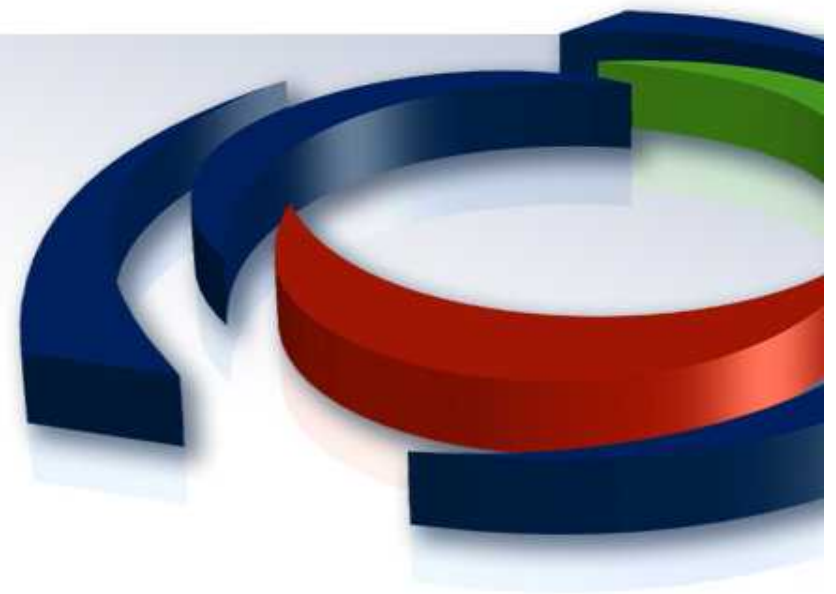




Alternative Biodiesel
Feedstock
Past, Present & Future

Jeremy Goodfellow
Sanimax
February 6th, 2008



Scope

- Oil Industry
 - > USA consumption per year:
 - 233 billion USG of crude oil (imports = 90%)
 - 62 billion USG of distillates
 - 52 billion USG of diesel fuel
 - > Global consumption per year
 - 1,200 billion USG of crude oil
 - 345 billion USG of distillates



Scope

- Agricultural-based Feedstocks
 - > USA production per year:
 - 3.4 billion USG of major vegetable oils
 - 1.4 billion USG of fats (animal & grease)
 - > Global production per year:
 - 32 billion USG of major vegetable oils
 - 3 billion USG of fats (animal & grease)



Scope

- The oilseed and fat market is only a small fraction of the oil industry
- IF ALL DOMESTIC FEEDSTOCKS WERE CONVERTED TO FUEL, ONLY 8% OF DIESEL COULD BE REPLACED
- IF ALL GLOBAL FEEDSTOCKS WERE CONVERTED TO DIESEL, ONLY 10 % OF DISTILLATE COULD BE SUBSTITUTED
 - > However, the entire world would go hungry



Scope

- Let's understand a few principles:
 - > We work in commodity markets
 - Supply and demand affect pricing
 - In a given market, the lowest cost producer will always win
 - > Markets are more complicated than we discuss
 - Many factors affect the markets – currency, trading, technology, interest rates, policy, consumers, fads and trends, aging population, emerging markets.....
 - > There will be continued growth in renewable fuels
 - > There is no silver bullet



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Sanimax

- Provide environmental solutions and added value to the agri-food industry
 - > **Rendering**
 - Collection and processing of animal by-products
 - > **Restaurant Services**
 - Used grease collection and processing
 - > **Agri-food Trading**
 - Trading of agricultural commodities including fats and oils
 - > **Hides, Skins and Leather**
 - > **Energy**
 - Biodiesel production, new feedstock developments and technology commercialization



Sanimax Energy

- Operate a 20 million USG multi-feedstock biodiesel refinery in Madison, WI
- Market biodiesel from Best Biodiesel in Cashton, WI (10 million USG facility) in addition to other high-quality biodiesel through marketing partnerships
- Produce high-quality glycerin and refine crude glycerin sourced from the market for added value to operations
- Control feedstock supply



Sanimax Energy



- Energy risk management services
- New Technology Commercialization
 - > Extraction of oils from by-product or co-product streams
 - > Production of renewable, high quality fuel (renewable diesel) and solvent replacements



The Current Feedstock Options



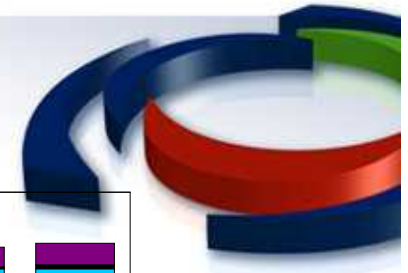
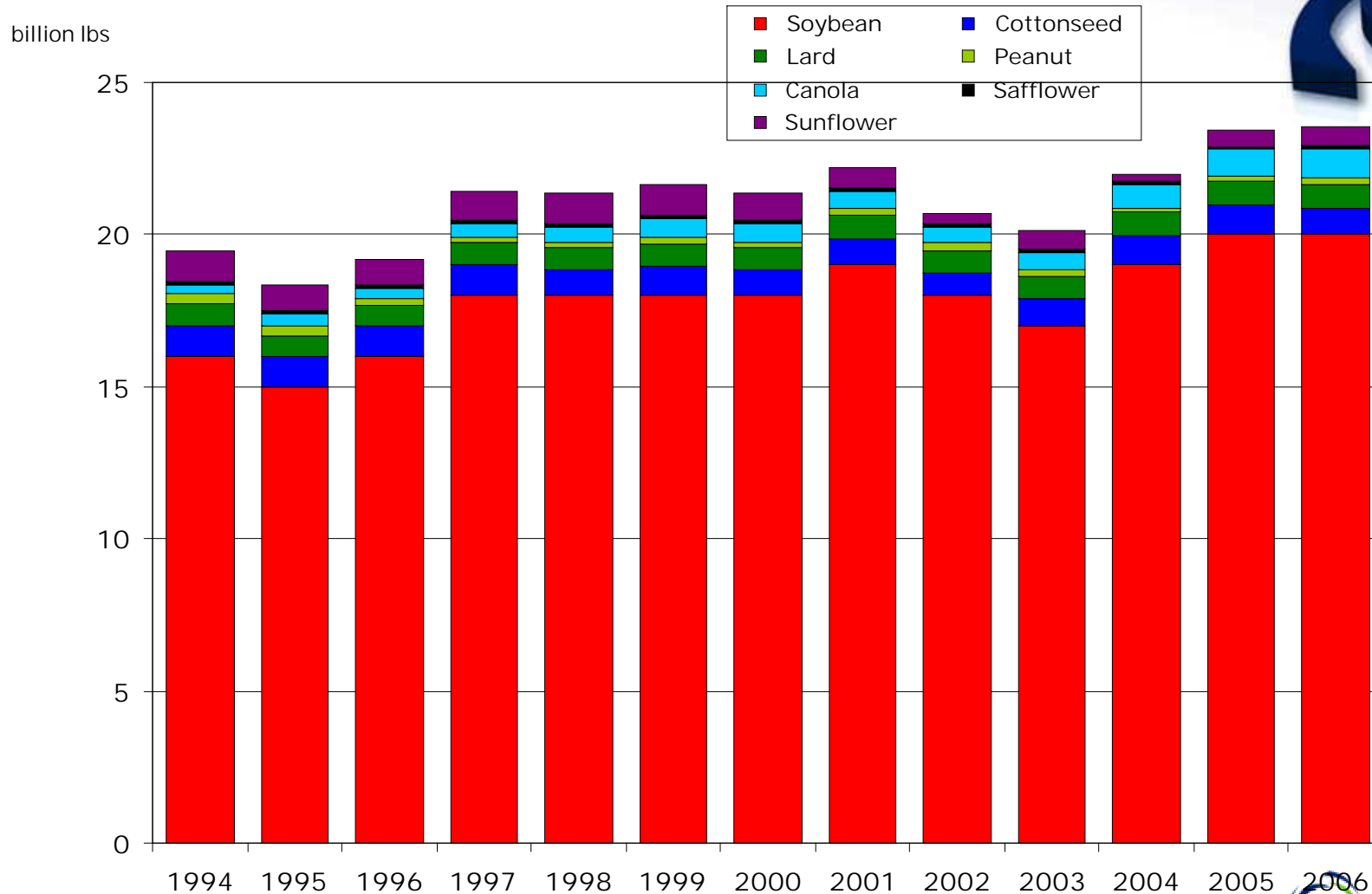
	Market	Production Properties	Economics	Outlook
Soybean Oil	Large market, yet supplied by only a few goliaths	Simple production, decent cold flow, but poor stability and cetane	On again, off again	Will remain tight to its break-even - not promising
Rendered Materials (BFT, CWG, Poultry)	Small market with only a few suppliers	Requires pre-treatment, but excellent stability and cetane with higher cloud point	Generally good	Use in biodiesel, particularly with "blenders", will continue to increase putting increased pressure on prices
Yellow Grease	Fragmented market with few suppliers	Requires pre-treatment, with a mix of results based on source	Good - with smaller credit	Use in biodiesel will continue to increase putting increased pressure on prices
Palm Oil	Large market with few suppliers	Generally simple production, yet poor cloud point	On again, off again	Global expansion of biodiesel will further pressure prices
Canola Oil	Largely European and Canadian supply	Simple production with excellent cloud point	Poor	Expensive product based on other uses makes it questionable for biodiesel

Feedstock Assessment

- Limited supply
 - > Crop Acreage
 - Limited increase in land space and product yields
 - Slow overall growth
 - > Food Industry
 - Meat and restaurant industry growth limited



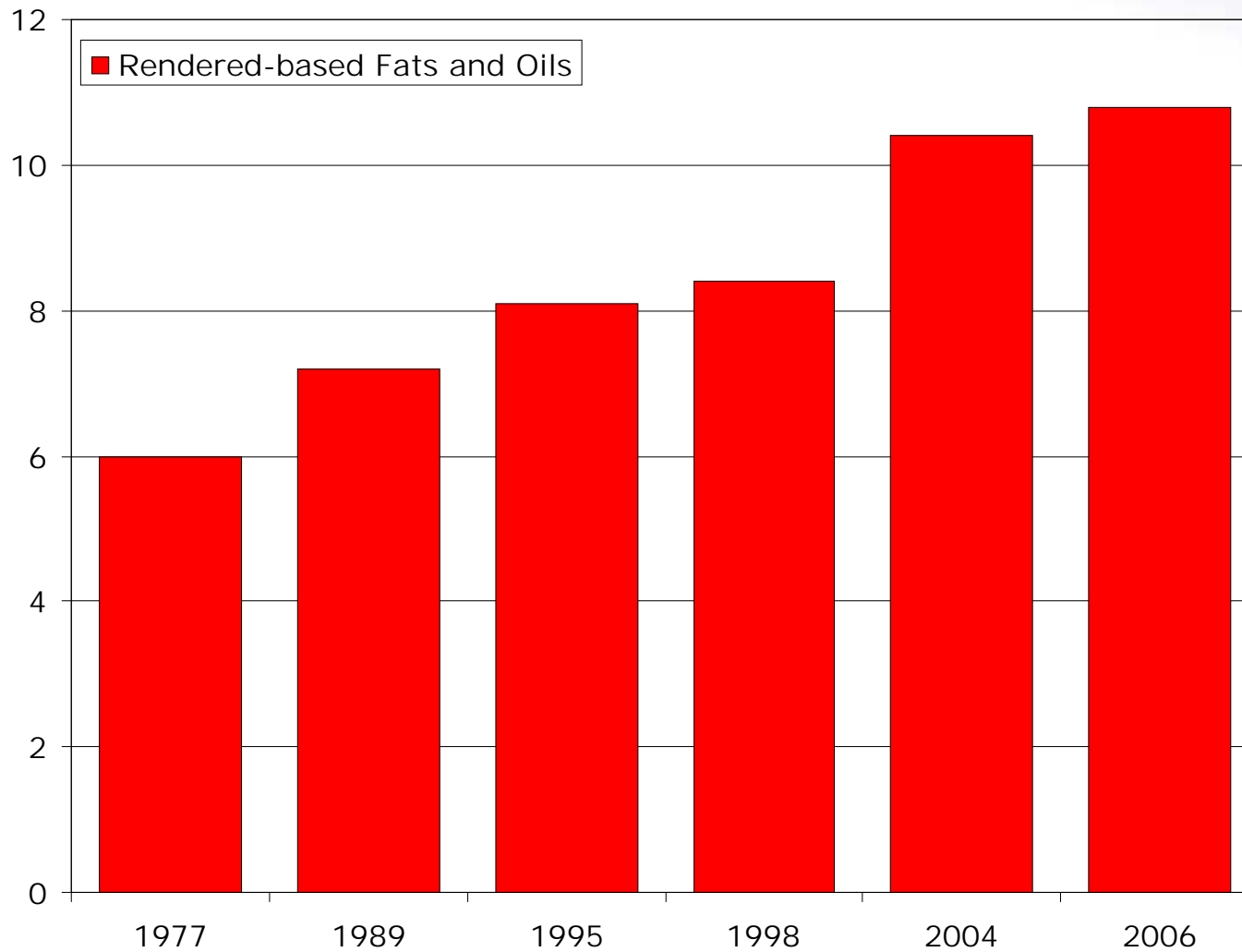
Total Oilseed Market – USA Production



Source: USDA

Total Rendering Market

billion lbs



Source: NRA



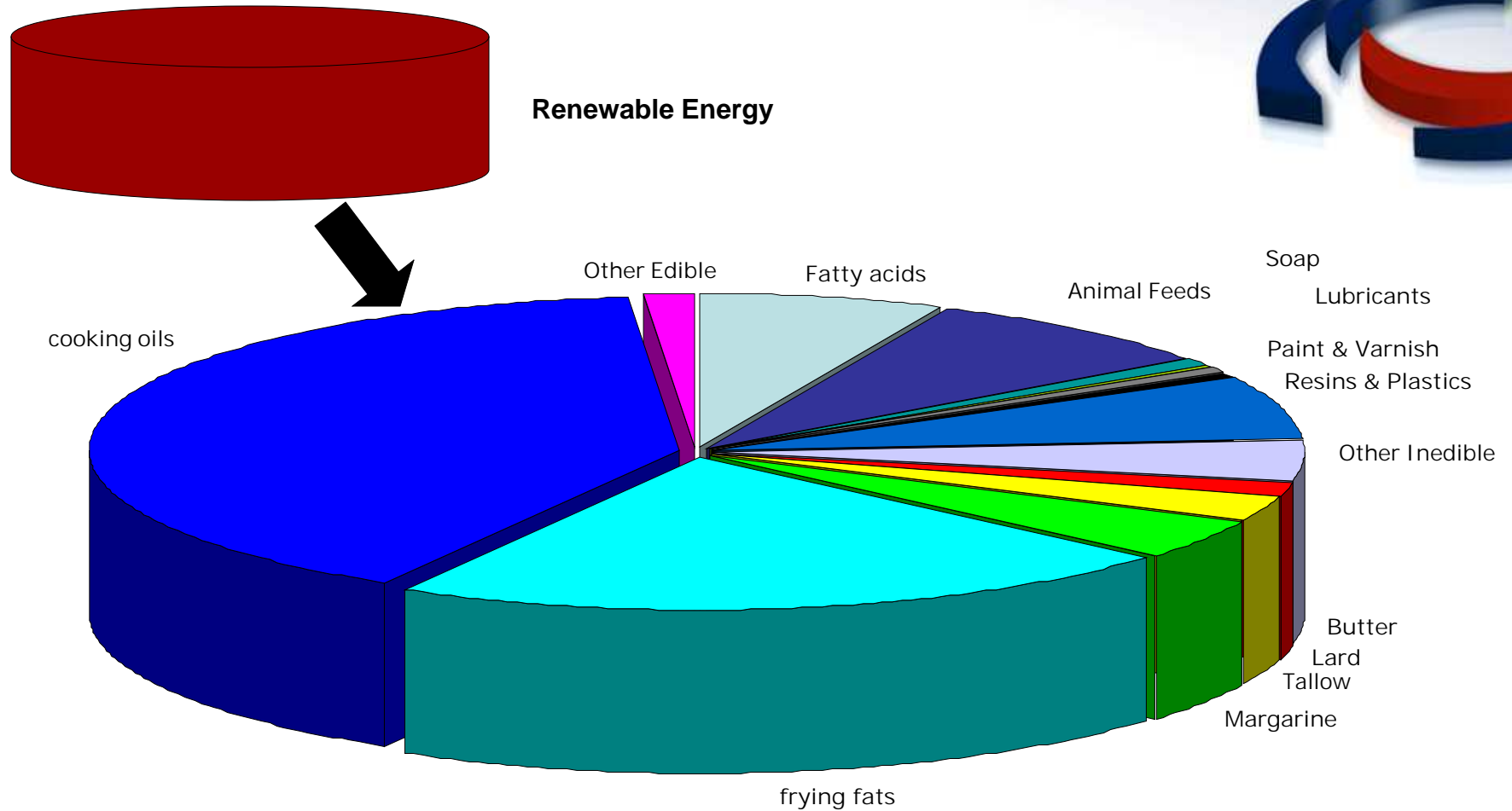
Feedstock Assessment



- Existing Applications
 - > Traditional feedstocks have been used for many years
 - > Energy is a relatively new application that has changed market dynamics
 - > Rapid growth in biodiesel has substantially outpaced the previous glut of soybean oil



Oil and Fat Domestic Uses – USA



Source: USDA

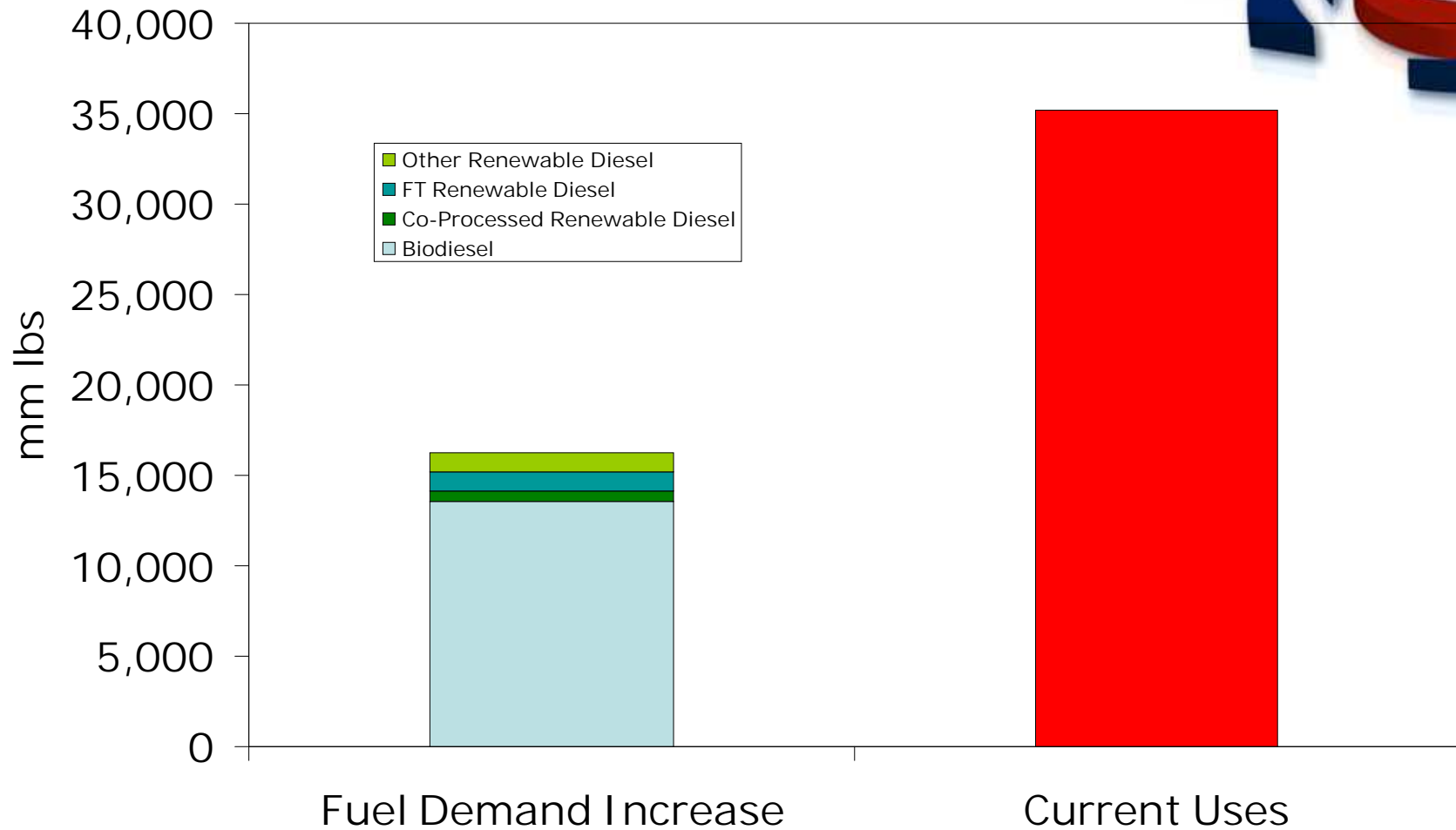
Feedstock Assessment



- Continued demand growth from the renewable fuels sector
 - > Increasing market growth of renewable fuels
 - > Policy can manipulate prices
 - > Scope of industry is imbalanced
- Increased impact of energy costs on agricultural commodity prices

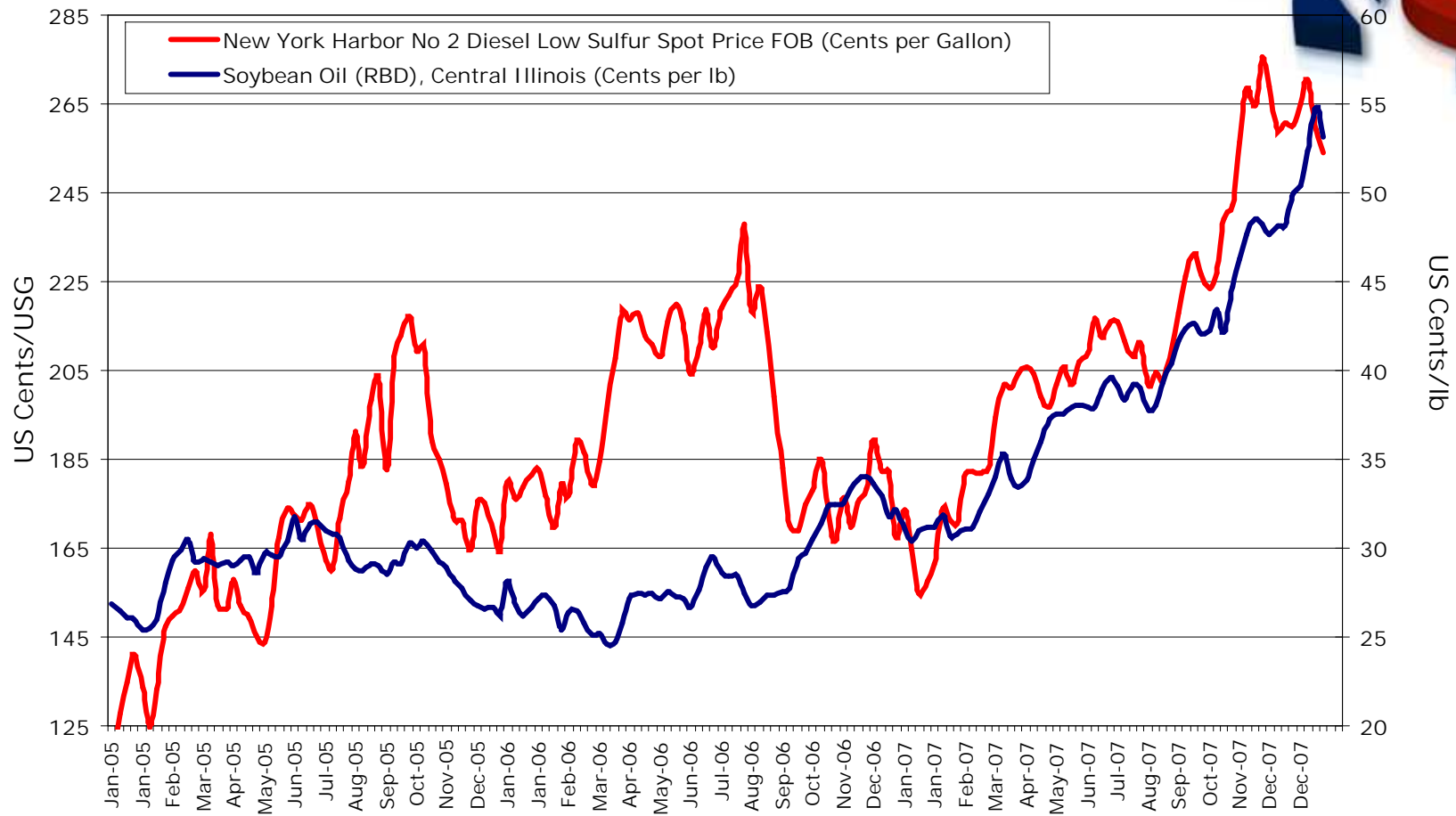


Biofuel Feedstock Demand



Source: USDA, NBB

Feedstock Pricing – Soybean Oil



Source: EIA, Jacobson

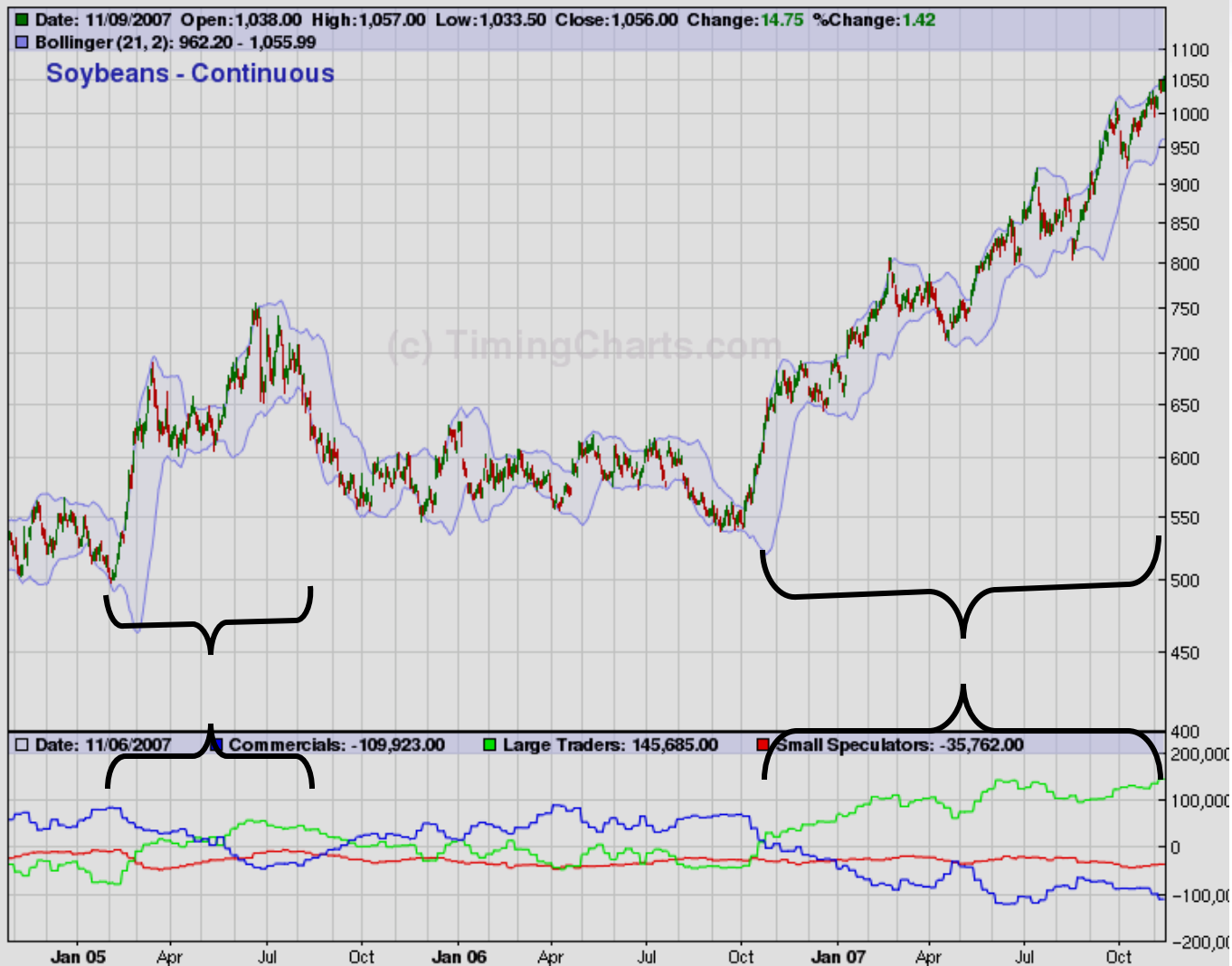
Market Dynamics - Oilseeds



- Food vs fuel debate
 - > Not true reality in North America yet, but an emotional issue that can affect policies
- Price Impacts
 - > Crop price + crush costs (capacity)
 - > Global trade and demand
 - > US Dollar – depressed dollar permits higher value for foreign buyers
 - > Hedge and Index Funds – increased volatility



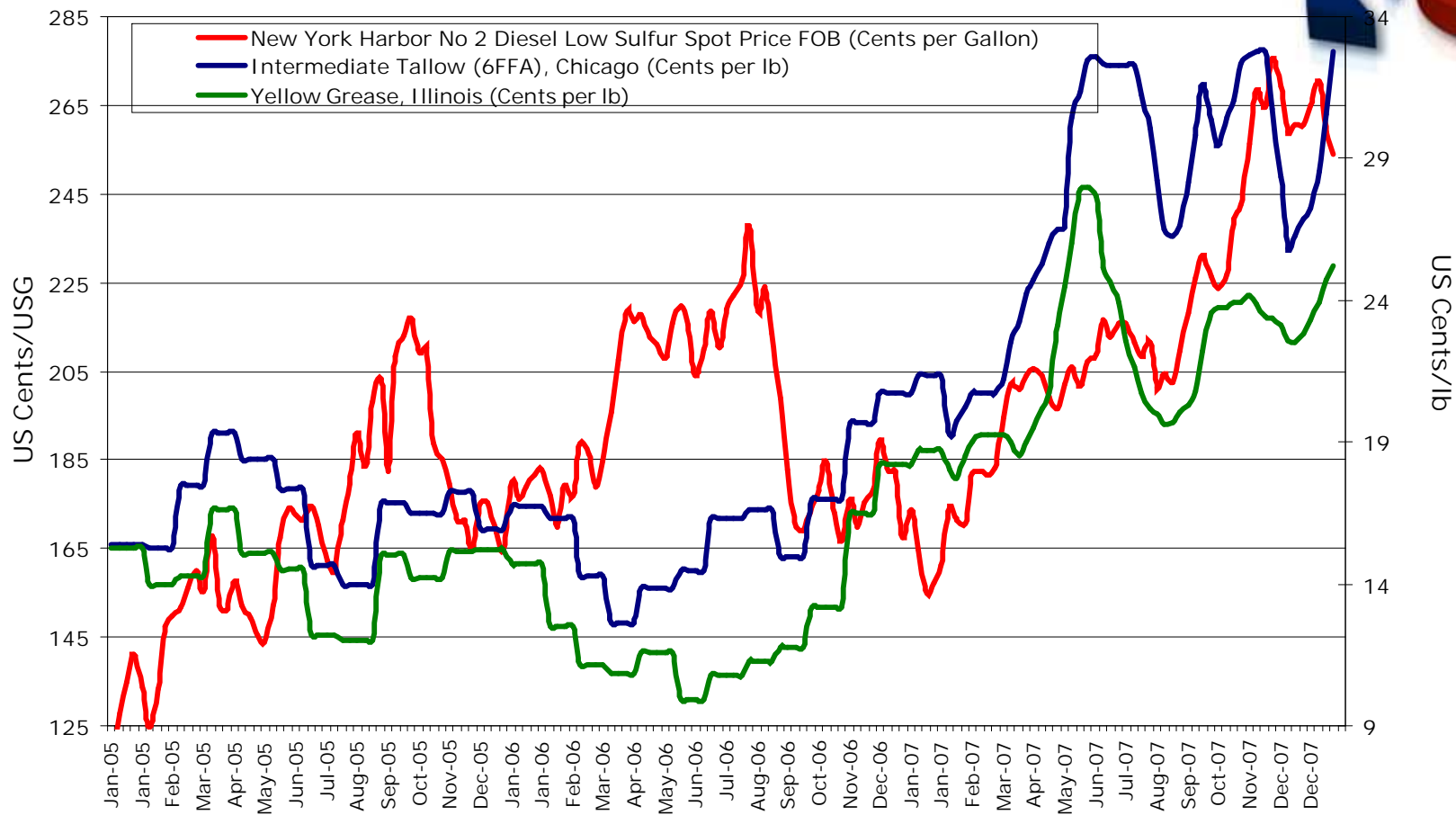
Commodity Markets - Soybeans



Commercials
versus
Non-
commercials

Source: Timingcharts.com

Feedstock Pricing – Tallow & Grease



Source: EIA, Jacobson

Market Dynamics – Tallow & Grease

- Index-based business
 - > Raw material value is returned to originating packer, store or restaurant
- Small market – few, very experienced suppliers and customers
- As value increases, more small players try to circumnavigate traditional channels
- Lack of available risk management tools



Energy Feedstock Economics



- Feedstock discovered for its energy value
 - > Energy will set the floor price for agricultural commodities - (feedstock's "energy value")
 - > Large incremental demand
- For example: today's biodiesel market
 - > Soybean oil pricing falls below its energy value
 - > Surge of new demand
 - > Drives price back up over the break-even price
 - > Biodiesel production slows down, reducing demand and price

Feedstock Control



- Large feedstock markets (soybean oil, palm oil)
 - > General availability at the market price
 - > Supplier relationships can benefit in tight supply situations
- Smaller feedstock markets (tallow, grease)
 - > Limited availability
 - > Usually requires some relationship to gain supply
 - > Many tallow and grease suppliers are also in renewable energy markets
- New Feedstocks



Feedstock Development



	Status	Production Properties	Expected Economics	Outlook
Palm Oil	Significant growth in plantings will bring growing supplies	Generally simple production, but poor cloud point	On again, off again	Palm producing countries will try to promote domestic biodiesel production
Corn Oil	Increasing growth, but very limited market with food applications	Requires pre-treatment, but good cold flow	Generally good	Limited availability and biodiesel producers who can utilize it
Jatropha	Strong growth in plantings will bring supply in the coming years	Unknown	Good for vertically integrated companies	Producers at "grass-roots" will hold an advantage based on investment risk
Algae	Product available, but not currently at economical prices	Unknown	Good for vertically integrated companies	Viable product when economics come into line - yet little knowledge

New Feedstock Development



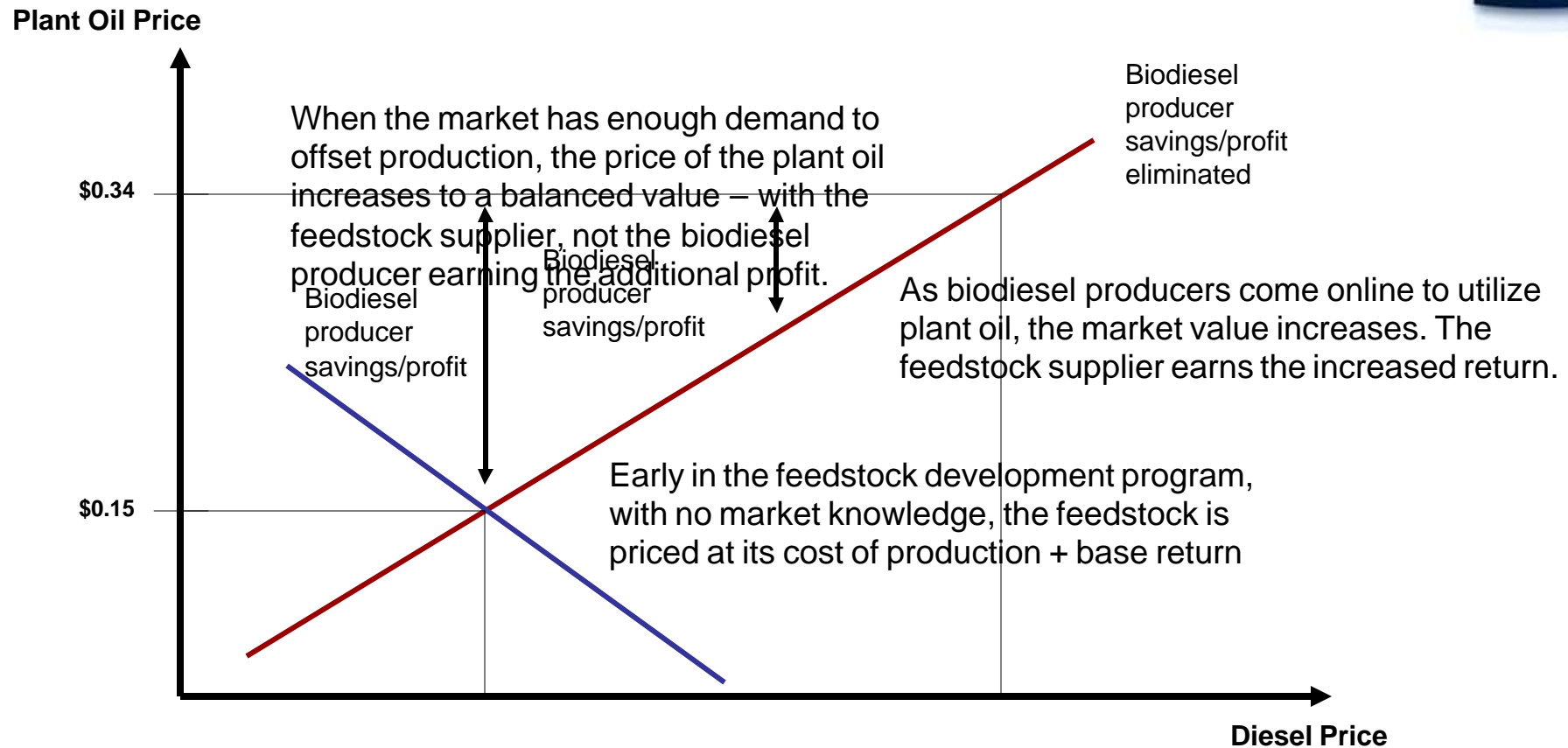
- Only a short term gain in new feedstocks:
 - > As the product is more readily available and useable as an energy product, the market price will be driven up to its energy value
 - > Even if you have feedstock control, need to value the feedstock at its energy value / market price
 - > Continued increase in global demand for fats and oils



New Feedstock Development



- A feedstock's price will move towards its energy value
(Example: Plant Oil with energy value of \$0.34/lb (\$3.05 - \$0.50 / 7.5 lbs))



Feedstock Supply Chain

- Planning considerations for a new plant:
 - > Plant size: production efficiency versus logistical challenges
 - > Storage and loading/off-loading efficiency
 - > True multi-feedstock production
 - Handling and chemical variations among materials
 - Impurities, moisture and transportation challenges
 - Effects of changes in feedstock composition in production and final product characteristics



New Technology Impact



New Technology Impact



- Technology will change the renewable fuel sector in two ways:
 - > Production and cost efficiency
 - > Development of higher value products
- Both result in a “higher propensity to pay”
 - > Companies with higher sales prices or lower production costs are able to pay more for feedstock and thus will drive up the price over their traditional energy value

New Biodiesel Competition

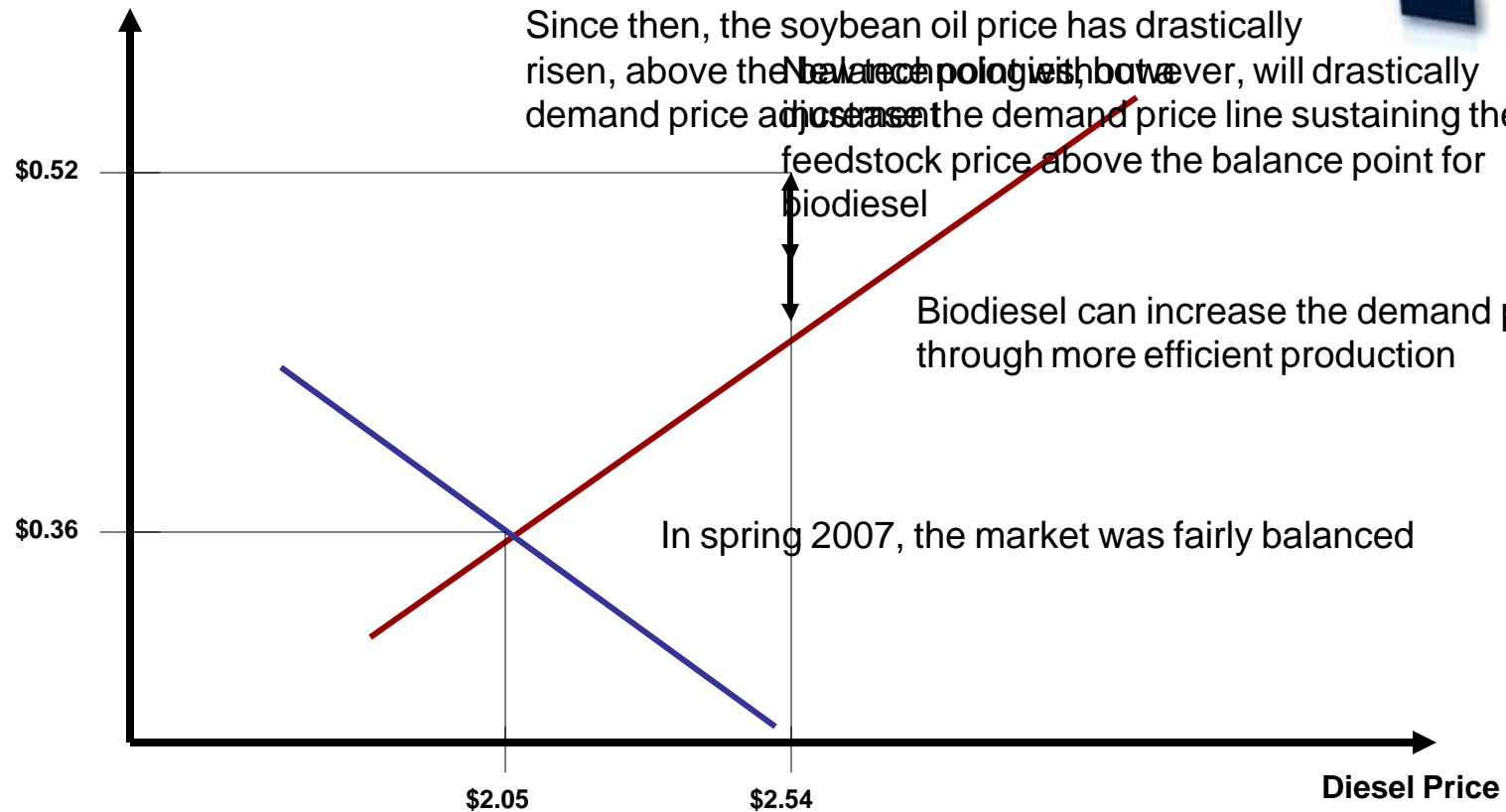


- Co-Processed Renewable Diesel
 - > (Conoco/Tyson – 2008)
- Singularly Processed Renewable Diesel
 - > (Syntroleum/Tyson, Neste – 2009/2010)
- Pyrolysis-based Renewable Diesel
 - > (Sanimax – 2010)
- Fischer-Tropsch BTL/GTL Diesel

Supply & Demand Curves



Soybean Oil Price



Summary - Markets

- Feedstock availability and pricing will continue to be the largest challenge facing biofuel producers
- Pricing of feedstocks will be drawn to their energy value as they are adopted for biofuel production
- Continued strength in feedstock prices as new technologies develop a higher propensity to pay



Summary - Producers

- Need to have multi-feedstock capability to switch materials as feedstock prices are effected by energy markets
- Finding long-term, true competitive edge through feedstock is very difficult, if not impossible
- Need to be lowest cost producer in the highest value biofuel (or at least in your particular market)





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