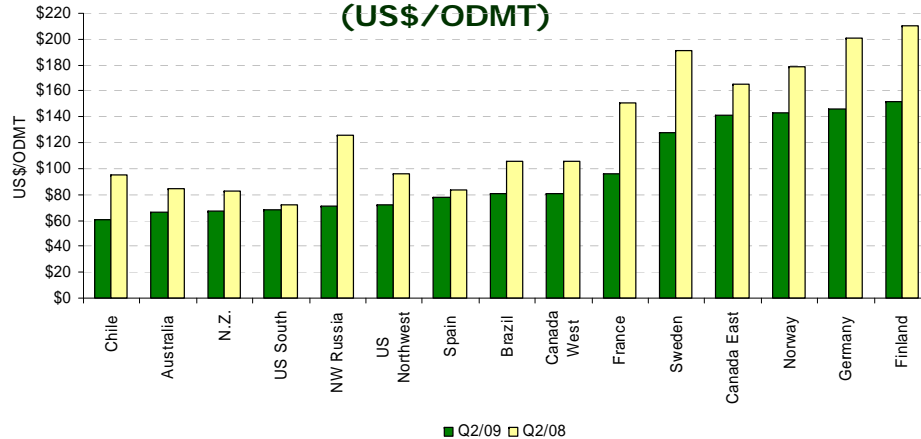
Source: RISI and CIBC World Markets Inc.

- The macro-economic showdown has triggered significant capacity reductions in the North American paper industry ~6.5 million tonnes in 2008/9 thus far.
- Capacity reductions range from the equivalent of 4% of demand for containerboard to 17% of demand for newsprint.
- The supply reductions have not been sufficient to maintain pricing in the short term.



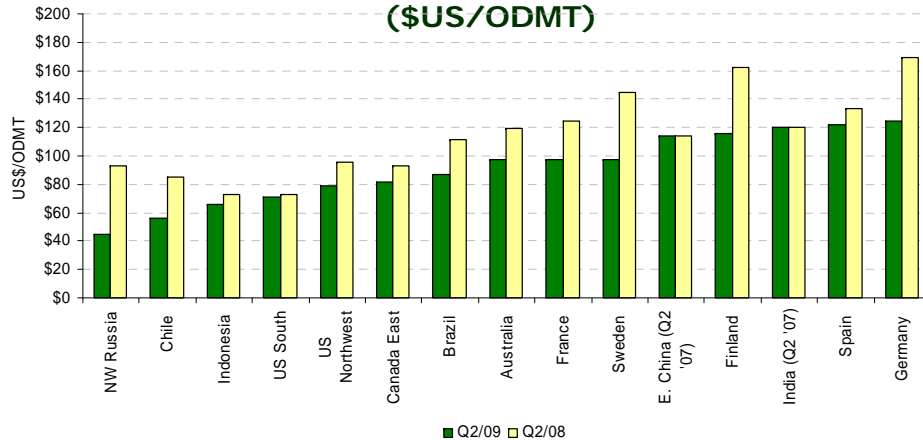
Global Pulp Wood Prices: Before and After the Crisis

**Average Delivered Softwood Pulp Log Prices, by Region
Q2/08 vs Q2/09
(US\$/ODMT)**



Source: Wood Resources International, Bloomberg and CIBC World Markets Inc.

**Average Delivered Hardwood Log Prices, by Region
Q2/08 vs Q2/09
(\$US/ODMT)**



Source: Wood Resources International, Bloomberg and CIBC World Markets Inc.

Wood fibre is the dominant and one of the most volatile cost components in the forest industry.

US South remains among the lowest cost regions of the world; and the competitive position of the Pacific Northwest has improved during the crisis.

For softwoods, Northern Europe and Eastern Canada are the highest cost regions in the world – both before and after the crisis.

The biggest reductions have been in NW Russia ~50% decline.

The crisis has caused the global cost curve for pulp wood to fall, and flatten. The relative importance of log prices in driving competitiveness has declined – other costs and general hosting conditions have increased in relative importance.



Looking Out From The Chaos



Looking Out From The Chaos

The financial crisis is causing mayhem throughout the global industry.....but it also may have a “silver-lining” for N. American producers:

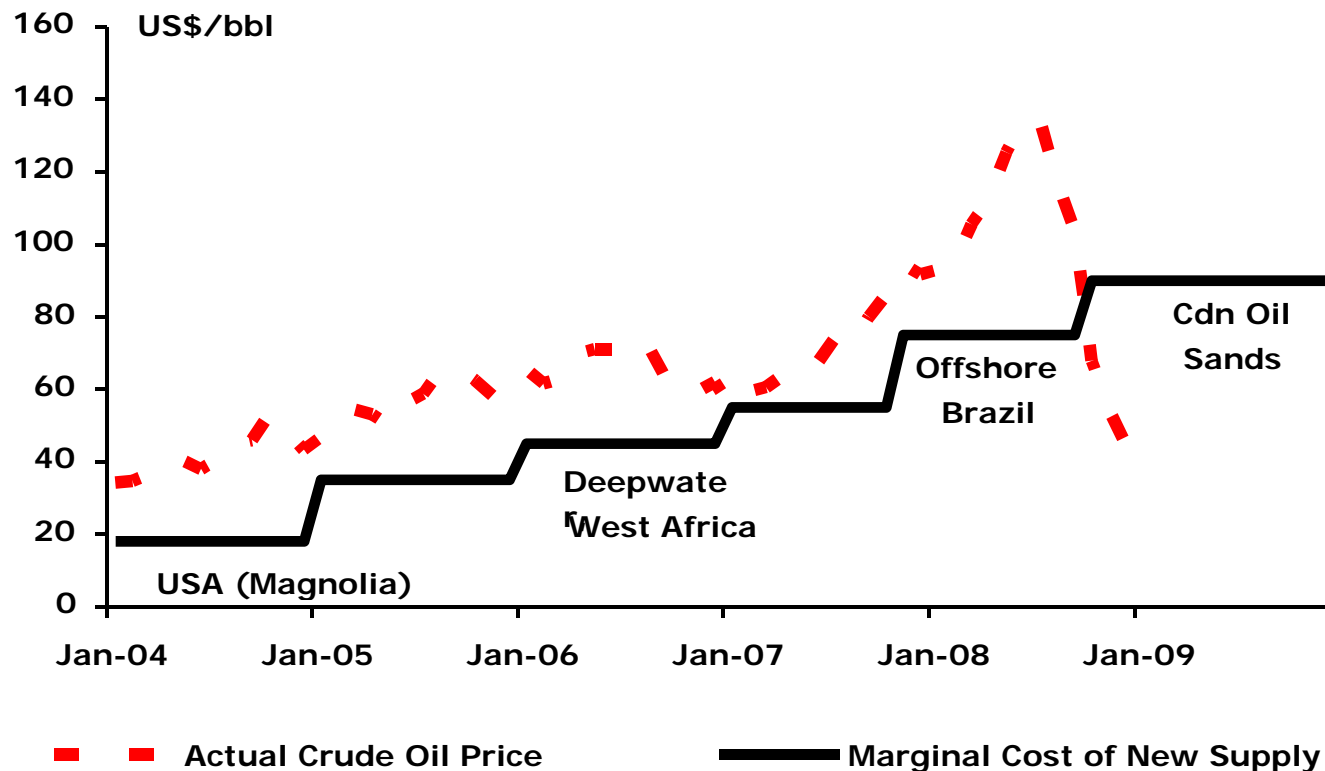
- Caused capacity expansions in S. America to slow dramatically;
- Added fury to the “*Perfect Storm*” that has moved onto Europe after hitting Canada;
- Exposed the “weak-underbelly” of the Russian oligarchs
- Revealed that the Chinese industry is much more dependent on direct (& indirect) export markets than thought;

Implication? Future off-shore competition may be less than we had thought – at least for awhile. *Markets will be tighter when the recovery does eventually come due to reduced capacity.*



Looking Out From The Chaos

Don't confuse the cyclical with the secular move in oil prices.
And ~ Given the shape of the global cost curve for oil ~ a "normalized" oil price in the \$60-80/bbl range seems reasonable



Source: CIBC World Markets Inc. Economics & Strategy



Looking Out From The Chaos

- **Strong signals that the Obama Administration *will put a price on carbon***
 - **Cap-and-trade system for NA *within 2 years?***
 - **Support for international measures at Copenhagen meetings in December 2009?**
- **Solid wood sector is a net winner, but its unclear for pulp & paper.**



PART 2:

Implications of the Current Financial Turmoil for the Bio-energy Sector.

- What has changed?
- ..and what has not?



What Drives Investment in Bio-Energy?

Four key variables shape the economics of investing in alternative energy:

- 1. The price of fossil fuels (the main substitute)**
- 2. The conversion technology**
- 3. The cost of the feedstock (50%-80% of the variable cost)**
- 4. Regulations (which stimulate demand)**

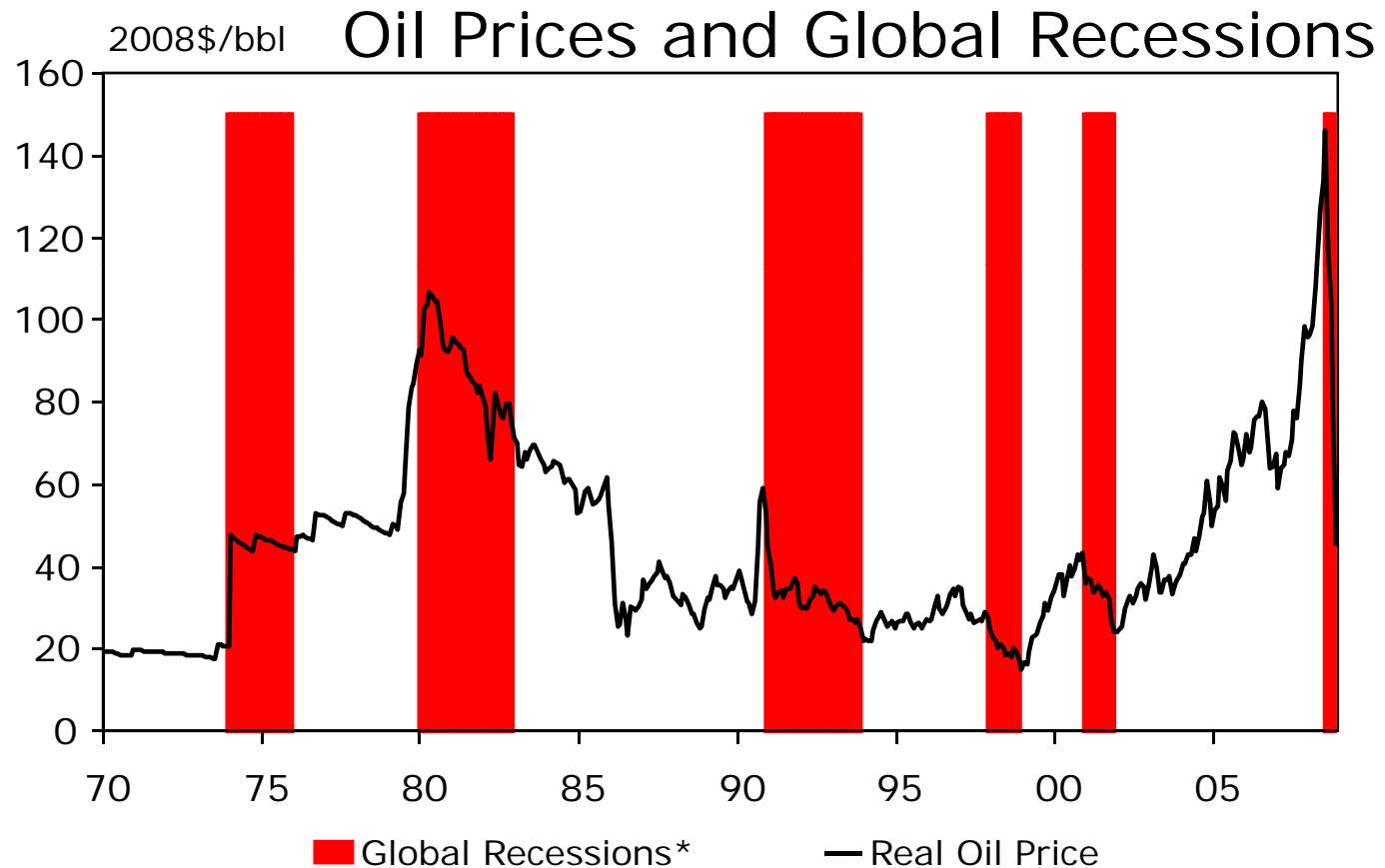
At present, all four of these variables are in a state of flux.



Bioenergy Drivers

Beware of what you hope for – especially if you are a bioenergy producer.

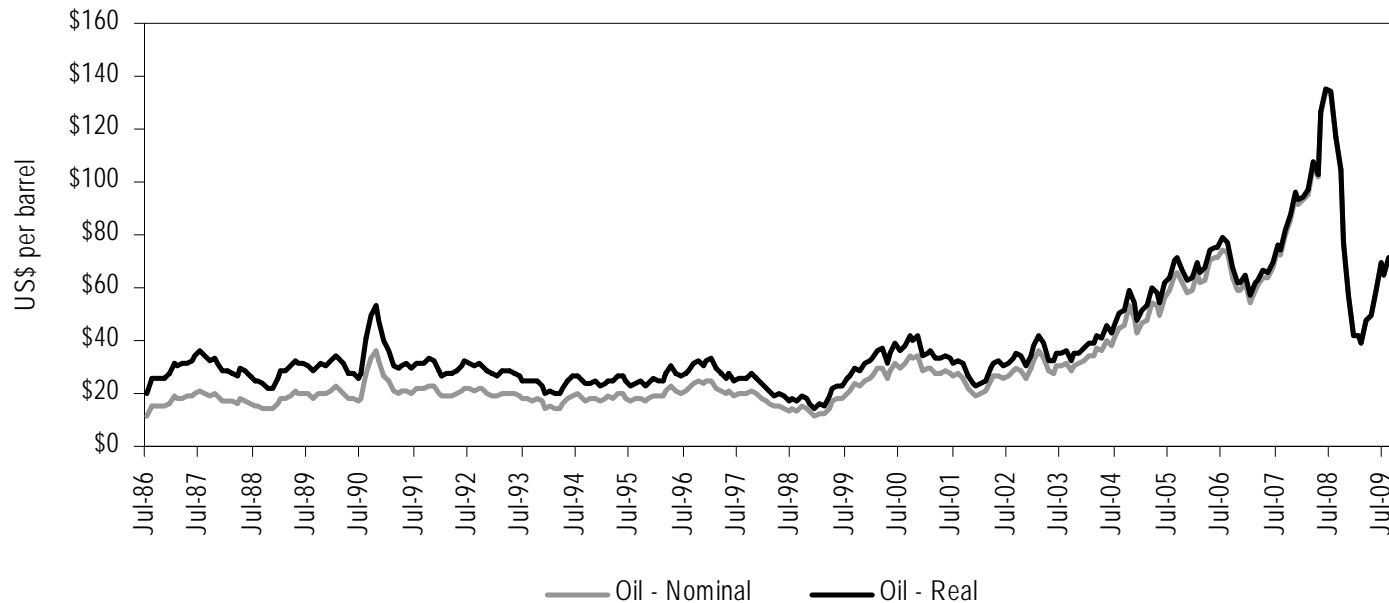
Oil Price Spikes *Preceded* 4 Out of Last 5 Global Recessions.



Source: CIBC World Markets Inc. Economics & Strategy



Historical Oil Prices

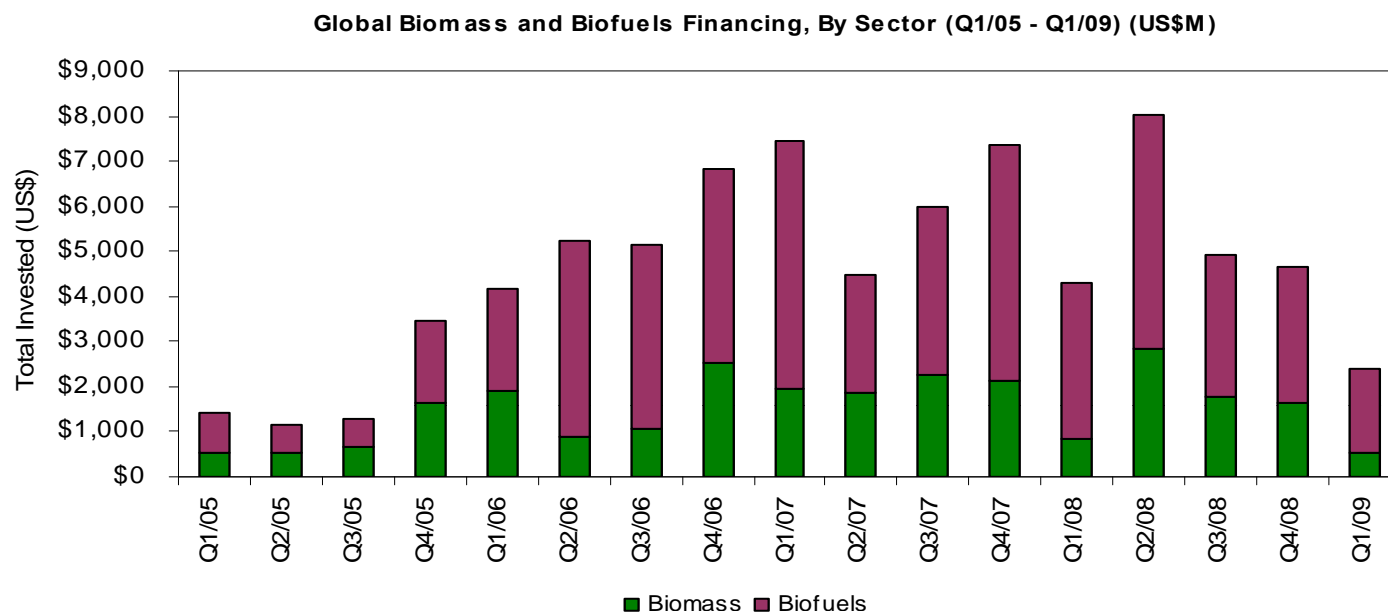


Source: Bloomberg and CIBC World Markets Inc.

- **Oil prices have also been a major casualty of the crisis due to decreases in actual (and expected) demand.**
- **But global energy demand is still expected to grow at a CAGR of ~2%, implying a doubling in consumption in ~30 years.**
- **Does anyone think the supply of oil will double? Do not confuse the cyclical vs. secular stories. Prices have already partly rebounded.**



Global Bio-energy Investment



Source: New Energy Finance and CIBC World Markets Inc.

Over \$20 billion was invested in the global bio-energy sector in 2008 - despite a fall off in the second half. Bulk in biofuels as opposed to biomass-based (i.e., liquid vs solid and gas form).

The crisis has had a major impact – investment down ~75% in Q1/09 from the peak in Q2/08.

It peaked in Q4/07, and was primarily focused on corn-based ethanol.

Going forward, we expect a recovery in 2010/11, with a focus biomass-based and cellulosic ethanol.



Convergence Of The Markets For Fuel, Food And Fiber

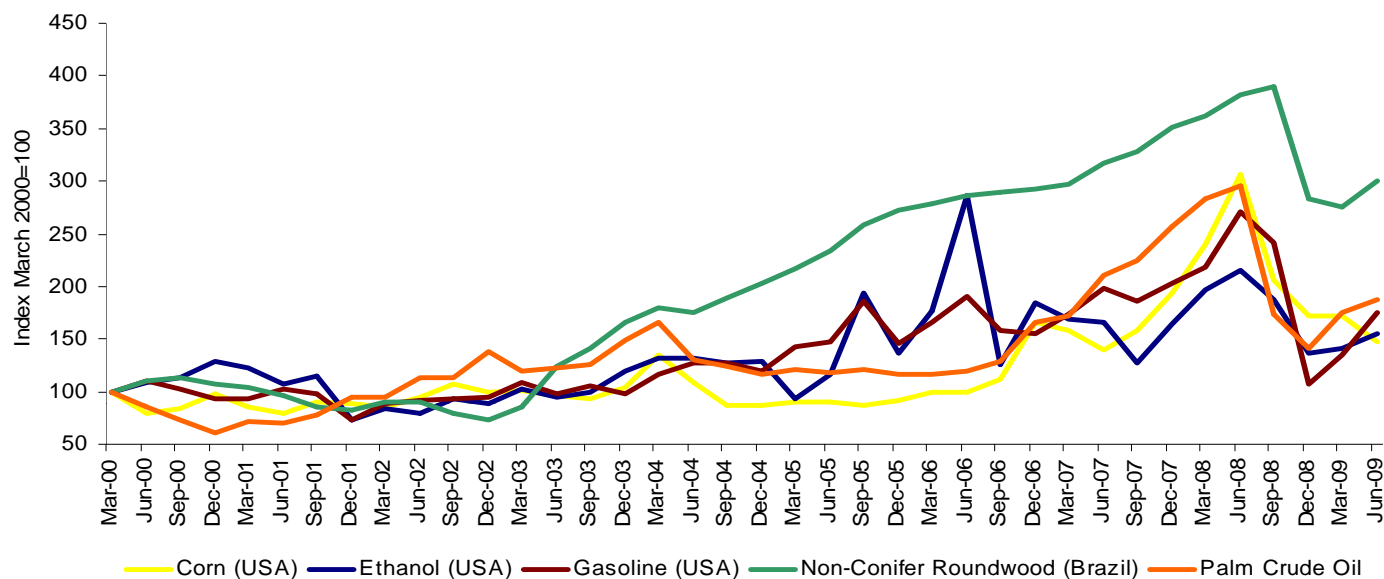
A key driver of the bio-economy.

Convergence of these three markets is occurring for a range of reasons, but all related to security (and driven by anxiety):

- **Environmental Security: i.e., combat climate change**
- **Economic Security: i.e., protection against the rising real price of oil**
- **National Security: i.e., diversification of energy supply**
- **Food Security: i.e., access to food at reasonable prices**
- **Political Security: i.e., secure political support at local level by rural development**



Biofuel & Feedstock Prices: Q1/2000-Q2/2009



Source: Bloomberg, WRI and CIBC World Markets Inc.

- **Convergence of the “3F” markets in the sense that the feedstocks will trade on the basis of their energy equivalency.**
- **The price of oil is expected to become a support price for cereals, oilseeds and lower-quality wood.**
- **Prices of all of the major feedstocks rose significantly, especially from 2006 to Q2/08 – outpaced gasoline & ethanol.**
- **The financial crisis caused all of the biofuel and feedstock prices to fall, and now they are starting to rebound. This is consistent with the convergence thesis.**



The Public Policies

What role is public policy playing in driving the bio-energy sector and the convergence of the markets for fuel, food & fiber?

Consider a whirlwind global tour of bio-energy policies:

- **United States**
- **China**
- **European Union**



United States

- **Renewable Fuel Standard in the Energy Bill requires 36 bln. gallons of renewable fuels by 2022, including 21 bln. gallons of “advanced” (non-corn starch) biofuels.**
- **Given the announced projects to date, the U.S. is off to a slow start in meeting its interim targets – partly due to the recession.**
- **More than 65 major new wood energy projects identified, with the bulk being cogen, wood pellet, and then cellulosic ethanol.**
- **Wood energy projects could consume 50 million tons/year of wood by 2012 and 70 million tons/year-200 million tons/year by 2020.**



United States

- **President-Elect Obama has committed to make Health Care and Clean Energy his top priorities.**
- **During the campaign he pledged to invest \$150 billion in the Clean Energy Sector over 10 years to create 5 million “green collar jobs”. However, he will find himself handcuffed by challenging economic times and a massive federal deficit.**
- **Key legislation on the agenda:**
 - **National Renewable Portfolio Standard;**
 - **Carbon cap-and-trade scheme (but with relatively weaker requirements and lower targets than many desire.)**
- **Climate change rarely mentioned during Campaign '08, but politicians in both parties regard the Clean Energy Sector as an economic development driver and key for energy independence.**



United States

The American Recovery and Reinvestment Act

Key new measures applicable to bioenergy projects include:

- **The Dept of Treasury's temporary new grant program, intended to spur renewable project growth by offering developers cash in lieu of tax credits.**
- **Committed to issuing funds representing 30% of a project's qualifying capital costs within 60 days of that project's commissioning**
- **Some State governments (e.g., Oregon) are topping the grant up to 65% of the capital cost.**



United States

On May 8, 2009 President Obama directed the USDA to expedite and increase the production of bioenergy within 30 days.

Five key measures were announced on June 8, but the most significant is the launch of the Biomass Crop Assistance Program.

- **Compensation for the collection, harvest, storage and transportation of biomass.**
- **Biomass must be used for heat, power, bio-based products or biofuels.**
- **Matching payments will be made up to \$45/ton**
- **Material providers will be eligible for up to two years of payments.**

Details are still being finalized.

Once a subsidy is given, it is very difficult to take away.



China

- **Ambitious target for renewables to account for 10% of all energy consumption by 2010 and 15% by 2020.**
- **Biomass power targeted to grow from 2 GW in 2006 to 5.5 GW in 2010 and 30 GW by 2020 – largely with ag waste.**
- **Need to build more than 1,000 biomass plants rated at 25 MW-30 MW by 2020 (~6/month).**
- **Most facilities are direct combustion plants, but China Holdings is securing approvals to build five 100 MW pyrolysis/gasification plants.**
- **Huge logistical challenge collecting 150,000 tpy-200,000 tpy of bulky straw from thousands of small 0.15 ha farms to fuel a 25 MW biomass power plant.**



China

- **State Forestry Administration targeting to develop 13.3 million ha of forests to produce feedstock for biofuel production and power – must compete with industrial wood and environmental demand.**
- **In 2007 the National Development and Reform Commission (NDRC) identified national wood pellet targets rising from 2 million tpy in 2010 to 50 million tpy in 2020**
 - **In early 2009, NDRC's Centre for Renewable Energy Development indicated that China's biomass feedstock resource is about 60%-70% less than the official numbers initially published.**
 - **Realistic target likely closer to 35 million tpy by 2020.**



European Union

- **The EU-25 has agreed on a binding target to reach a 20% share of renewable energy source in total energy consumption by 2020 (currently ~7%):**
 - **~2/3 of the renewable energy is expected to come from biomass.**
 - **If enforced, Pöyry/McKinsey study forecasts a 200 million m³/year-260 million m³/year wood deficit in Europe in 2020. (Canada currently harvests ~200 million m³/year)**
 - **More recent ECE/FAO study forecasts a wood deficit of 320 million m³/year-450 million m³/year to meet both the energy objective and support a growing wood-based industry.**
 - **If the target is enforced, expect meaningful upward pressure on global wood/biomass prices.**

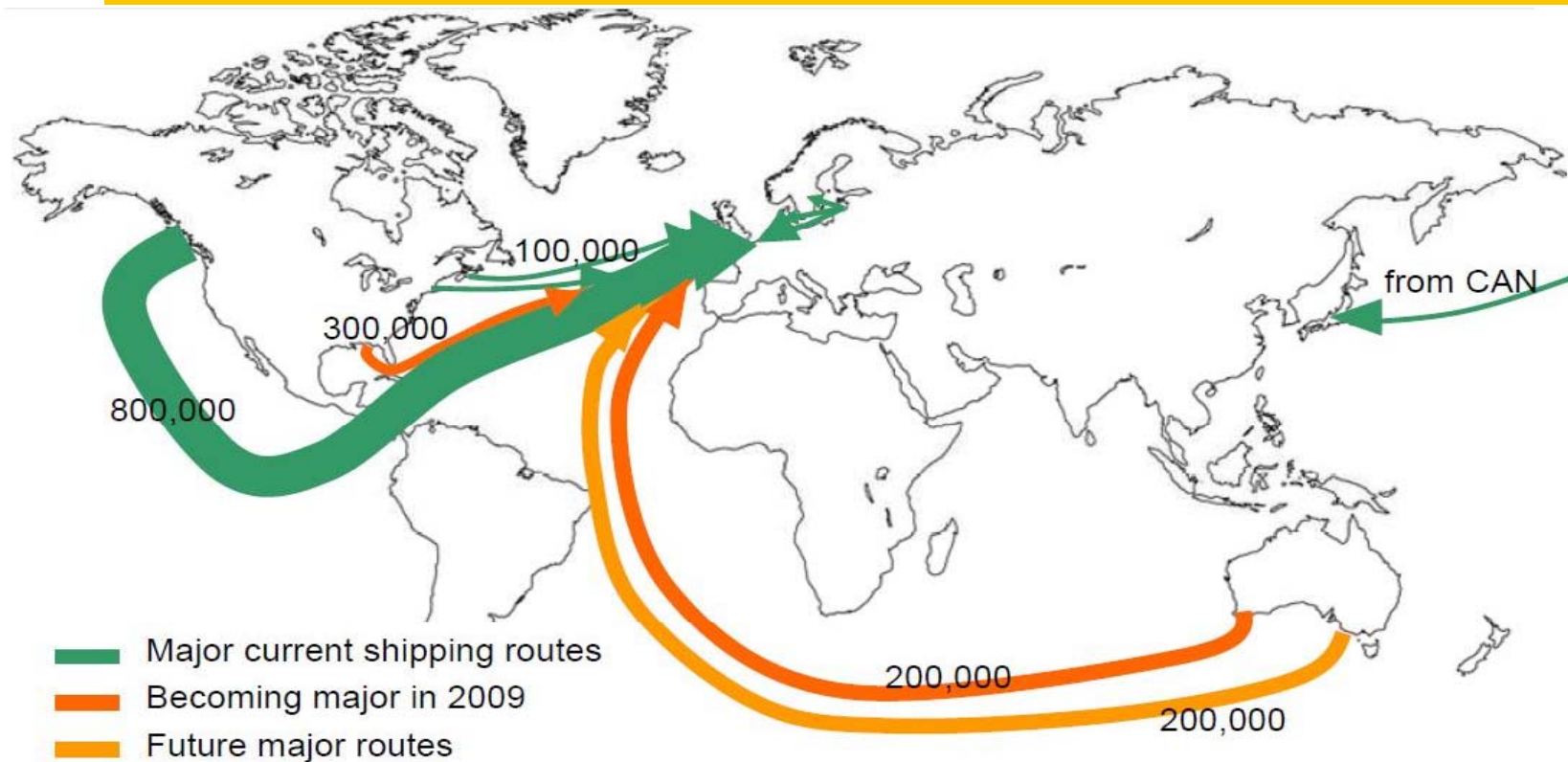


United Kingdom

- **GHG emission reduction targets in the UK are amongst the most aggressive in Europe.**
- **By 2020,**
 - **Renewable energy's share to 15% from ~1% in 2006**
 - **Electricity from renewables to 35% from ~5% in 2007 (if draft target confirmed)**
- **Twelve projects are already under various stages of development, with the capacity to generate 2.7 GW of biomass energy.**
 - **Equates to ~12 million ODMT of wood pellets, or 20 million tpy of green wood chips.**
 - **Equivalent wood requirements of 4 world-scale pulp mills.**



Global Wood Pellet Trade (Tonnes)



Source: New Energy Finance and CIBC World Markets Inc.

Wood pellets are the fastest growing source of bio-energy in the world, and the market is being driven by European regulations.

Europe sources the bulk of its wood pellets from Canada, but Australia and the U.S. will soon become important sources as well.

Three potential sources which we think are underestimated are Brazil, Russia and West Africa.



Shifts In Land-Use

A secular rise in fuel, food and fiber prices will trigger changes in land-use patterns.

Historically, land kept under forests for two main reasons:

- 1. Owners want the production of some non-market good or service.**
- 2. The land can't make it in agriculture.**

Convergence is expected to have the largest impact in the southern hemisphere since they enjoy higher crop yields and have lower land and labor costs.

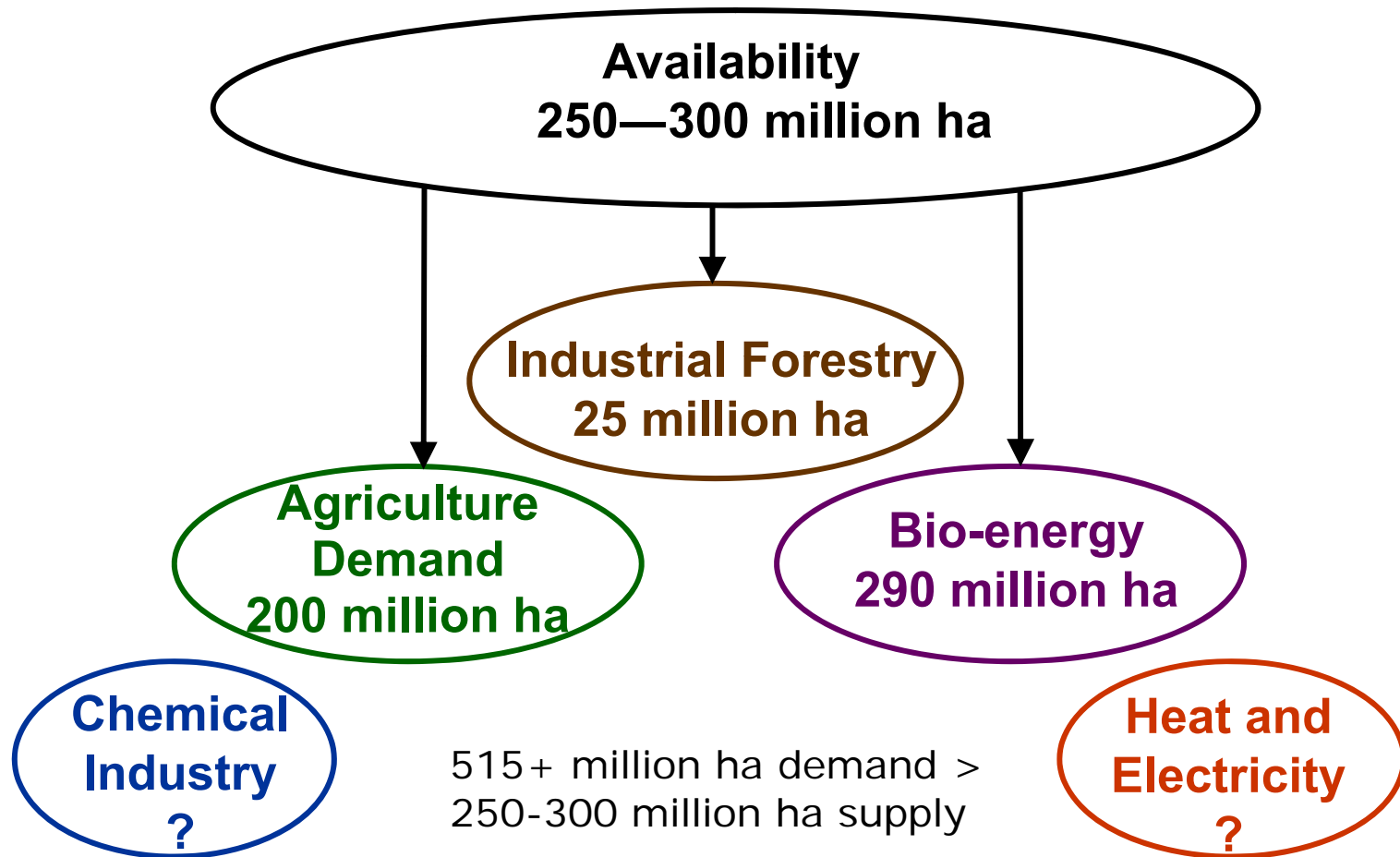


Shifts In Land-Use

- **We think some of the best forest land will be under pressure for conversion to either food or bio-energy crops – especially in the tropics.**
- **Expect greater land-use conflicts in many regions due to rising demand relative to potential supply.**



Where Is The Land Coming From — 2030? How To Balance The Demand?



Source: S. Nilsson, IIASA.



Implications of Convergence

So What?

What are the key:

- **Organizational Implications?**
 - **Policy Implications?**
 - **Analytical Implications?**
 - **Investment Implications?**
-
- **Today, we only have time to explore the first two.**



Organizational Implications

Need to break out of our sectoral silos

- **At HQ, develop more “virtual” teams that cut across sectors.**
- **For forestry organizations (provided the big picture themes are understood and communicated), move the decision making closer to the land-base.**



Organizational Implications

To deal with these challenges, companies are having to realign the supply chain & play to their relative strengths.

Need for strategic alliances across sectors.....

.....further driving the convergence between the markets for food, fuel and fiber.



Organizational Implications

Strategic Alliances:

“Upstream” & Feedstock Companies

We have identified more than 20 such alliances. For example:

- Chevron/Weyerhaeuser for transportation fuels**
- Neste Oil/Stora Enso for Fisher-Tropsch fuels**
- Preem Petroleum/Sodra & Sveaskog for Fisher-Tropsch fuels**
- Andritz (Carbona)/UPM-Kymmene for Fisher-Tropsch fuels**



Organizational Implications

Case Study:

Catchlight Energy - Weyerhaeuser & Chevron JV

- Formed in February 2008, with a focus on liquid transport fuels.
- Chevron provides expertise in molecular conversion, product engineering and fuel distribution.
- Weyerhaeuser provides land, expertise in resource management, and ability to provide feedstock at scale.
- Feedstock strategy:
 - Inter-cropping: strips of S.Y. Pine & perennial grass
 - Grass must not hurt quantity/quality of S.Y. Pine
 - Grass harvested annually for 9 years before replanting
 - Grass production of 10-20 BDMT/acre/year

Weyerhaeuser – “*the Tree Growing Company*” - is not initially thinking about trees for bioenergy!



Organizational Implications

Case Study: UOP/Ensyn JV

- Formed in Q4/2008 with a focus on “drop-in” transport fuels
- UOP
 - Owned by Honeywell
 - Leading supplier & licensor of process technology, catalysts, absorbents, process plants and technical services to the petroleum refining, petrochemical & gas processing industries
 - UOP technology furnishes 60% of the world’s gasoline, 85% of the world’s biodegradable detergents & 60% of the world’s para-xylene
 - Strong relationships with leading refining and petrochemical customers worldwide
- Ensyn
 - Most experienced producer of pyrolysis oil in the world
 - Seven commercial plants in U.S. & Canada (max. 100 BDMT/day, but about to announce 400 BDMT/day)
 - Operating since 1990



Organizational Implications

UOP/Ensyn JV (cont.)

- **“Drop-in” transport fuel means the stabilized pyrolysis oil (bio-crude) can be upgraded and then processed in conventional refineries, moved over conventional pipelines and delivered to customers without blending with non-renewable resources.**
- **Build series of 3,000 BDMT/day plants, which feed into existing refineries (hub & spoke model).**
 - **Scale of plant achieved**
 - **Address decentralized nature of feedstock**
 - **Cost-effective movement of the energy & chemicals in biomass**

Feedstock strategy:

- **Mixed woods and corn stover**
- **Expect to be commercial within three years**



Policy Implications

It depends –

Are you a “Focused Fixer” or a “Paradigm Shifter”?



Policy Implications

If you are a “Paradigm Shifter”, likely emphasize:

- Need for dramatic reductions in consumption levels and changes in in consumption patterns among the wealthiest 10% of humanity (and altered expectations among most of the remaining populace).
- Need to convince voters that the world has gone down the wrong path, and that we have to go back.

Does demanding such fundamental change divert attention from practical solutions?

Is this possible, at least without a major crisis first?



Policy Implications

If you are a “Focused Fixer”, likely emphasize:

- Bio-engineering, especially to increase productivity and “robustness”
- Develop the bio-refinery concept, and exploit nanotechnology
- Agro–forestry–energy interface
- Pasture improvements
- Yield gaps between private and public lands

Given the complexity of the issues, worth actively supporting the development of formal markets to address as many of the historical externalities as possible (e.g., water, carbon, bio-diversity, etc).



Policy Implications

At the global level, there is a clear trend toward the devolution of forest management authority – it is becoming less centralized. This is responding to the need to put the decision making closer to the land base.

More than ¾'s of developing countries are now undergoing decentralization and devolution processes associated with their forest tenure shifting public authority from central to local government bodies and from government to the private sector and civil society

Over the past decade, the area of forest over which community control is legally recognized has doubled.

Communities now legally own or administer at least 380 million ha of forest, mostly in developing countries.

In the last 2 years alone, new tenure policies or legislation have been adopted in Brazil, Bolivia, China, Indonesia, India and Russia.



Policy Implications

How can we structure the tenure arrangements so that:

1. The right fiber goes to the right mill?
2. Facilitates the cost efficient collection of biomass?

At the same time, the tenure system should be sufficiently flexible in accommodating new technologies (and players) who may be more efficient – the bioenergy field is very dynamic.



Policy Implications

Two key guidelines for public policy re bio-energy markets:

- 1) In terms of strict energy efficiency, it is best to use biomass in heat and electricity production than for biofuels.**
 - Conversion losses of 10–20% for H&E;
 - Conversion losses of 30-65% for biofuels.

- 2) When allocating public wood, note the differences in economic multipliers:**
 - For 1 m³ of wood, relative to BioEnergy, Pulp & Paper generates (based on European data):
 - 8x more GDP;
 - 13x more Employment.



Policy Implications

When assessing the impact of renewable energy policies, remember that biomass is not the only source of clean fuel.

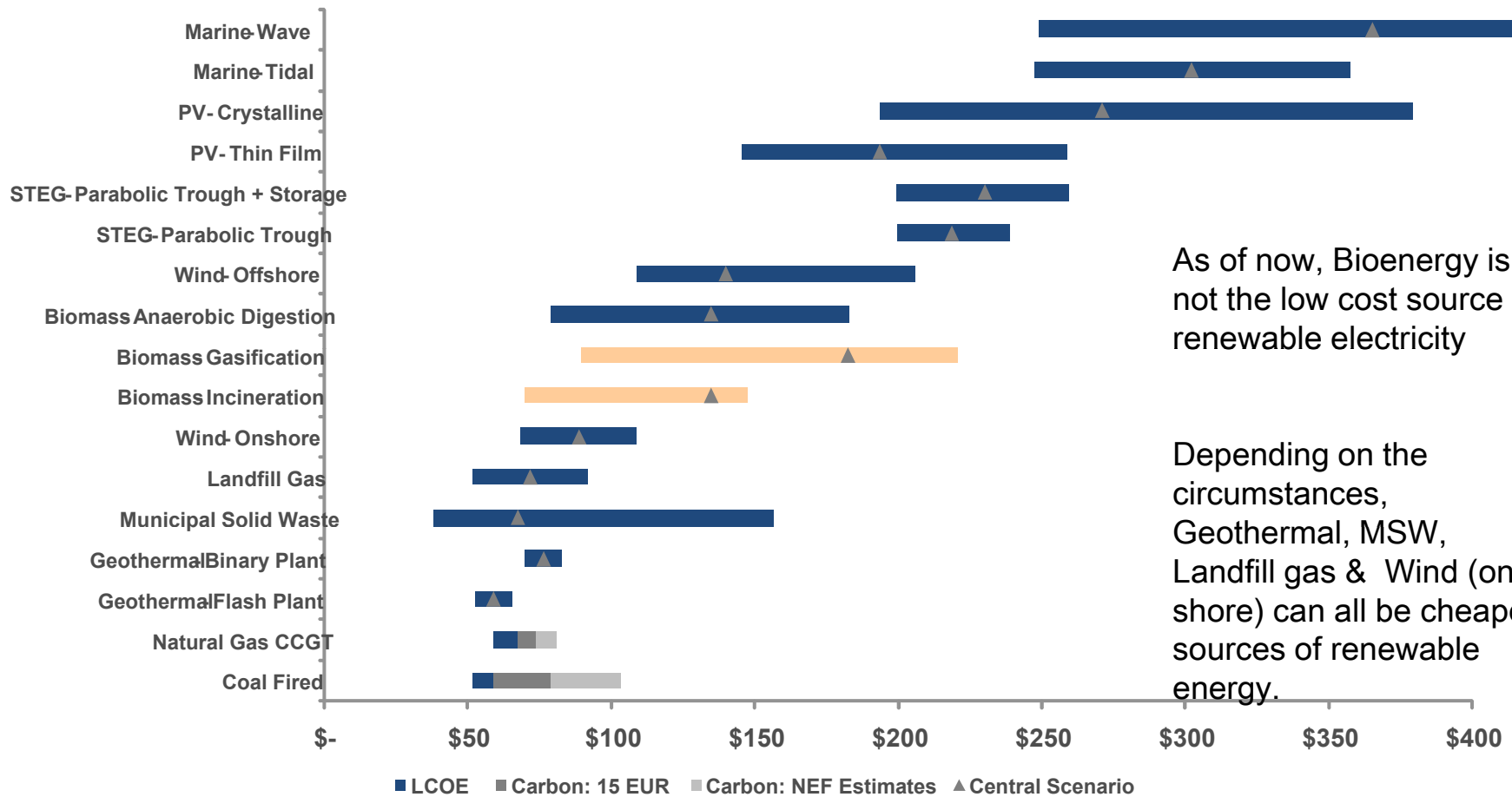
Aside from fossil fuels, how does bio-energy compete with:

- **Wind?**
- **Solar?**
- **Hydro?**
- **Marine?**
- **Geothermal?**

This is key when forecasting which technologies will be able to best satisfy targets like Renewal Energy Standards.



Levelised cost of energy Q2 2009



As of now, Bioenergy is not the low cost source of renewable electricity

Depending on the circumstances, Geothermal, MSW, Landfill gas & Wind (on-shore) can all be cheaper sources of renewable energy.

Source: New Energy Finance, CIBC World Markets Inc.

Note: "Carbon 15 EUR" assumes a constant carbon price across the project lifetime; "Carbon NEF estimates" is based on European carbon price forecasts contained in the June 2009 EU-ETS Deep Dive.





Central to all bio-energy strategies is a competitive price for delivered biomass..... True regardless of the current financial turmoil



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Appendix B: Bio of Don Roberts

- Mr. Roberts is a Managing Director with CIBC World Markets Inc., an investment bank with 23 offices around the world. He leads CIBC's Paper & Forest Products Research Team, and is also responsible for the bio-fuels sector. His primary responsibility is to lead a team of analysts in advising financial institutions (e.g., pension/mutual funds) on their investments in the global paper & forest products industry. He is consistently ranked by institutional investor surveys as one of the top equity research analysts covering the forest products industry.
- Mr. Roberts specializes in international commodity markets, and has collaborated with a number of international forestry organizations to gain a global perspective on the paper & forest products sector. He has over 30 years of experience related to various aspects of the forest products sector. Prior to joining the investment business, he was Chief of Industry and Trade Analysis with the Canadian Forest Service.
- 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.

