



Industrial Markets meet the “World of Agriculture”

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September 25, 2014 Genova



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Evolution of biobased products

Biobased products are not new.

- Vegetable oils, starch derivatives, proteins traditional industrial ingredients
- Development of petrochemicals displaced biobased products
- Starch & vegetable oil traditionally compete for space in Industrial markets; Paper, Building material, Paints & Coatings are early implementers.
- Biotechnology has enabled use of biobased feedstock for fermentation

Drivers for the Bio-Industrial revolution

Examples of historically used arguments to support biobased products:

- A better consumer experience; hard and soft factors
- Continuity; fossil based products are finite resources
- Economical advantages; cost reduction and diversification
- More dependable, renewable and lower-cost feedstock's
- More environmentally friendly products and processes; smaller environmental footprint



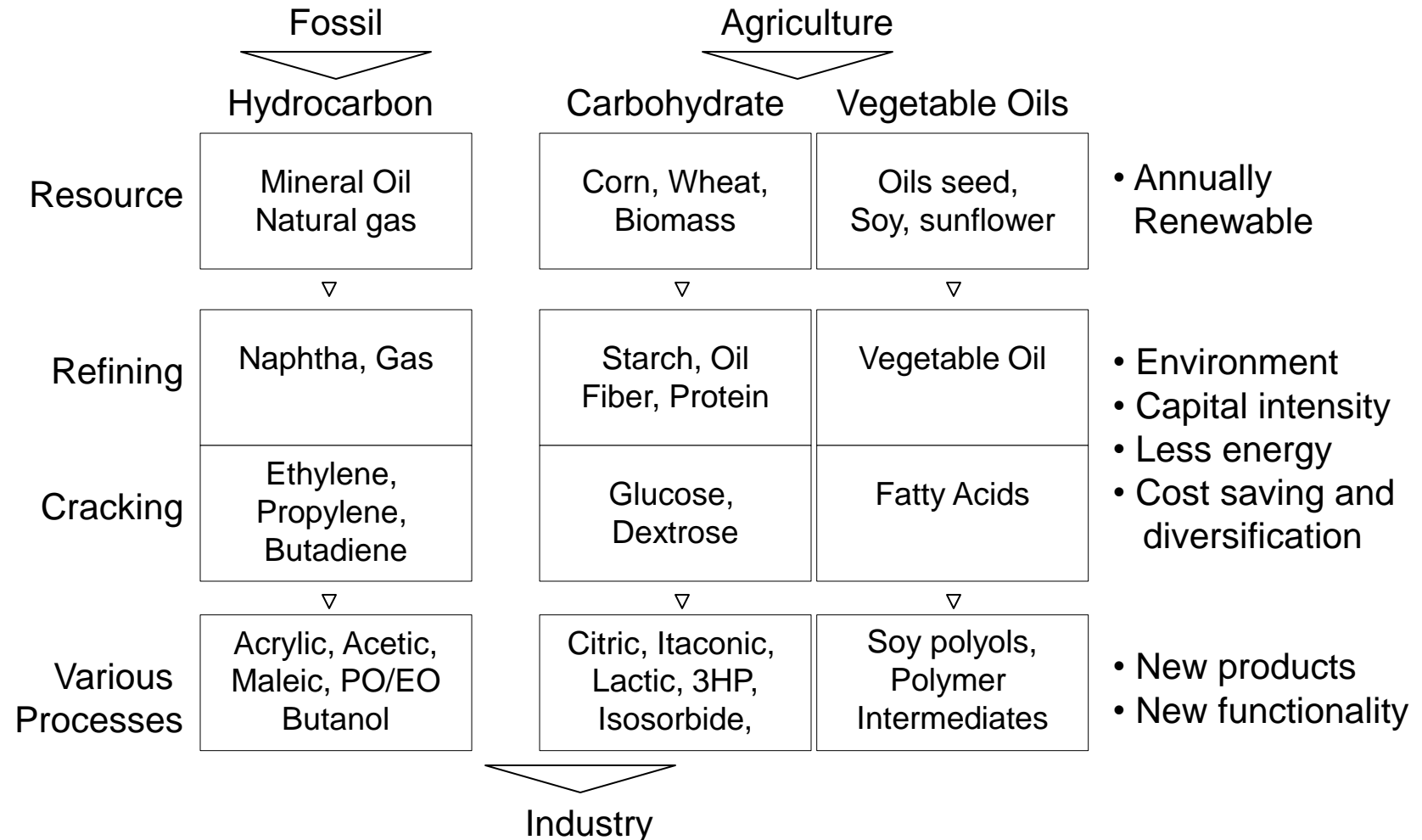
CargillTM

Industrial Bio-Products



**Fostering the
Bio-Industrial
Revolution**

The Biorefinery process: Farm to Industry



Processes are still valid, however some assumptions on feedstock have changed. Vast experience around time-to-cash created a new filter

Factors influencing Bio Feedstock

- **Supply : Grain/Root, Oilseeds**

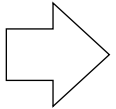
- Global trading Patterns
- Local trading habits & policies
- Weather events
- Regulatory Challenges
- Improved farming practices
- Process capacity utilisation
- Forex fluctuations
- Climate

- **Demand : Elasticity of Substitutes**

- Rationing behavior per feedstock grade
- Economical Growth/Contraction
- Population Growth
- Fund activity
- Geographical demand shifts
- Stock/Usage ratio
- Feed Conversion Rates
- Develop ways to use non-grain biomass for fuel
- Stimulated Bio-fuel demand

Current World Supply of Selected Commodities

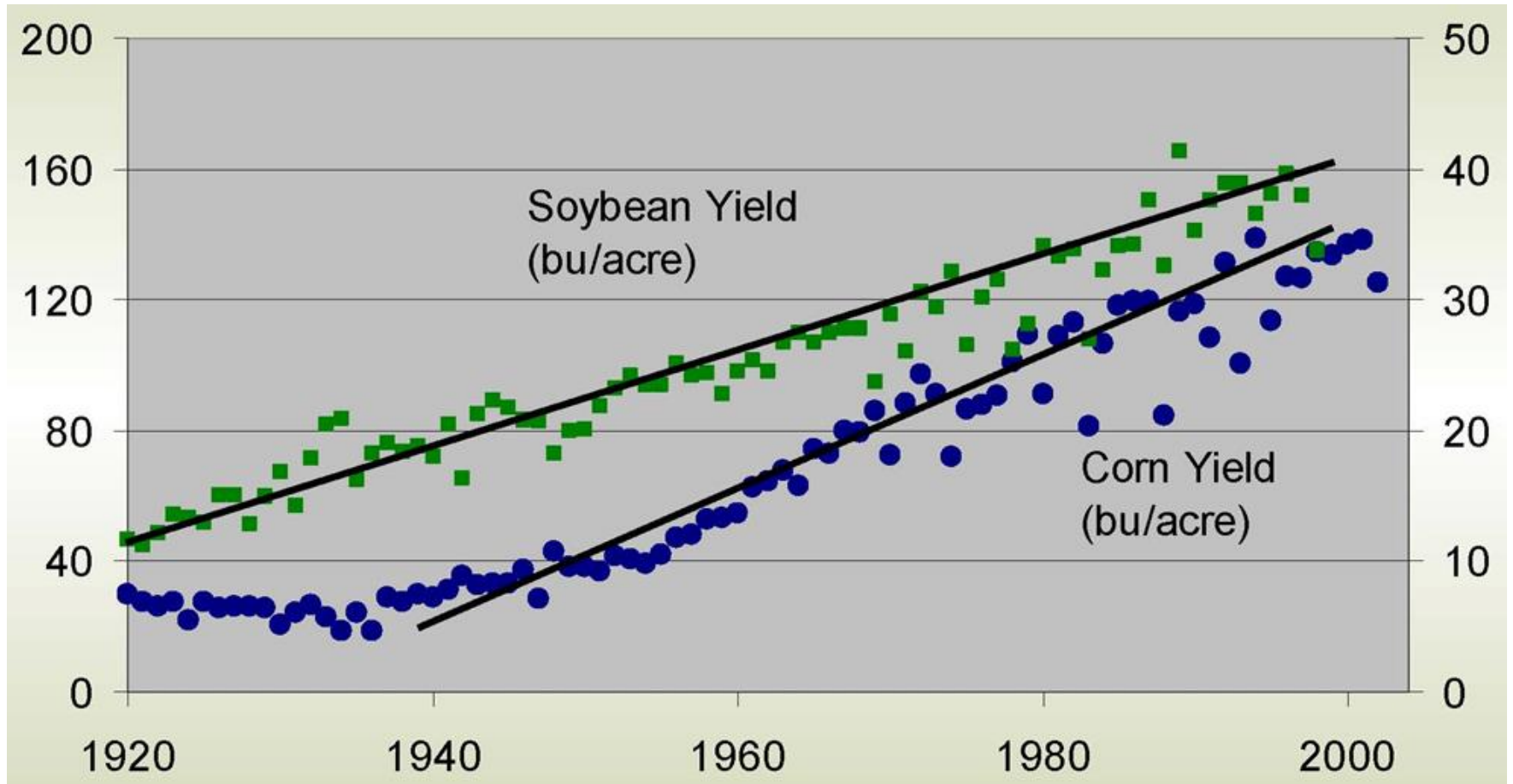
Commodity	Quantity (in MT/year)
Fats/Oils	~ 166 million
Sugar	~ 160 million
Crude Petroleum	~ 4,000 million
Grain/Rice/Oilseeds	~ 2,600 million



Crude remains the largest traded commodity/resource



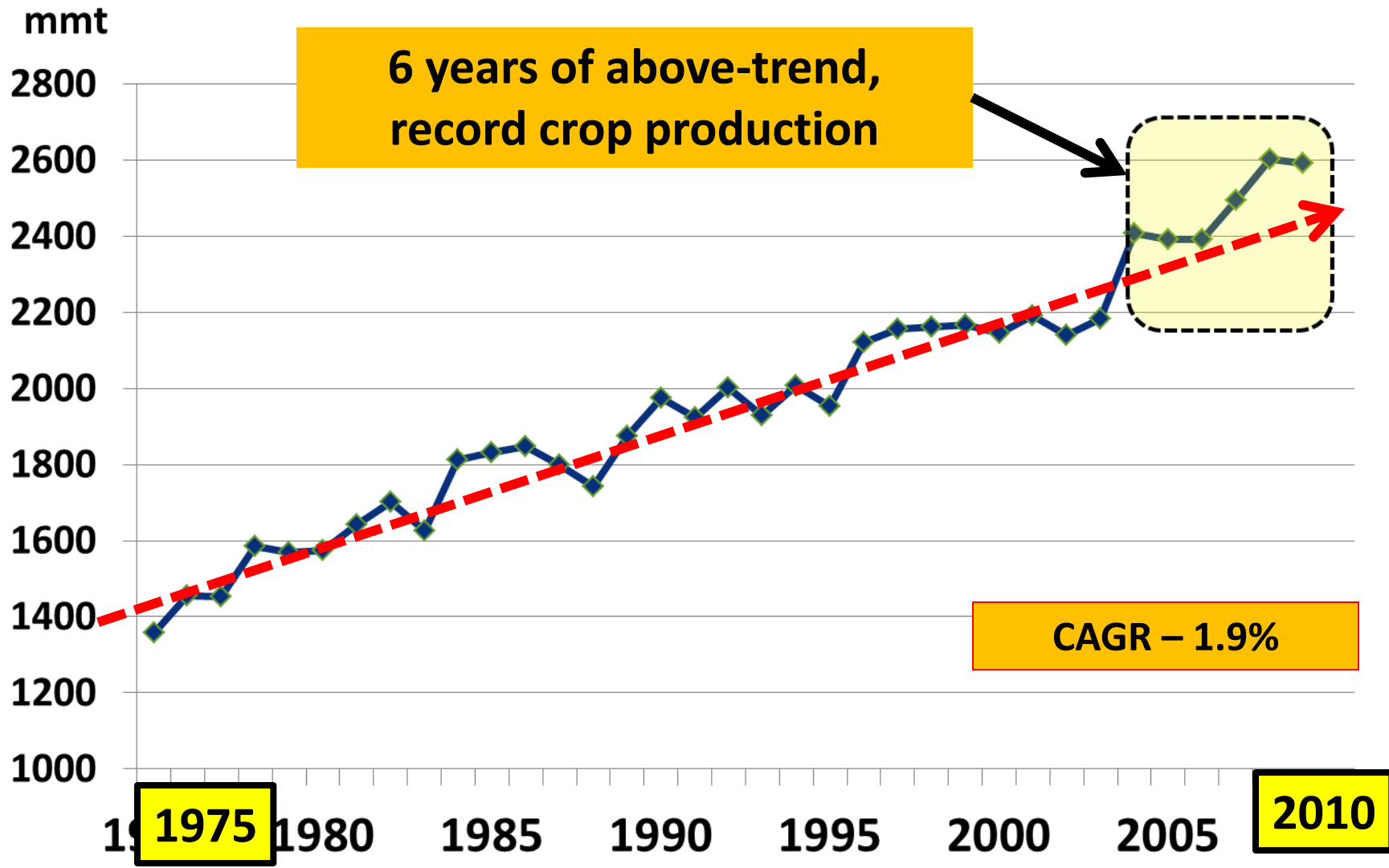
Crop Yields



Source: Internal Cargill

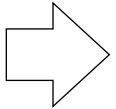
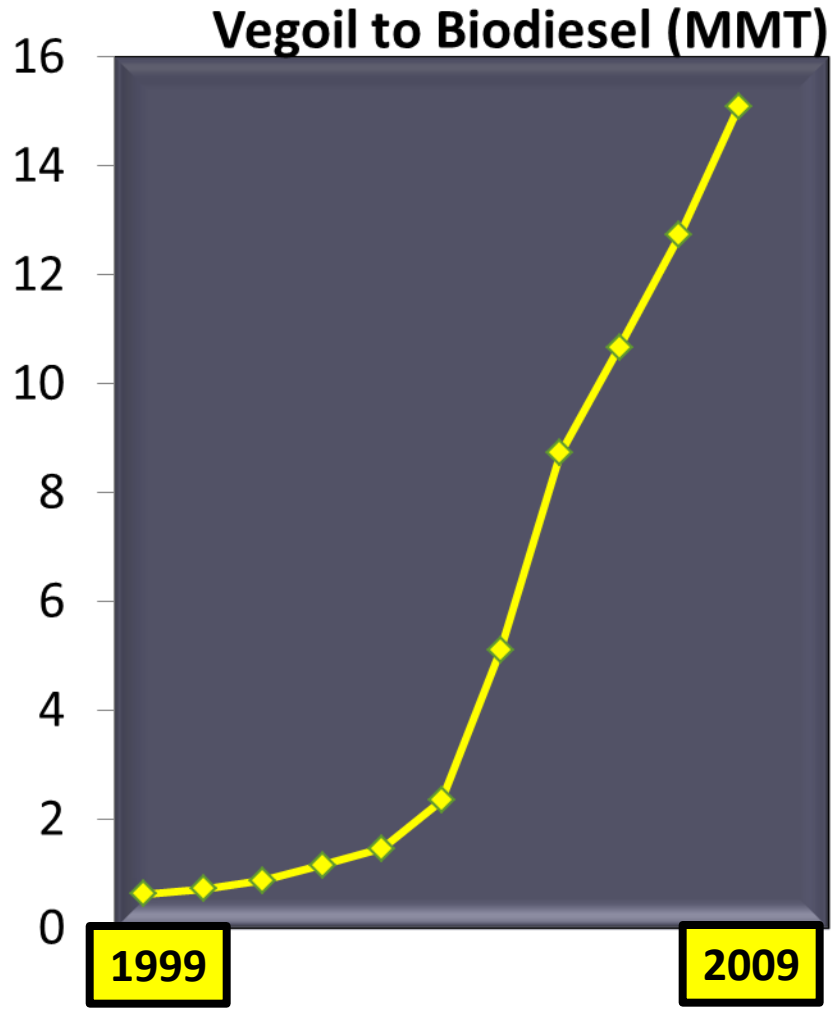
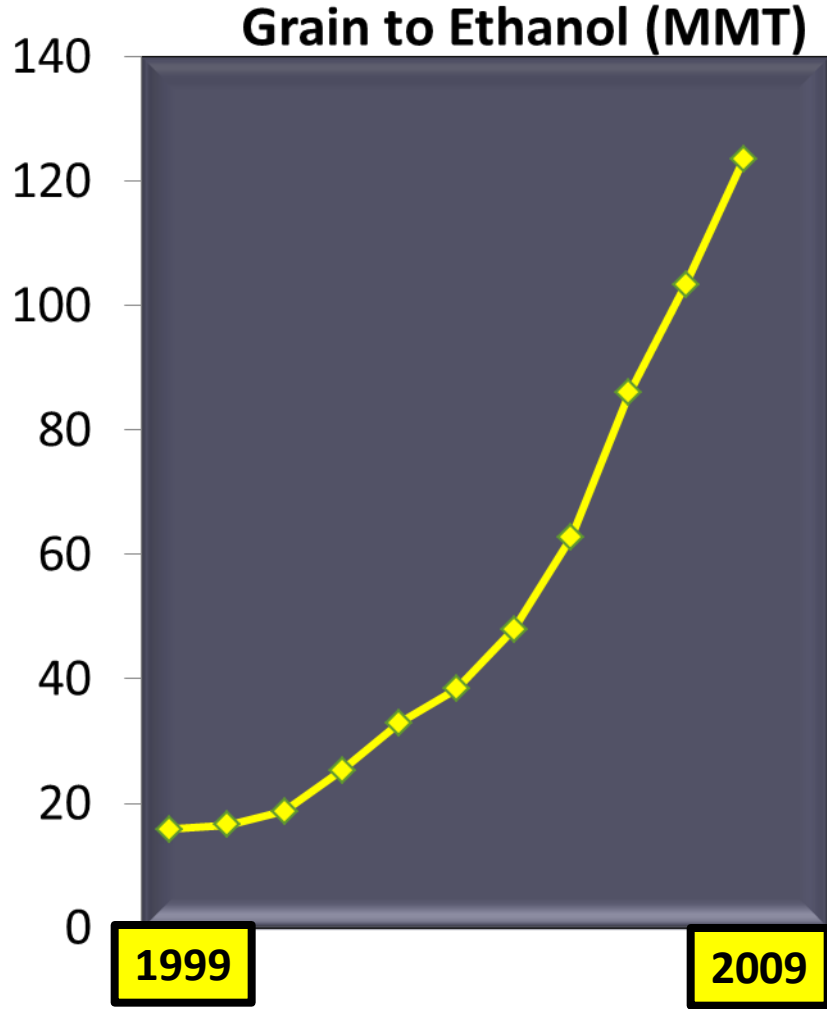
➔ Crop yields have continually improved to match the increased demand for agricultural products

Global Production of Grain, Rice, and Major Oilseeds



Source: USDA FAS

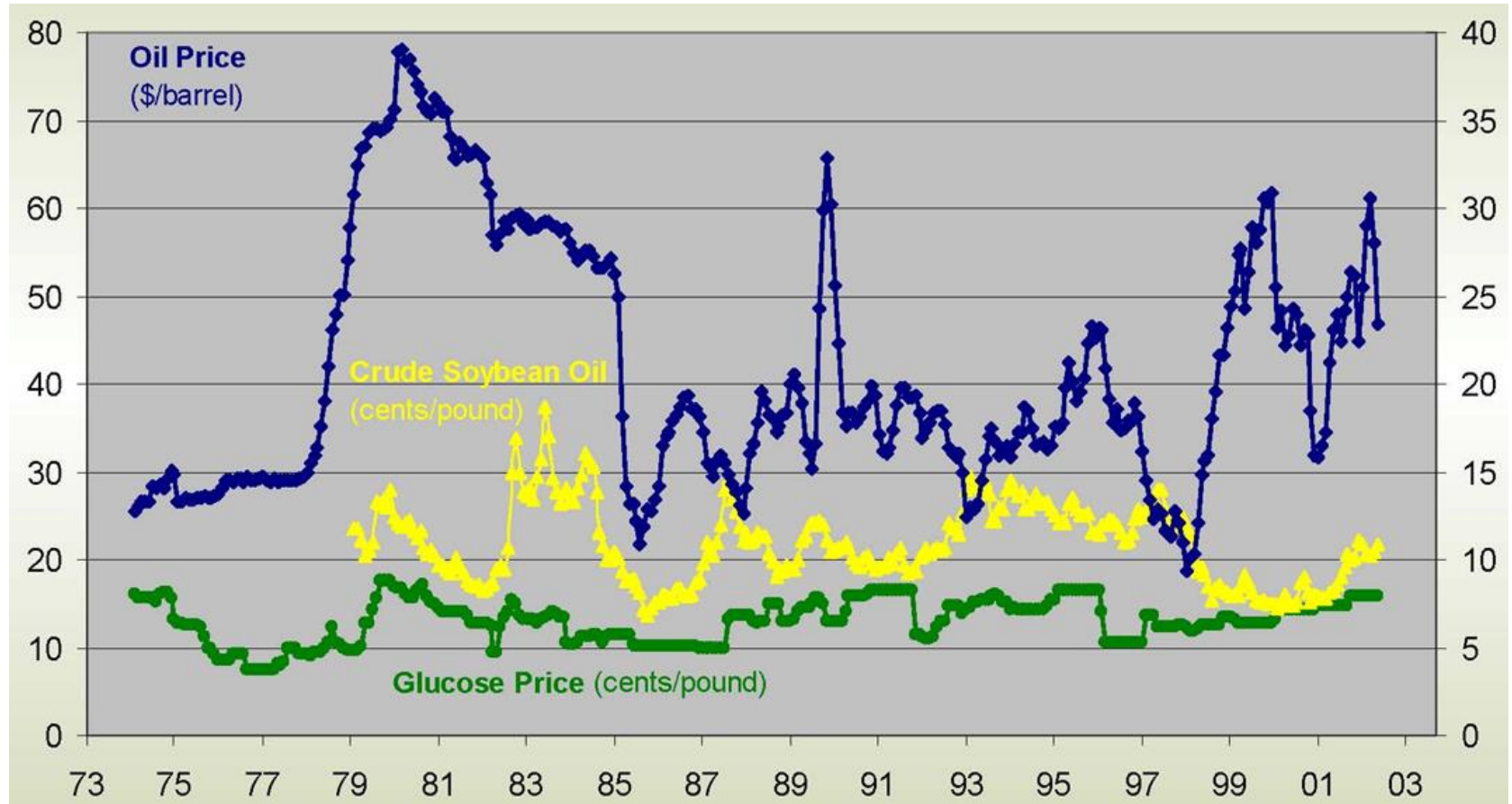
Bio-fuel impact on Grain & Oilseed Use



Bio-fuels related grain use has seen a steep increase in last 10 years

Source: Cargill

Price comparison: Crude, Glucose, Soybean Oil

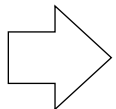


Source: Internal Cargill

Historically, biobased products provided cost opportunities versus a volatile crude price

Global Trading Patterns

- **Supply**
 - Maize (US) - Wheat (Europe) - Barley (All)
- **Trading**
 - Wheat Big 8
 - Corn Big 5
- **Regulatory and Weather**
 - Sugar beet and cane
 - Tapioca
 - Potato

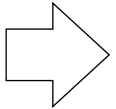


3 Large trading complex evolutions largely determine commercial pure feedstock cost

CBOT-Matiff Wheat Price 2000-2009 vs Stock/Use ratio

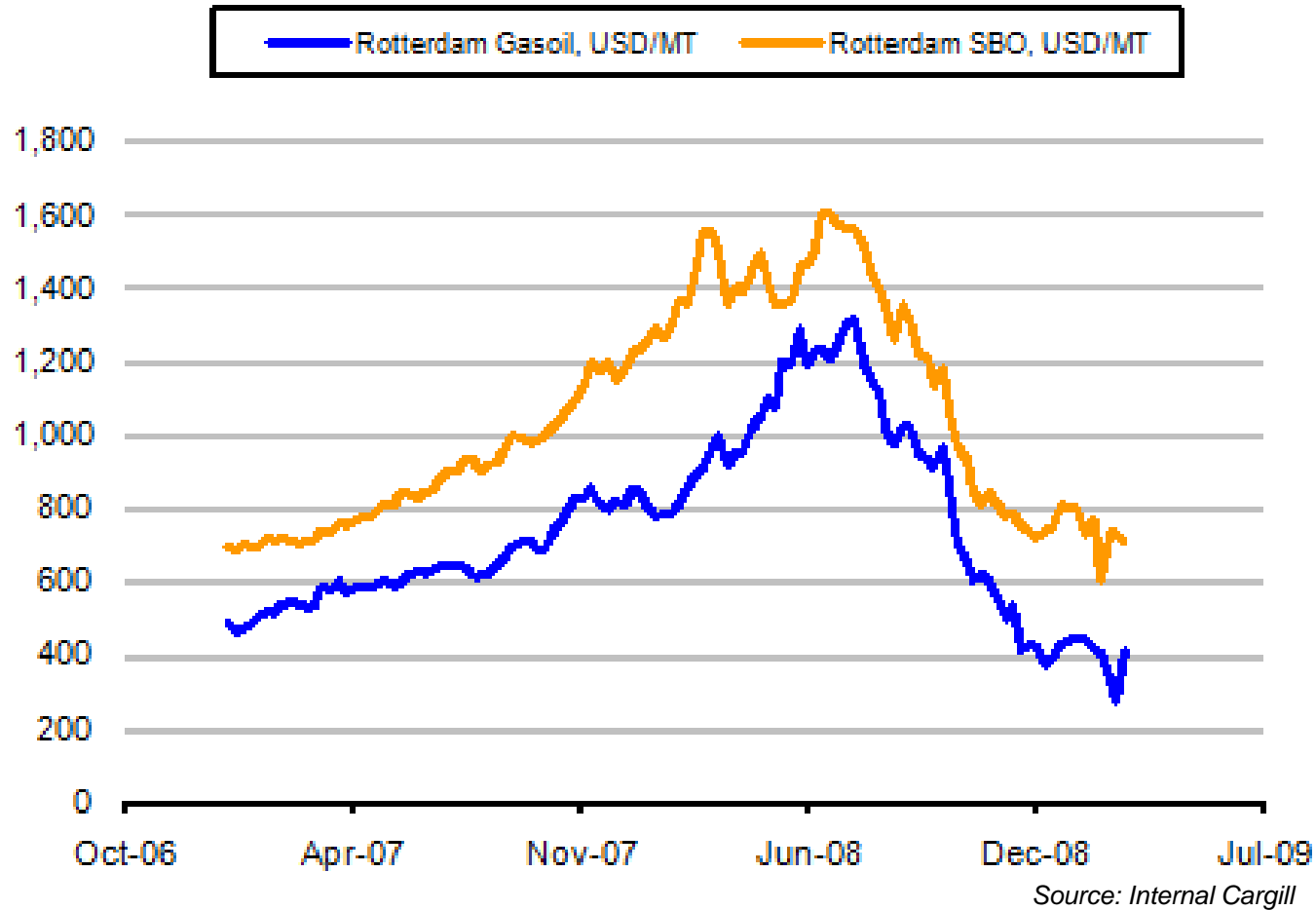


	2001	2002	2003	2004	2005	2006	2007	2008	2009
Stock/Usage	31%	26%	25%	32%	31%	28%	24%	30%	30%+



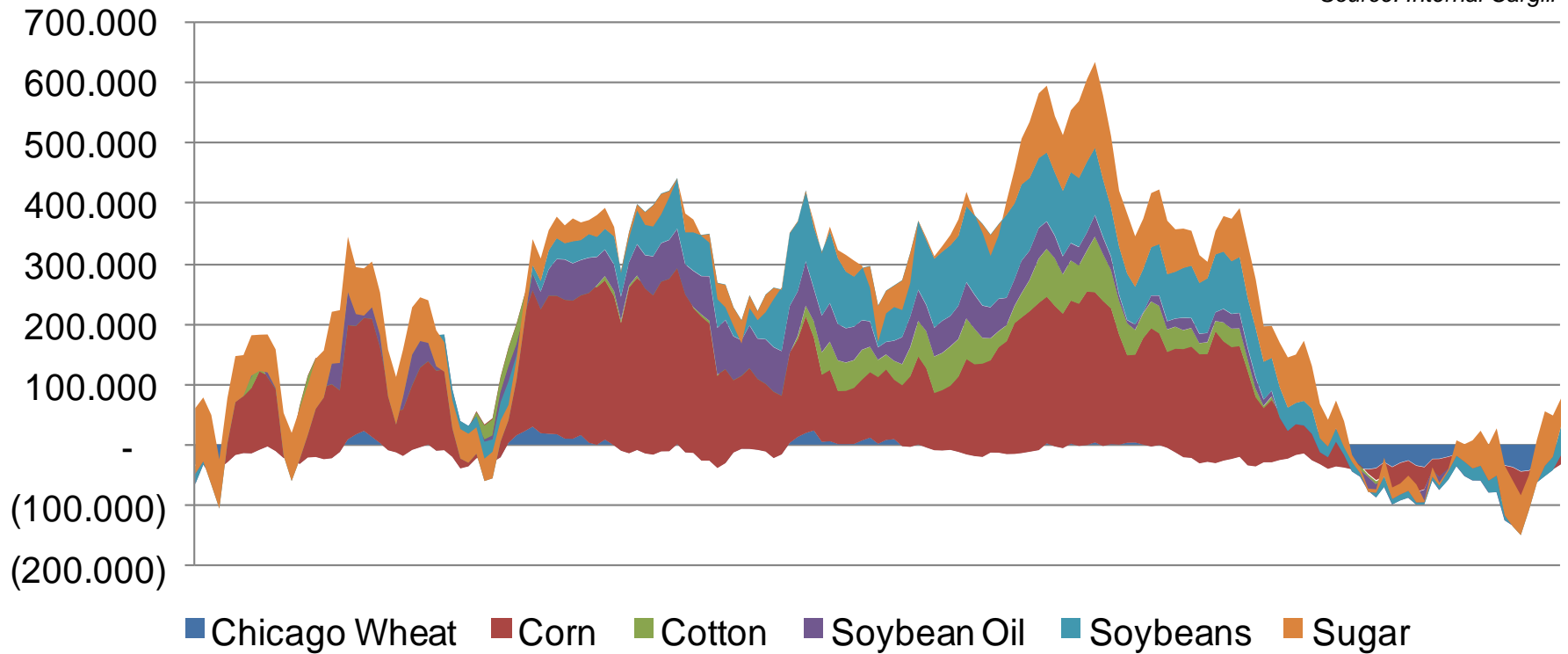
Wheat Stock/Use ratio remains a very strong fundamental indicator for wheat pricing

Price Comparison: Gasoil vs Soybean Oil

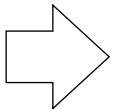
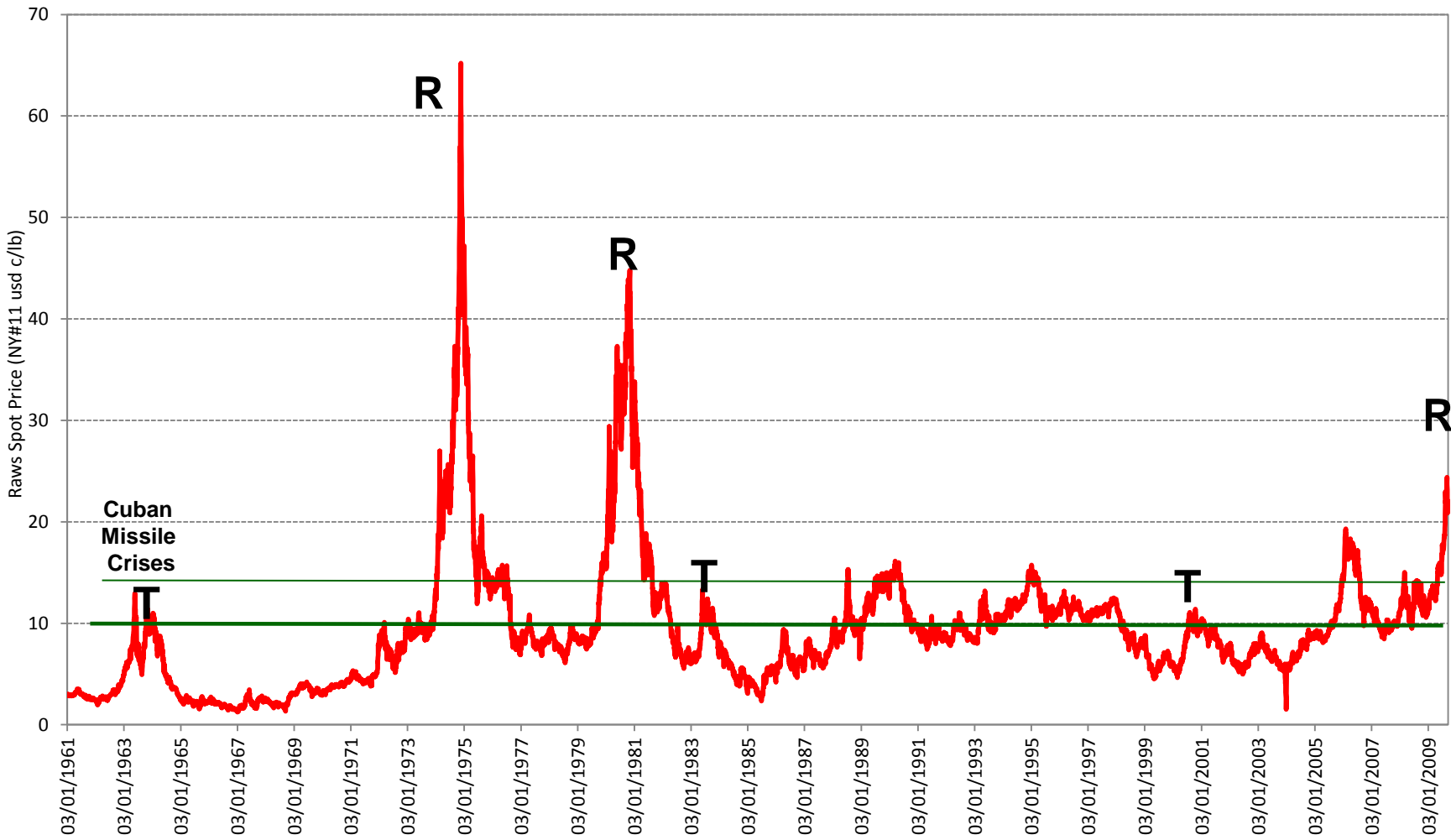


Fund Activity in Commodities

Source: Internal Cargill

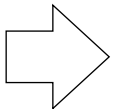
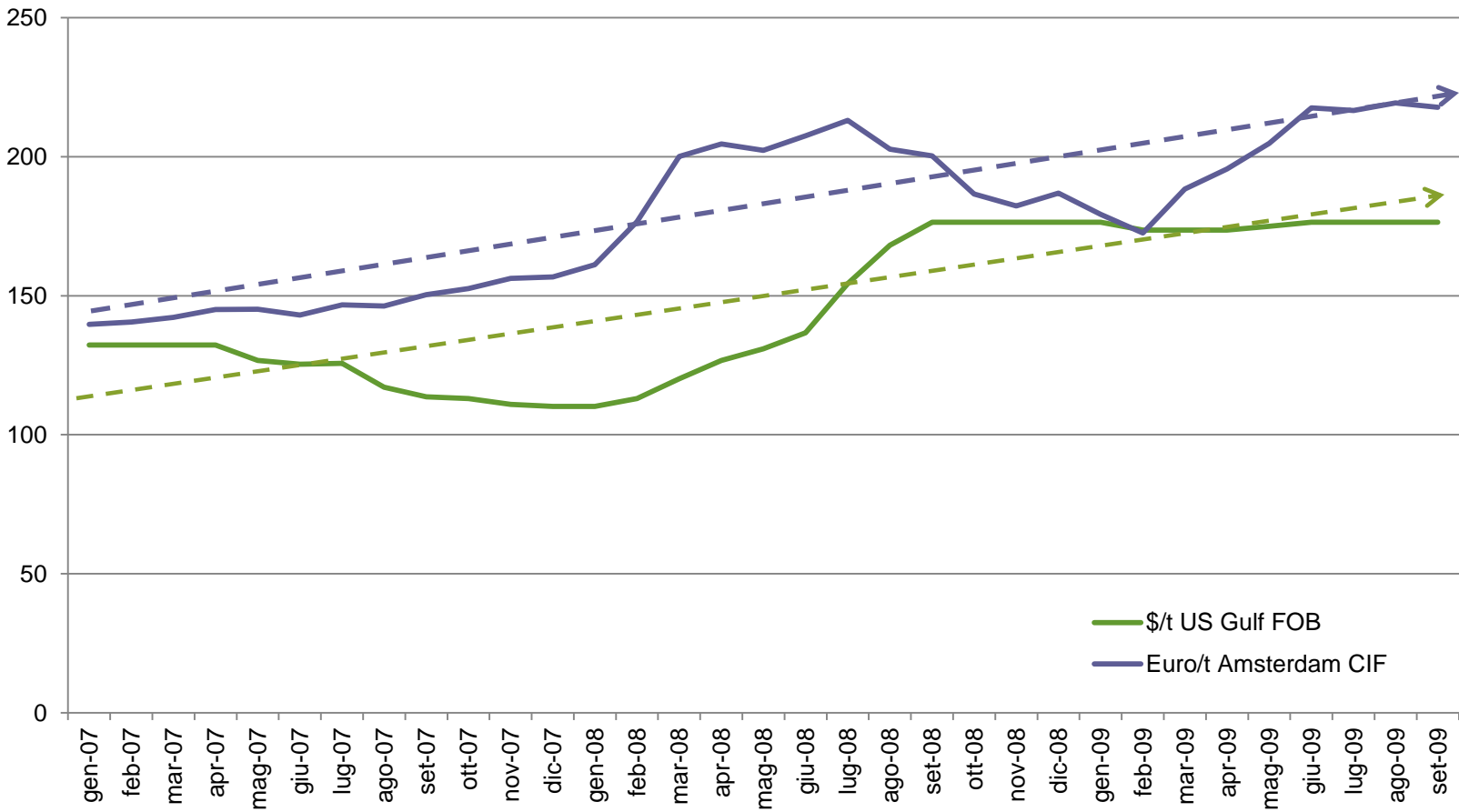


Sugar Price Evolution



Sugar price rally requires 3 factors : Tightening S&D, Economic Rebound (U), Overall Commodity price drive

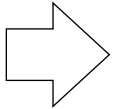
Molasses Price Evolution



Significant production dismantled in Europe has influence Molasses trade flows, coupled by the dramatic production dip in India

Feed Conversion Ratios - Effect Land Use

Animal	Feed Conversion Ratio (Approx.)
Cattle	8 : 1
Hogs	4 : 1
Poultry	2.5 : 1
Fish	1 : 1



50pct of Global grain and oilseed demand is fed to animals. Changes in animal protein consumption have an impact on grain markets



Thank you for your attention

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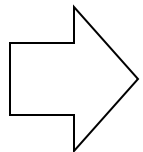
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The new realm

Future biobased product initiatives can have one or some of below elements underneath their success :

- Novel catalysts, enzymes and process technologies for improved yields and selectivity
- Deep insights and understanding of agriculture-based ingredients and their physical and molecular chemistry (Food/Fuel)
- A purpose fit relationship between the players involved in delivering from farm to consumer



Initiatives solely depending on a consistent low feedstock price will be more vulnerable in the new environment.

EXPECT INNOVATION

DESIGN

TECHNOLOGY

SUSTAINABILITY

ErgoStep™ Backing

with

BiOH
A Cargill Innovation

800.248.2878 tandus.com

MONTEREY C&A CROSSLEY

LEAVE NO TRACE™

 **Tandus**
EXPECT INNOVATION

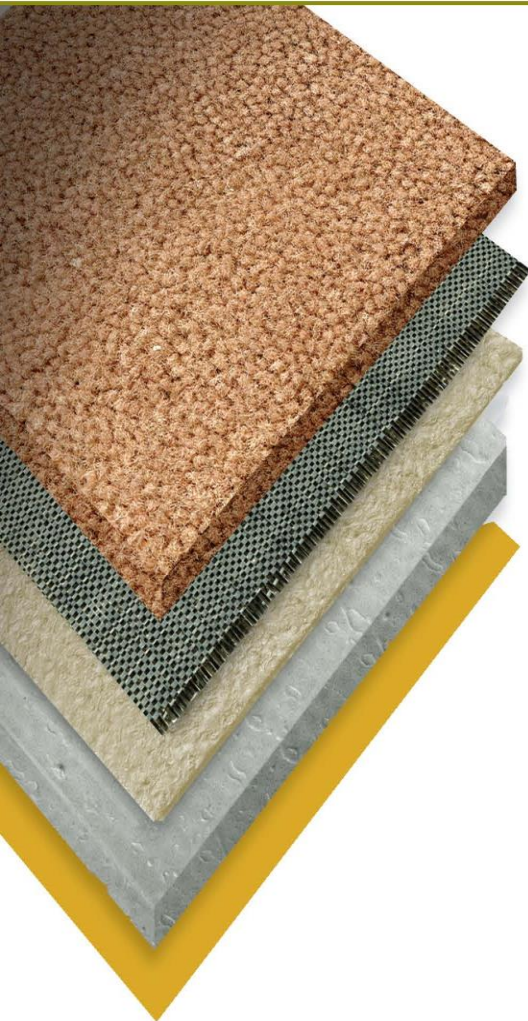
For more than 40 years, Tandus has been examining ways to be a better corporate citizen and environmental steward. While we are proud of our many significant, real accomplishments, and know that we have made a positive and lasting difference in the world, **we understand that sustainability is a journey, not a destination.** We realize there is much more to do and are committed to following and finding new roads to reducing our environmental footprint.

As a result, Tandus is the first carpet company to partner with Cargill to use a biobased polyol cushion. Developed by Cargill, BiOH™ production uses ingredients from soybean oil,* which results in 36% less global warming emissions and uses 61% less non-renewable energy than traditional polyols¹. At Tandus, our goal is nothing less than unwavering, environmental accountability. Our culture is about making a difference, and our environmental commitment is to LEAVE NO TRACE™, becoming givers to, rather than takers from, the Earth.

*Though BiOH™ Polyols are made from soybean oil, they do not have a significant impact on global food supply due to the small scale of the polyol market relative to total vegetable oil supply.

¹Results from a preliminary life cycle analysis by Five Winds International.

ErgoStep™ Backing



Face Yarn

Primary Backing

Pre-coat

ErgoStep™ Backing with BiOH polyols

Broadloom

Size
12 foot/3.6 m
(width minimum)

Installation
Direct glue

Warranty
10 years

Primary Backing

Features Woven Polypropylene
Function Low static propensity
Low moisture absorbency
Provides flexible strength
Benefits Durability

Pre-coat

Features Polymeric Binder
Function Maintains excellent tuft bind for life of carpet
Maintains flexibility over a wide range of temperatures and site conditions
Creates a polymeric bond between the primary and attached backing for a unified composite material
Benefits Withstands heavy foot traffic
Facilitates seaming and pattern match

ErgoStep™ Backing

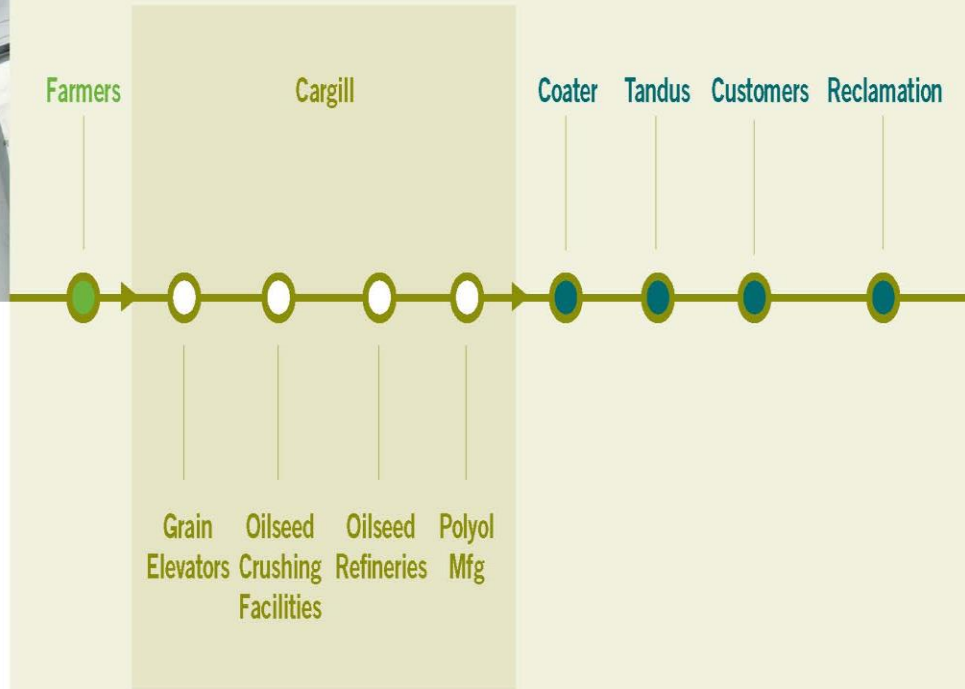
Features High Density Polyurethane Cushion with BiOH polyols
Function Cushion comfort
Benefits Adds comfort
Reduces crushing
Extends carpet life cycle
Complies with CRI Green Label Plus Standard
Felt 100% PC recycled-content Polyester

ErgoStep™ Backing is:	oz/yd ²	%Post Consumer Recycled Content	% Biobased
Polyurethane Cushion	28	18	10
NonWoven PCR Polyester Felt	4.5	100	0
ErgoStep Backing	32.5	30	8.6



BiOH polyols – A Vertically Integrated Value Chain

Helping Reduce Our Environmental Footprint



LEED® Certification

Guideline specifications in order to contribute to the achievement of LEED certification

	Face Wt. oz/yd ²	% Post Consumer Recycled Content (Total Product)	% Biobased
Monterey/Crossley	22	10.5%	3.0%
	41	8.7%	2.5%

- The “eco” story started as an upgrade: NaturalLEE
- Six months later, they made many of the NaturalLEE options standard across their furniture line
- LEE’s business has continued to prosper over the past 18 months



Read below to learn more about each earth-friendly step we took to make naturalLEE.

1. Seat Cushions: The seat cushions are made up of Preserve[®] foam core with fiber wraps in a 100% cotton down proof ticking. The Preserve foam replaces 20% of the petroleum-based ingredients with a renewable soy-based BiOH[™] polyol. The fibers are 80% regenerated fibers. Regenerated fibers consist of virgin fibers and waste fibers that are added with a binder fiber. This reduces the amount of waste that would normally go into our nation’s landfills.

2 & 3. Back & Throw Pillows: The backs and throws are made up of 100% recycled fibers made from clear and white plastic bottles. The recycled material is reprocessed into its original form and then into fiber. The cushion casing is made up of 100% down proof ticking.

4. Seat Deck & Trim Pad: The seat deck and trim pad are made up of 80% regenerated fibers that consist of virgin fibers and waste fibers that are added with a binder fiber.

5. Arm Padding: Foam padding is Preserve[®] foam with soy-based BiOH[™] polyol. A fiber overlay made up of 80% regenerated fibers that consist of virgin fibers and waste fibers that are added with a binder fiber.

6. Finish: Not only naturalLEE, but all LEE frames use only water-based finishes.

7. Fabric: Fabrics are made from organic and natural fibers. This is in addition to our premium selection of LEE fabrics.


8. Frame: Constructed of engineered laminate panels and soy-based resins. These panels use less old growth timbers and maximize lumber yields, making these truly environmentally friendly products. All of our suppliers voluntarily adhere to the Sustainable Forestry Initiative (SFI); all of our laminate frames meet this stewardship ethic. Even more, the springs used in our frames are made from 60% recycled metal.

9. Recycling: Our efforts go beyond naturalLEE. Throughout the organization we recycle paper, plastic, aluminum products and cardboard. In manufacturing, all fabric, trimmings, and fiber waste are recycled through a national waste management company who, in turn, distributes almost 100% of our raw materials for use in other products.

As part of our commitment toward a better future, one tree will be donated to American Forests[®] for every piece of naturalLEE furniture sold.

Partnership with HOM Furniture

- We are partnering with HOM Furniture to promote the use of BiOH[®] polyols in the Serta mattresses they carry
- Bedding sales associate training, product information, and social media support
- Not necessarily promoting the mattresses as “green”, but identifying the benefits of the soy foams with BiOH polyols



made with
BiOH[®]

BiOH[®] polyols are soy-based ingredients that replace a portion of the petroleum materials in foam. They have a smaller environmental impact through lower energy use and a smaller carbon footprint.

BiOH[®] is a trademark of Cargill, Inc.

The positive environmental impact of one piece made with BiOH[®] polyols may be small. However, by working together to demand products made with BiOH polyols, the environmental savings can be significant.

You Can Make A Difference



BiOH[®]
www.experiencebioh.com

Platinum Plus Carpet Cushion through Home Depot Stores

- Sold as the premium carpet underlayment at Home Depot
- Premium driven by both product performance as well as green/healthy message



HEALTHIER CHOICE
PREMIUM CARPET CUSHION

Platinum Plus / Calidad Platino Plus

FOAM The best of eco-friendly memory foam with all the features of our premium shock absorber, providing ultimate comfort and protection for the carpet helping it last longer and so longer.	Hecho de una espuma viscoelástica que actúa como resorte de amortiguador en minutos, proveyendo comodidad y protección para el alfombrado, ayudándole a durar más y a durar más.
BiOCH Made in part with eco-friendly soy-based BiOCH™, a product that results in 20% less global warming emissions and a 61% reduction in non-renewable energy use than the standard product it replaces.	Hecho en parte con la biotecnología de soja BiOCH™, un producto que resulta en un 20% de menos emisiones de calentamiento global y un 61% de reducción en el uso de energía no renovable que el producto estándar que lo reemplaza.
Ultra Fresh Providing protection against mold, mildew and bacteria, ultra-fresh technology is your assurance of a healthy, odor-free home.	Proporciona protección contra el moho y bacterias, y aromas frescos en su familia para un hogar saludable y sin malos olores.
MOISTURE BLOC The foam acts as a breathable moisture barrier like a waterproofing vapor barrier, keeping liquid spills while allowing vapor to evaporate and escape. Protects softwood and hardwood composite decks.	La espuma actúa como una barrera de humedad respirable como si fuera un aislante impermeable de las membranas, evitando cualquier derramamiento de líquidos mientras que el vapor permite el escape y la salida de los vapores. Proteja los pisos de madera y los pisos de madera compuesta.
GREENGUARD Equivalent for all indoor "green" floors, all not by but due to meeting the other passing. The microbubble construction offers outstanding heat transfer and a low VOC value.	Equivalente para todos los pisos de madera y compuestos, no se trata por causa de la placa de calentamiento como otros aislantes. La construcción microburbuja ofrece un excelente aislamiento térmico y un bajo VOC.
GREENGUARD The assurance of the very best indoor air quality, the only carpet cushion which is GREENGUARD Indoor Air Quality Certified placing the nation's most stringent air-polluting criteria for low emitting building products.	Su garantía de aire más limpio en la habitación interior. La única opción de alfombrado que es Certificado con el Certificado de Aire Interior GreenGuard® garantizando la más alta calidad de emisión de gases en un hogar por sus bajas emisiones en sus procesos de construcción.

HEALTHIER CHOICE
PREMIUM CARPET CUSHION

TIME WARRANTY

Made with **BiOCH** soy-based technology

INDOOR AIR QUALITY
VOC Emissions Comparison

HEALTHIER CHOICE OTHER CUSHIONS

WWW.HEALTHIERCHOICE.COM



Industrial Markets meet the

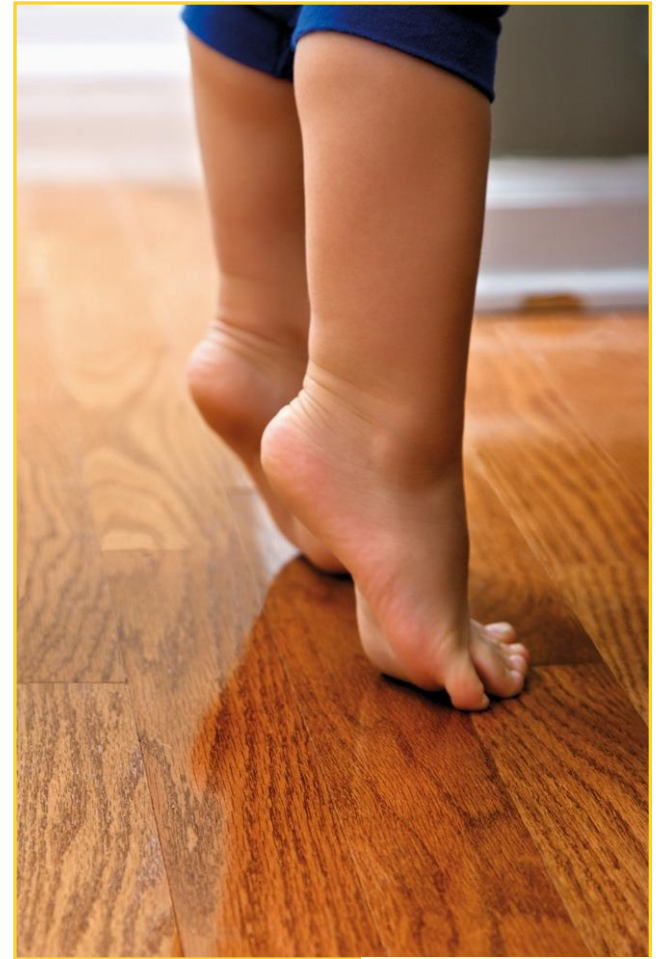
What is **AsWood™** ?





What is **AsWood™** ?

- **AsWood™ is Dynea's new family of low emission adhesives**
- **It is a concept for achieving emission levels at the level found in natural untreated wood**
- **Dynea's resin solution for panel boards and wood based products that are used in situations where people are particularly sensitive to indoor air quality.**
- **Registered trademark**



AsWood
by dynea