



RENEWABLE FUELS

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Who is Fram?

- Sponsored by a Norwegian ship owning company
- Staffed by locals in Georgia
 - John Colquitt President
 - Harold Arnold Vice President
- Offices in Savannah, Georgia

Might Fuels be an even more interesting Forest Product for Georgia Landowners?

➤ Yes, But ---- there are barriers to the growth.

❖ Transportability of the fuels

❖ Burner capabilities in our neighborhood

Wood Pellets are a “Transportable” form of bioenergy

- Wood Chips 34 Ft³ per MWHr
- Wood Pellets 10 Ft³ per MWHr

Wood chips and hog fuels do not lend themselves to travel for they are half water!

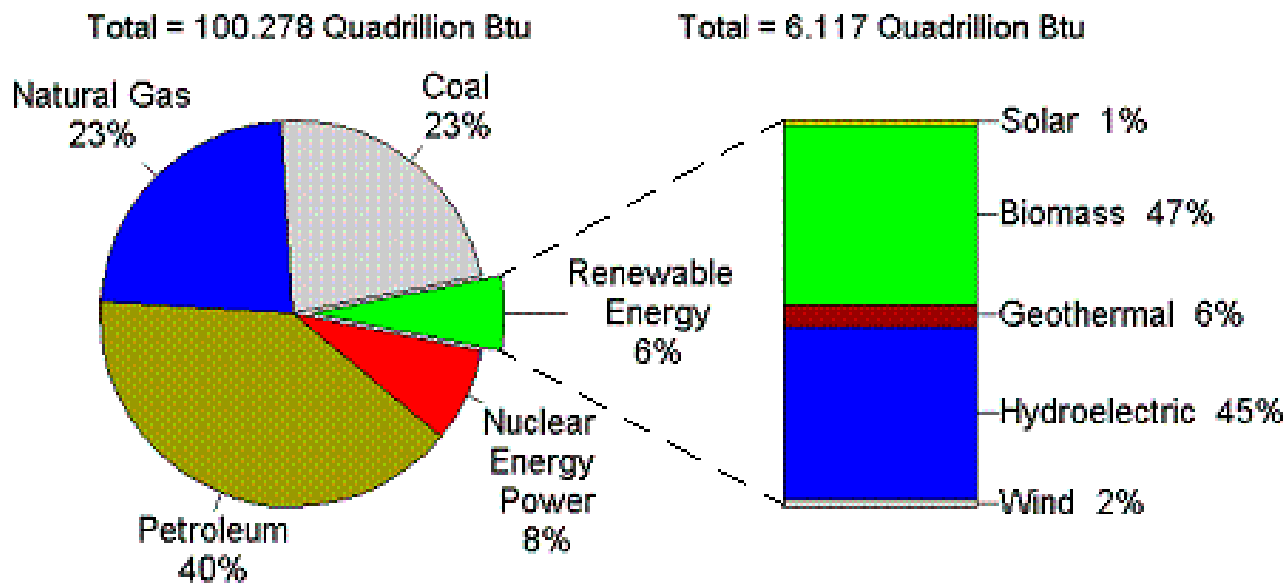
Comparison of Various Energy Sources

(Approximate Cost per MWHr)

Order of Magnitude
USD/MWHr

- Oil \$18
- Natural Gas \$25
- Coal \$ 9
- Wood Chips \$12 (at \$25/ton, *delivered*)
- Wood Pellets \$30

Renewable Energy Consumption in the Nation's Energy Supply, 2004



Source: Department of Energy

Considerations in Marketing of Wood Fuels

- Land Owner's Objectives
 - ✓ Profit
- The fuel marketer's objectives
 - ✓ Profit

Land Owner's Objectives

- Profits and other motivations
 - Enhance markets for thinnings, small wood, logging slash, mill residue, and other fiber waste
 - Grow market for chip-n-saw and big log by-products
 - A basic fact hampers wood fuel marketing: Fuel is in nearly all cases the cheapest thing (per ton) that comes in the gate of a mill or power station.

Fram's Objectives have been

- **Develop the Markets**
 - **Export**
 - **Domestic**
- **Provide or Improve Markets for “non traditional” Raw Materials**
- ***Survival !***

How The Export Market Developed

■ European Market

- Sweden might be considered the birthplace of renewable fuels
- EU emergence broadened the interest
- Kyoto attracted more interest in 1992
- Energy price increases (Oil and N. Gas) have helped the biofuels industry
- The Pacific Rim will develop

Sweden Lead, *and Leads*, the Way

- **Taxes Fossil Fuels Heavily**
- **Taxes on Emissions**
- **Incentives for Converting**
- **Strong Environmental Law**

European Union Environmental Laws

- Laws vary by country
- Swedish Laws are simple: Use renewables or pay taxes
- EU 1992 stated objectives
 - Emissions will be 90% of the 1990 levels
 - Kyoto is the root of this and is now in treaty form, signed by all of the EU members.

EU Members Compliance Approaches

- Swedish – Taxes on fossil fuels
 - Coal
 - Oil
 - “Nature’s” Gas

- Dutch – Subsidies

- UK – ROC’s

- Denmark – Subsidies

Wood Pellet Export Business

- Capital Intensive
 - 100,000 ton/year pellet mill can cost \$17,000,000
- Ocean Freight Considerations
 - In the past two years the ocean freight has doubled
- Marketing Costs are High
 - Travel and communication are expensive
- Customer Commitment has been Lacking
 - Political Support is fickle !

Technical considerations

- Heat Value
 - Torryfication might be an answer but is very expensive
 - ❖ Norwegian company is attempting to commercialize this but cost is high and there is market resistance to the pellets, though they have about 5% higher NHV
- Ash melting temperatures
- Nitrogen content
- Durability
- Particle size demands

High bark content desirable for some industrial applications



Moisture	6%	6%
Net Heat Value		
MWHr/MT:	4.970	4.800
Gj/MT:	17.78	17.46
Particle Size <2mm:	99.32%	92.5%
Ash:	2.7%	0.5%
Ash Melting (IT):	1,185C.±	1,350C.±
Price:	White pellets are more sought after!	

High Capital Investment hampers entry into the pellet business.

- Heavy Size Reduction Equipment
 - Hogging a second time required for drying
 - Hammer milling needed to achieve particle size required by industrial customers
- Dryers are fuel “hogs”
- High Cost / Low Production Equipment
 - Presses are maintenance hogs
- Drying and Air Quality Concerns hampering growth

Logistics a Consideration !

- Inland
- Few Suitable Export Ports with storage and loading facilities
- Ocean Freight is a frightening part of the equation

Ocean Freight -- *is a fright!*

■ Ocean Freight

- Rates

- Bunker Escalations

- China ran the ocean freight market up 100%

 - Is India next?

- Ports, Stevedore and Storage are serious considerations

Pellets can be transported in bulkers



Baltic Dry Bulk Index

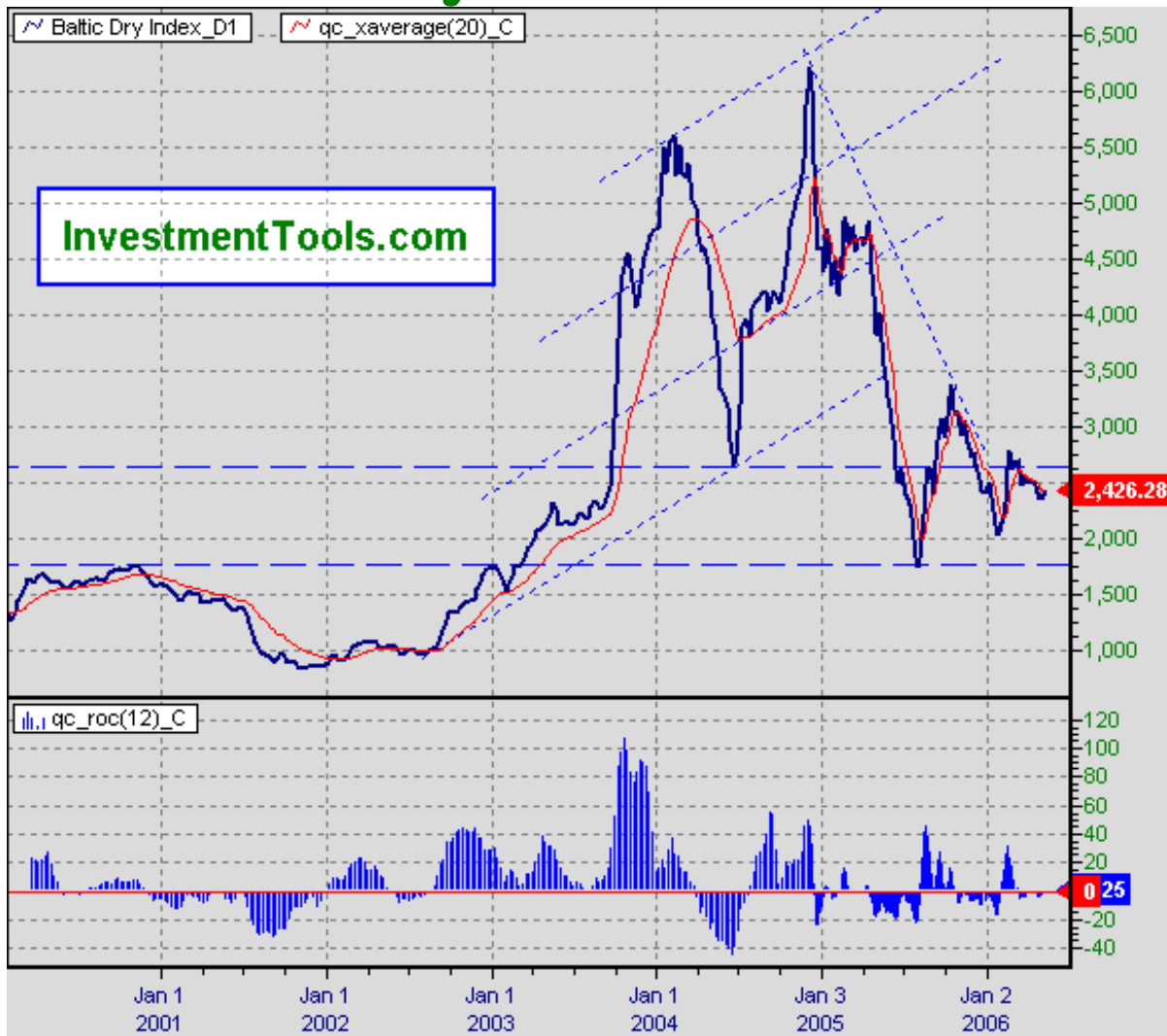


Chart created with NeoTicker EOD © TickQuest, Inc. 1998-2004

Marketing Costs are high for the Export Market

- Customers are Dispersed Geographically
- Multi Language
- Multi Culture
- Expensive Travel
- Currency Conversion / Hedging

European Buyer's Profile

- ❖ Generally Lacking Commitment
- ❖ Coal as a commodity doesn't require term
- ❖ Short-Term purchasing doesn't permit recovery of the pellet mill's investment

Competition in the European Market

- ❑ Major European Pellet Manufacturers, 250 of them!
- ❑ European Ag Based Fuels (“Energy Crops”)
- ❑ Russian Forests are close by
- ❑ Domestic US Boilers
- ❑ Domestic US Pellet Mills about 50 - 60

Export Market Potential

- Pellet Mills are a potential market for small wood
- Economics will be a problem
 - Raw Material cost
 - Electricity cost a consideration
- Need Harvesting Systems Development

So: *Why do it?*

- **Faith that the market will develop in the future.**
- **Find markets for previously unmerchutable materials.**



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