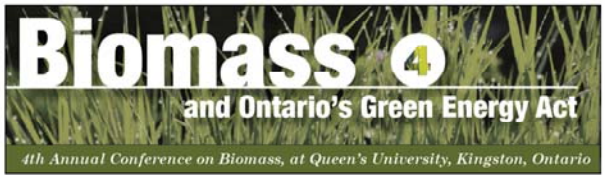


Wood To Energy – Time for a New Value Paradigm?

Presentation to

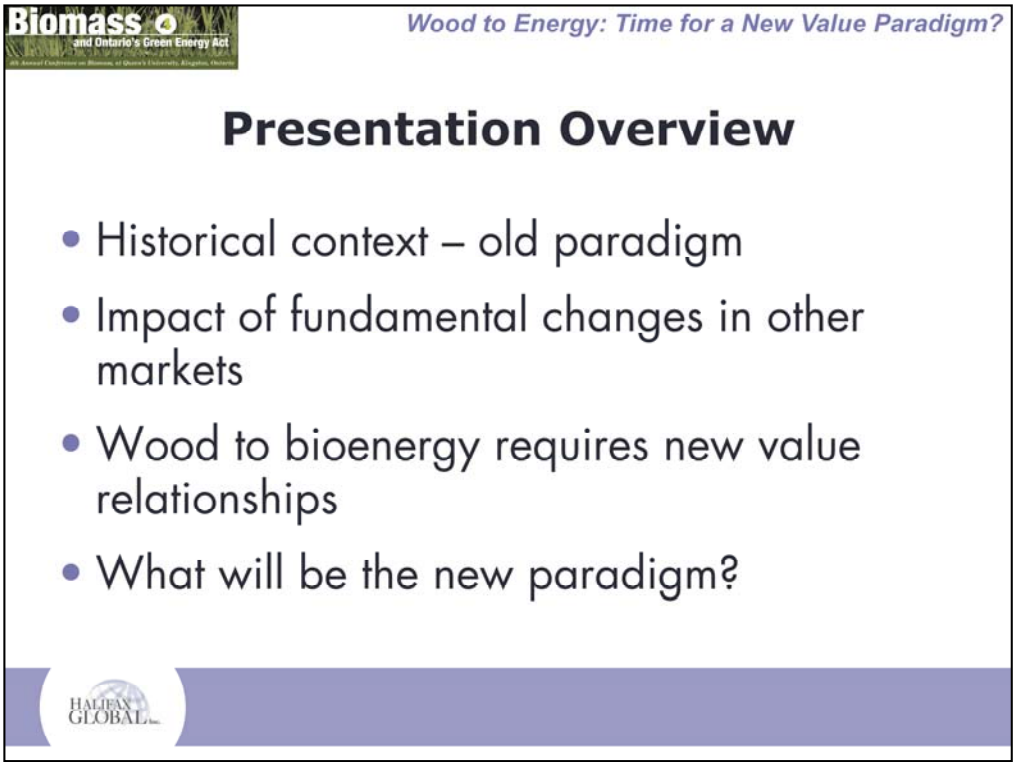
Queen's Institute for Energy and Environmental Policy

&

Queen's Sustainable Bioeconomy Centre

4th Annual Biomass – Bioenergy Conference, Kingston

June 6th, 2011

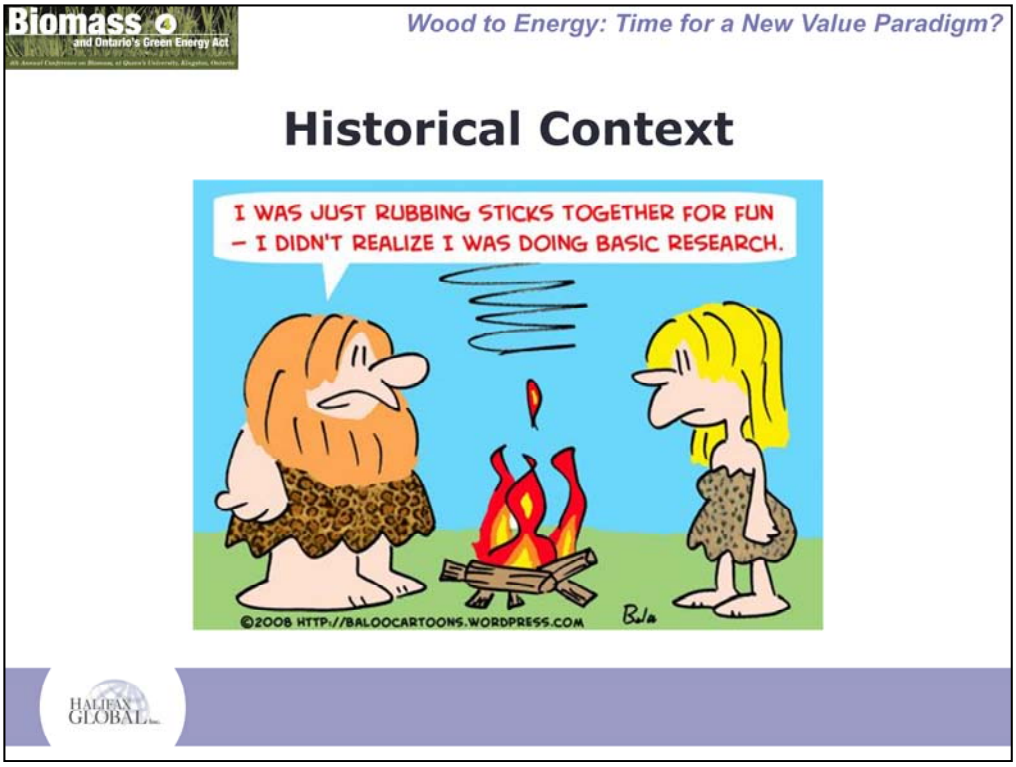


Thank you for the introduction. I'm delighted to participate in this conference again.

When Warren invited me to speak , he asked me to address the challenges to developing biomass to bioenergy projects, to look at why so little progress seems to have been made in area that appears to have such promise.

I believe there are some quite fundamental strategic level business issues, driven by changes in other sectors, that contribute to the transformation of the historic value relationship which has framed the availability of woody biomass feedstock for bioenergy production.

My objective in this presentation is to provide some perspective at that 'bigger picture' level, recognising that other presenters will be focusing on more technical and related issues.

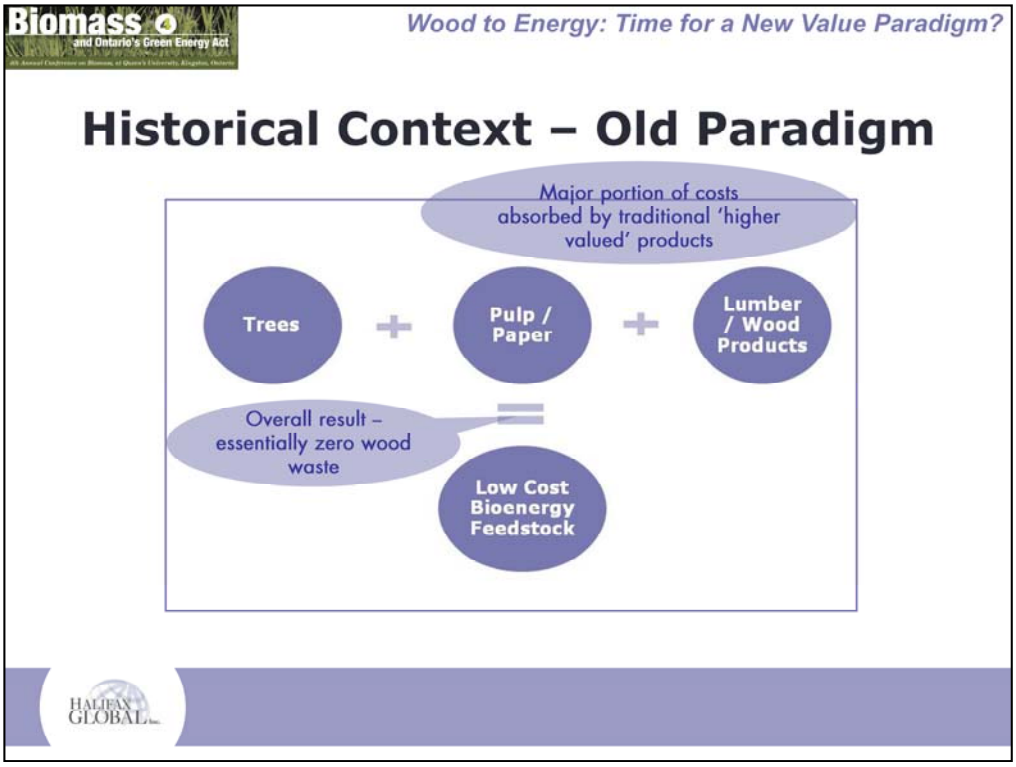


Using wood to generate energy is not a new concept. Man has used wood for heat and light since the beginning of time.

Indeed, fuel remains the dominant use of wood on the planet.

Forest products manufacturers have also been using wood fibre to generate heat and electricity for many decades.

So, why have proposed projects to use biomass to generate electricity proved to be so challenging?



Traditionally, combined heat and power generation -- cogeneration -- at forest products manufacturing plants has relied on an economic balance that has prevailed for most of the past century.

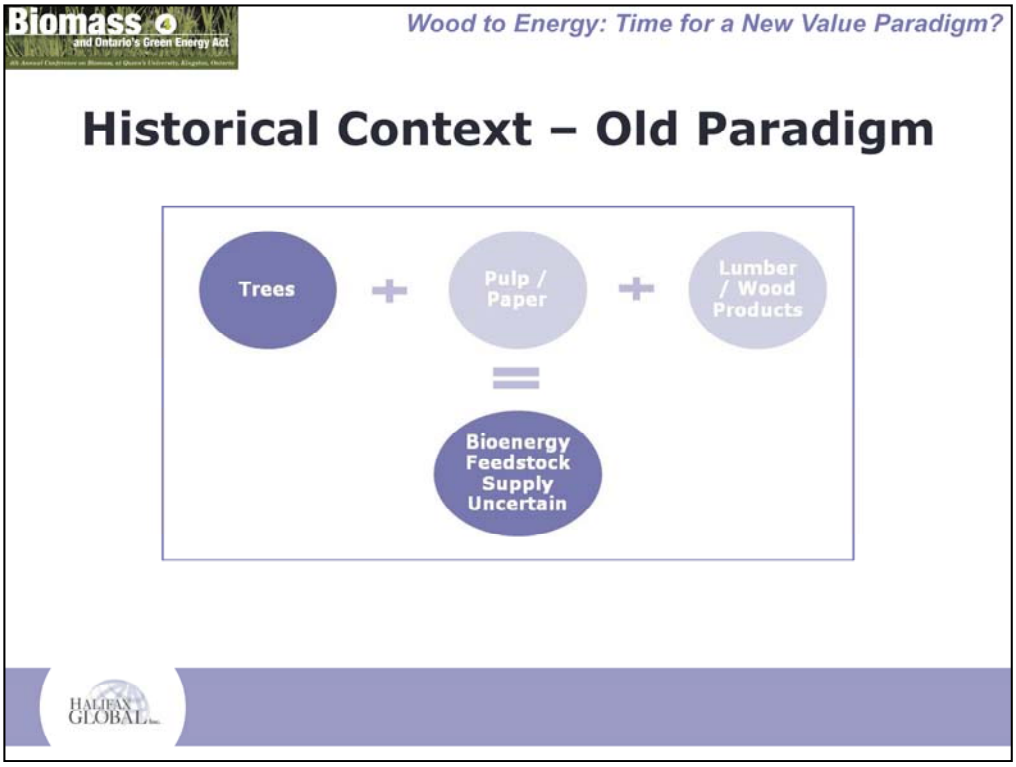
- **Harvesting and processing of trees into lumber or other wood products, into wood chips that become pulp furnish or roundwood that also becomes pulp furnish;**
- **The result is that bark and other residuals become feedstock for energy generation.**

Key to viability -- overall balance of total use and conversion of harvested material into some combination of wood, pulp and paper products and energy is maintained.

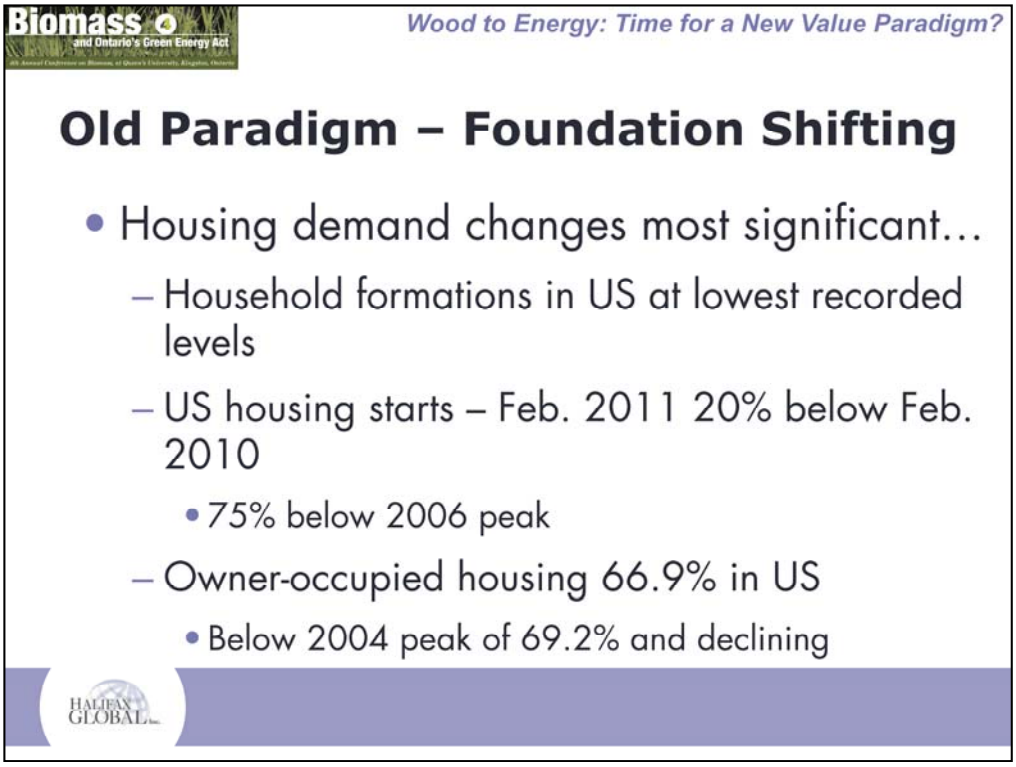
Economic reality of this relationship is that most of the cost of harvesting and processing has been absorbed by higher value products – lumber, pulp, paper.

Result is that remaining residuals became low cost feedstock for heat and power production, also mostly used in process.

Even in situations in which surplus heat and power could be sold to other users or the grid, the low cost of the residual feedstock created a viable economic relationship for the energy producing facility.



But the reality is that the segments of the industry that produced the 'higher value' products have been undergoing fundamental transformation.



•***Household formations in the US at historically low levels --***

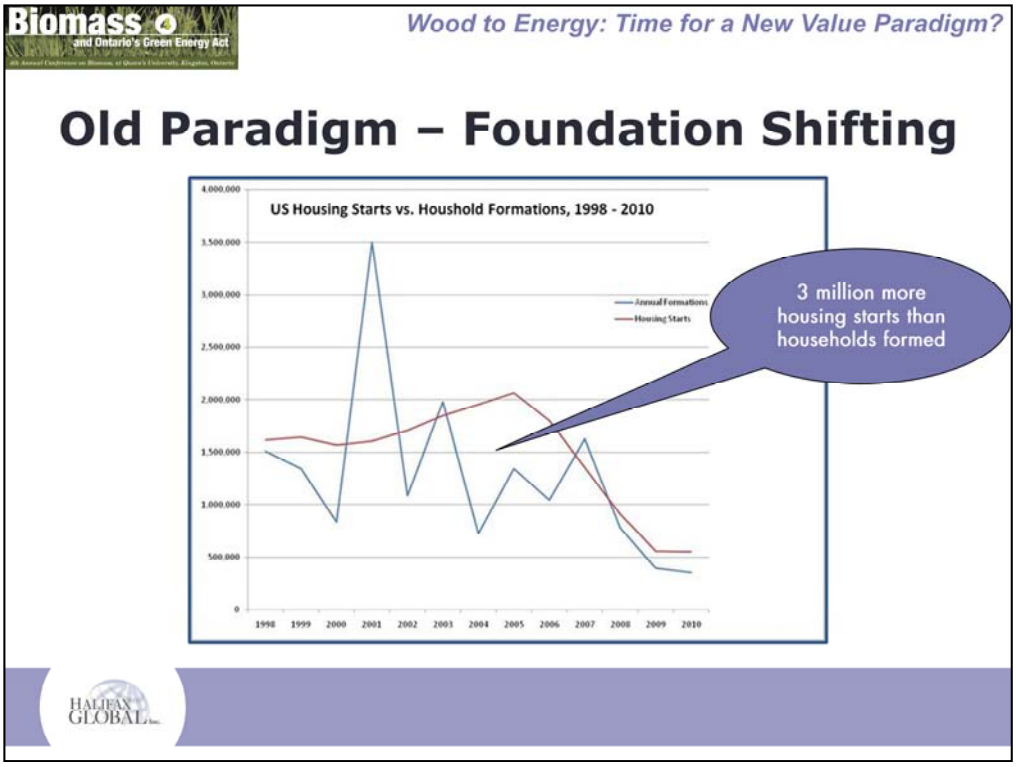
A recent US Census Bureau Report notes that between March 2009 and March 2010, the number of households rose by 357,000, the smallest increase since 1947. The previous year, households increased by only 398,000, the third smallest increase on record. These are steep drops from the 2002–07 period, when household increases averaged 1.3 million a year. This drop largely explains why the housing glut remains stubbornly high, despite decreases in housing starts.

•***Housing starts remain at historic lows --***

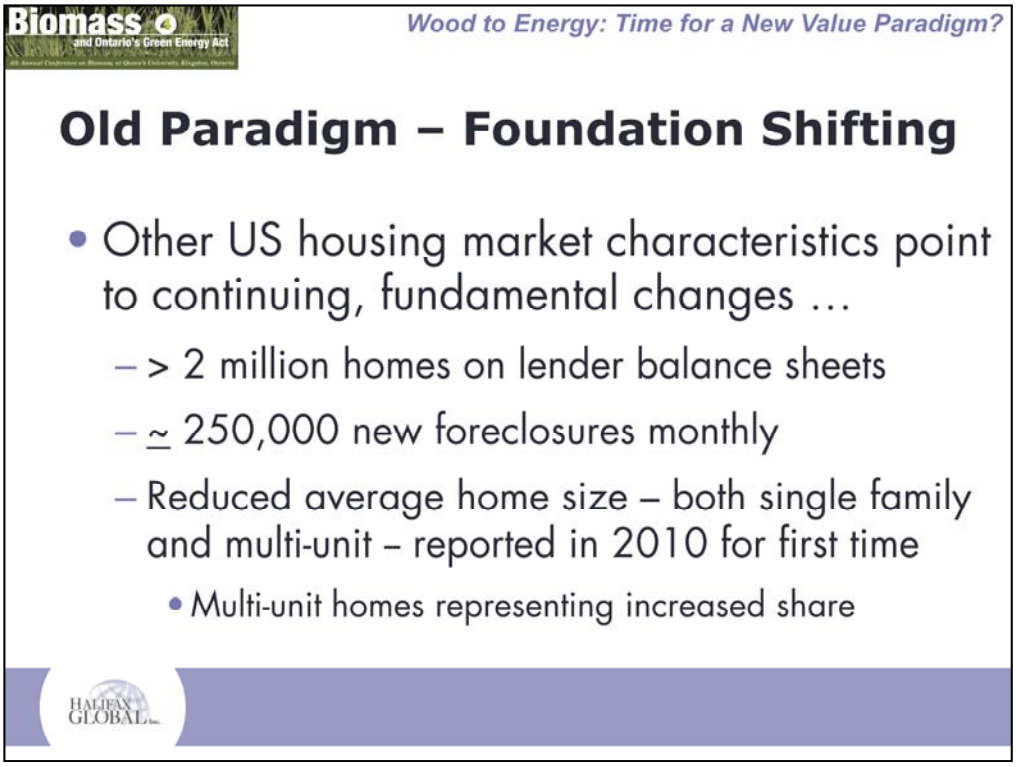
US Census Bureau data shows that housing starts in February, 2011 in the US were at a seasonally adjusted annual rate of 479,000, down more than 20% from February, 2010.

•***Declining home ownership lowers demand for wood products --***

As reported in Random Lengths Yardstick publication, (September 2010), owner-occupied housing declined to 66.9% of the US housing mix, the third consecutive quarterly decline and well below the historical peak of 69.2% reached during the fourth quarter of 2004. This decline is linked directly to reduced demand for single family housing.



Over the thirteen year period shown in the graph, the number of homes built by the US housing industry exceeded the number of households formed during the period by more than 3 million. Even after allowing for purchases of second vacation homes, replacement of destroyed and dilapidated housing and other normal replacement factors, it is clear that the US overbuilt housing by a significant margin. That excess inventory remains in the marketplace, much of it held by financial institutions through foreclosure activity.

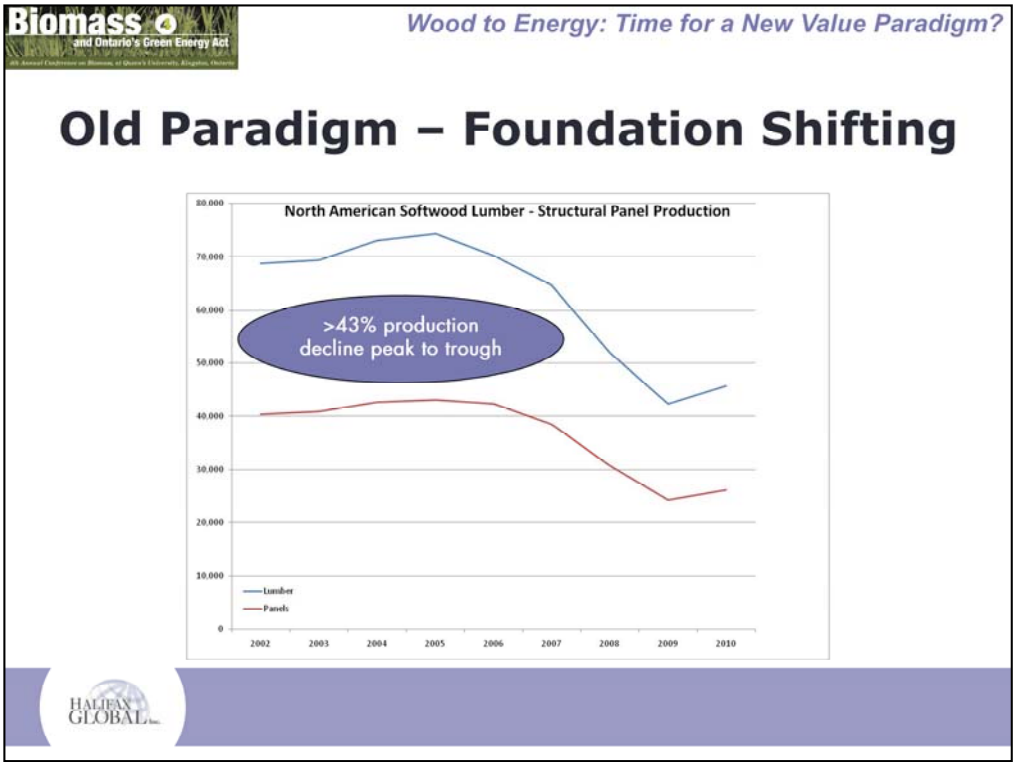


•Inventory of unsold homes in US continues to depress new home sales --

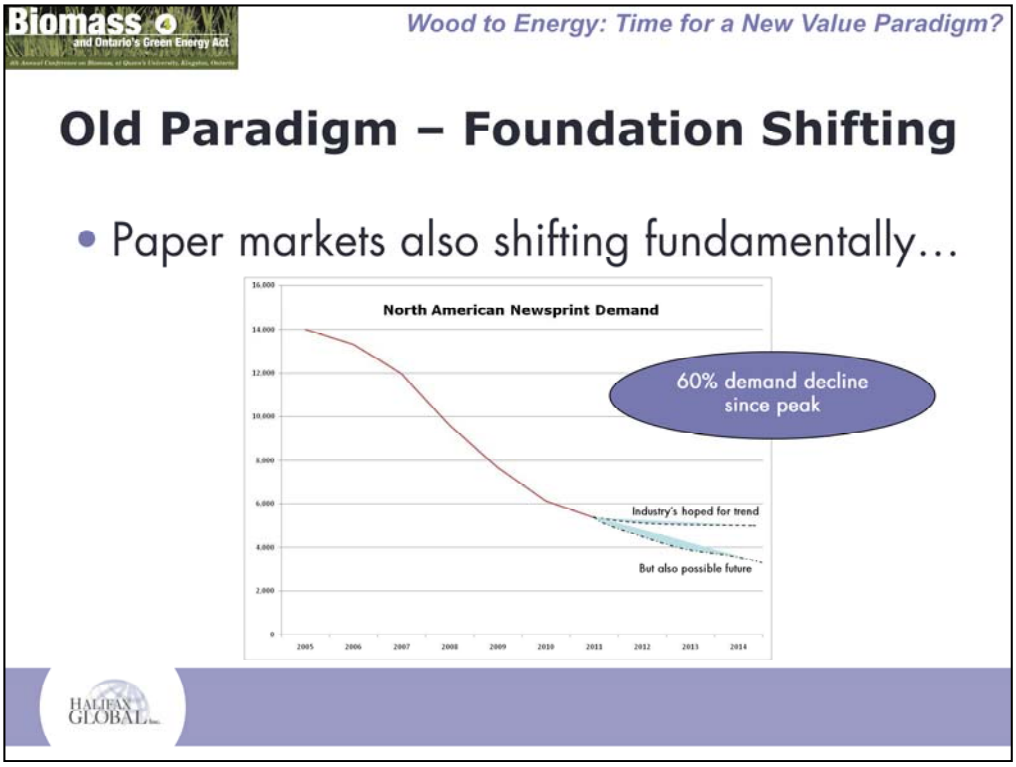
Economists at California's Chapman University point out that with two million houses either on lender balance sheets or predicted to be headed there, it will take five years to absorb the inventory under normal economic conditions. High unemployment and consumer debt may extend that to eight to 10 years.

•Home foreclosures in US continue to dampen real estate demand --

According to a Congressional Oversight Panel report , approximately 250,000 new foreclosures are started every month, while 100,000 are completed. This has widespread impact, experts say, because foreclosures negatively affect neighbourhoods and drive down local real estate values, resulting in more cautious and less free spending consumers, further depressing the economy. The Panel estimates that up to 13 million foreclosures will have occurred by 2012 since its formation in 2008.



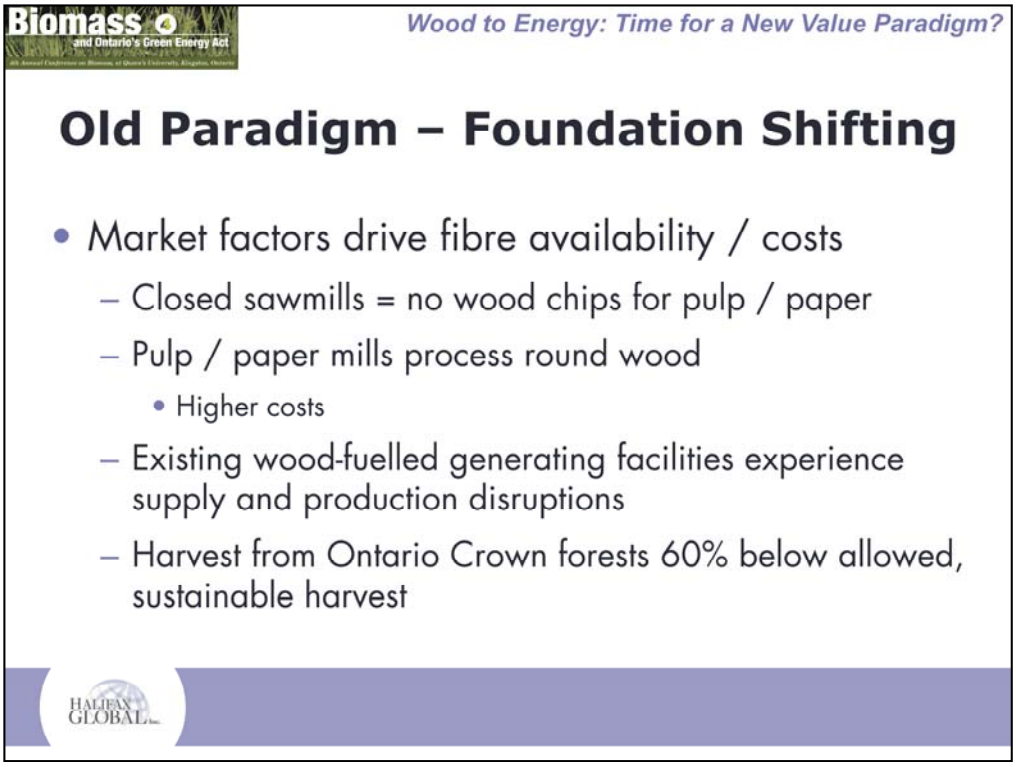
These changes in product demand have resulted in a 44% - 45% decline in softwood lumber production across North America since 2005. While that decline has been somewhat offset by recent increased sales to China and India by west coast producers, current levels of forest harvesting and lumber production in Central and Eastern Canada remain 50% - 60% below peak levels of 2005-06.



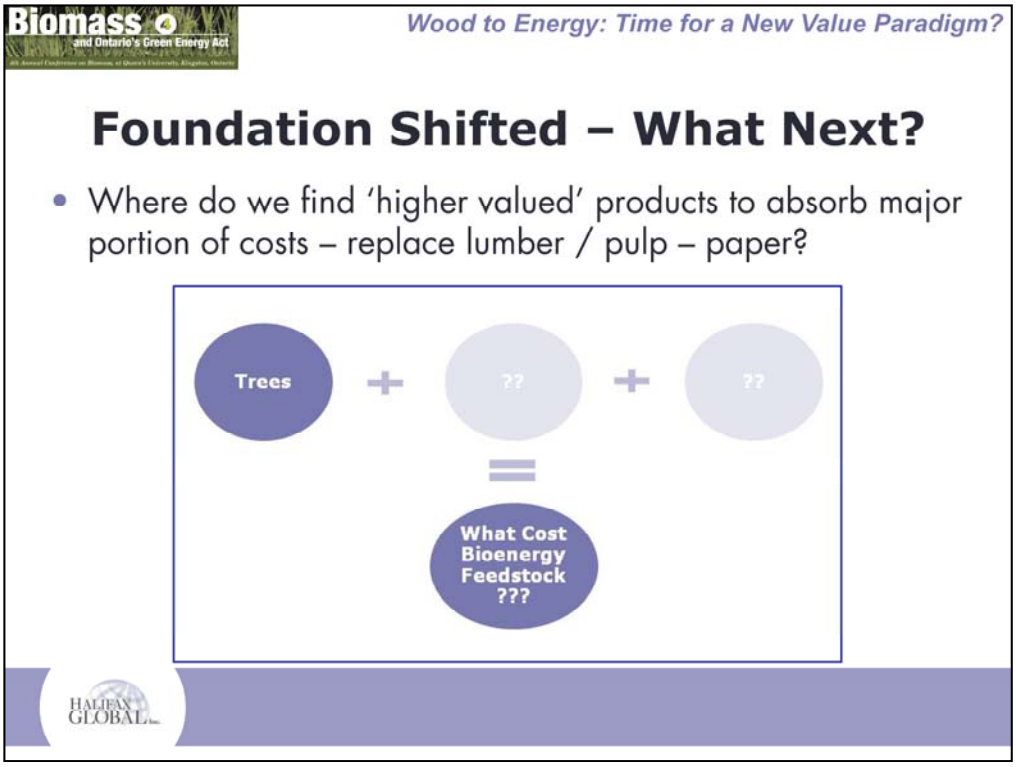
The paper industry side of the value balance has also experienced disruptions.

North American demand for newsprint has decline by more than 60% since 2005 and close to seven million tonnes of production capacity has been permanently shut down or idled. Recent analysts reports indicate that even with recent price increases, most newsprint producers cannot achieve financial breakeven. Industry statements predict additional capacity reductions.

Demand for other printing papers has also declined, though more a result of reductions in economic activity rather than structural change.



Paper producers have also been affected by reductions in lumber demand, because closed sawmills don't produce wood chips needed as pulp furnish. The result is that some mills have had to resort to whole tree chipping and face increased costs.

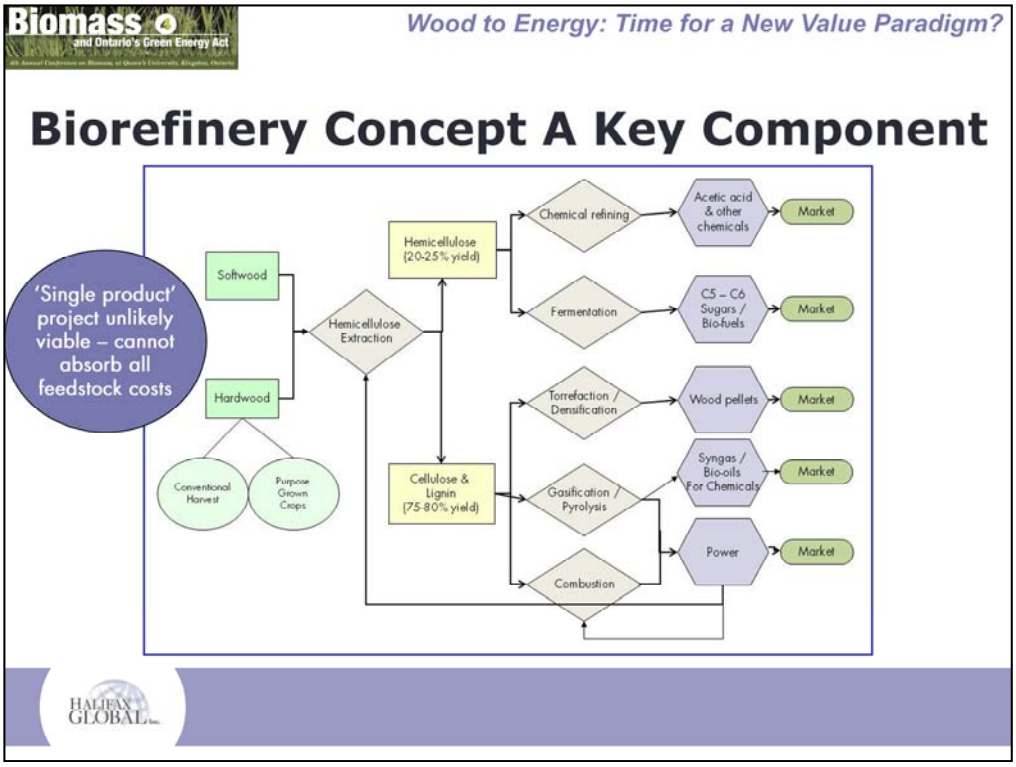


Conventional forest products manufacturing and cogeneration has been viable because costs of harvesting, transport and processing were absorbed primarily by the higher valued products – wood products and pulp and paper.

However, with the structural shifts in demand for those products a new value balance is needed.

But, the question remains, what is the new, sustainable value relationship?

Where do we find 'higher valued' products with sufficient margins to absorb most of the costs of harvest, transport and processing, while leaving 'residual' materials that can usefully be used as biomass to bioenergy feedstocks?

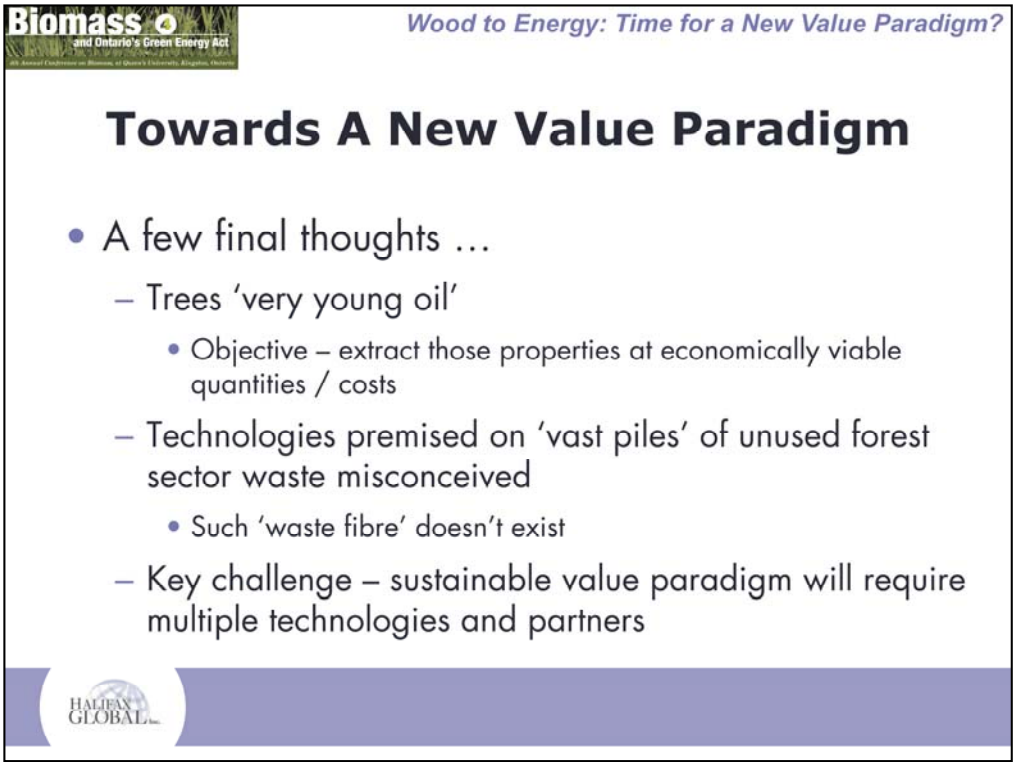


A sustainable economic relationship for biomass to bioenergy will likely be found in combinations of processing technologies and product streams that –

- **Capture value from range of properties of the feedstock**
  - **Biochemical extraction, eg. extraction and processing of the hemicelluloses (sugars) to produce five and six carbon sugars, then fermented and processed into advanced biofuels, biopolymers and other products.**
  - **Remaining cellulose fibre and lignin exhibit increased unit energy values and additional advantageous properties, such as becoming more hydrophobic than conventional pellets.**

Purpose-grown bioenergy crops, (eg. willow, miscanthus, reed canarygrass, switchgrass), are also likely to become part of the long term sustainable feedstock mix.

Such crops offers the agriculture sector potential new cash crops; and, applicability of completely mechanised planting and harvesting processes can ensure predictable and lower costs than conventional forest harvesting.



Biomass technologies and projects for which proposed economics are based on naïve assumptions of conventional forest industries producing vast piles of unused waste materials will prove to be unviable – primarily because the 'waste' simply doesn't exist.

And, if it's available at all, it certainly doesn't exist at the close to zero cost frequently incorporated into such venture proposals.

What will prove viable and sustainable will be a combination of outputs that generate sufficient value to ensure reasonable feedstock costs for each product stream. As the cost of oil rises, achieving that new value relationship for biomass becomes easier. But, proponents seeking to develop new projects, whether greenfield or repurposing idled forest products facilities, should include multiple partners and technologies needed for a sustainable value relationship.

DISCUSSION – QUESTIONS?

A copy of this presentation will be available today for download at our website – www.halifaxglobal.com