

POTS Kuala Lumpur

U.S. Biodiesel

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October 15, 2012



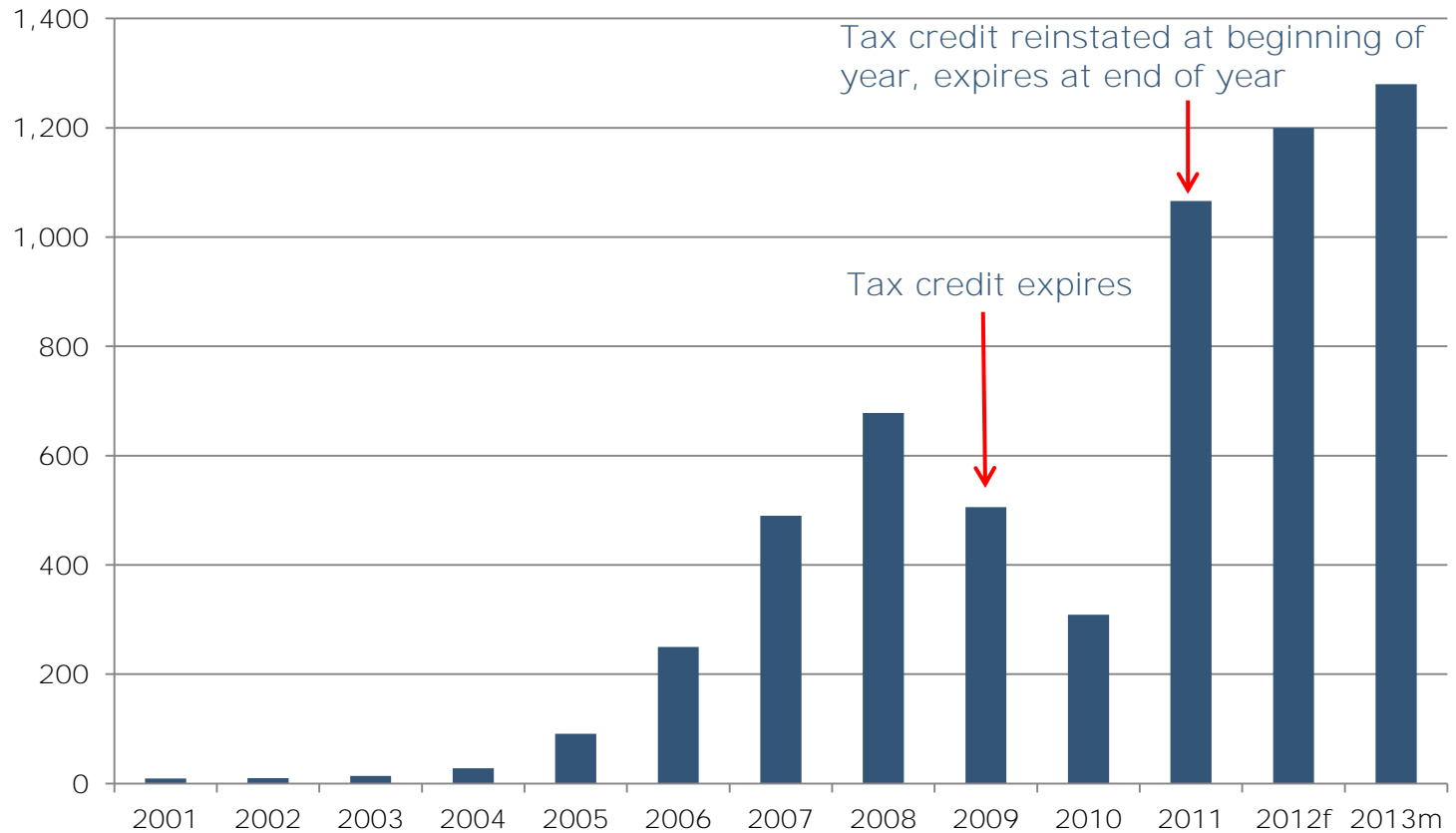
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U.S. Biodiesel Production

Tax treatment has been inconsistent, leading to rocky growth.

Volume mandates are needed to provide framework for more stable growth.

Million gallons



Source: US EPA EMTS, 2012



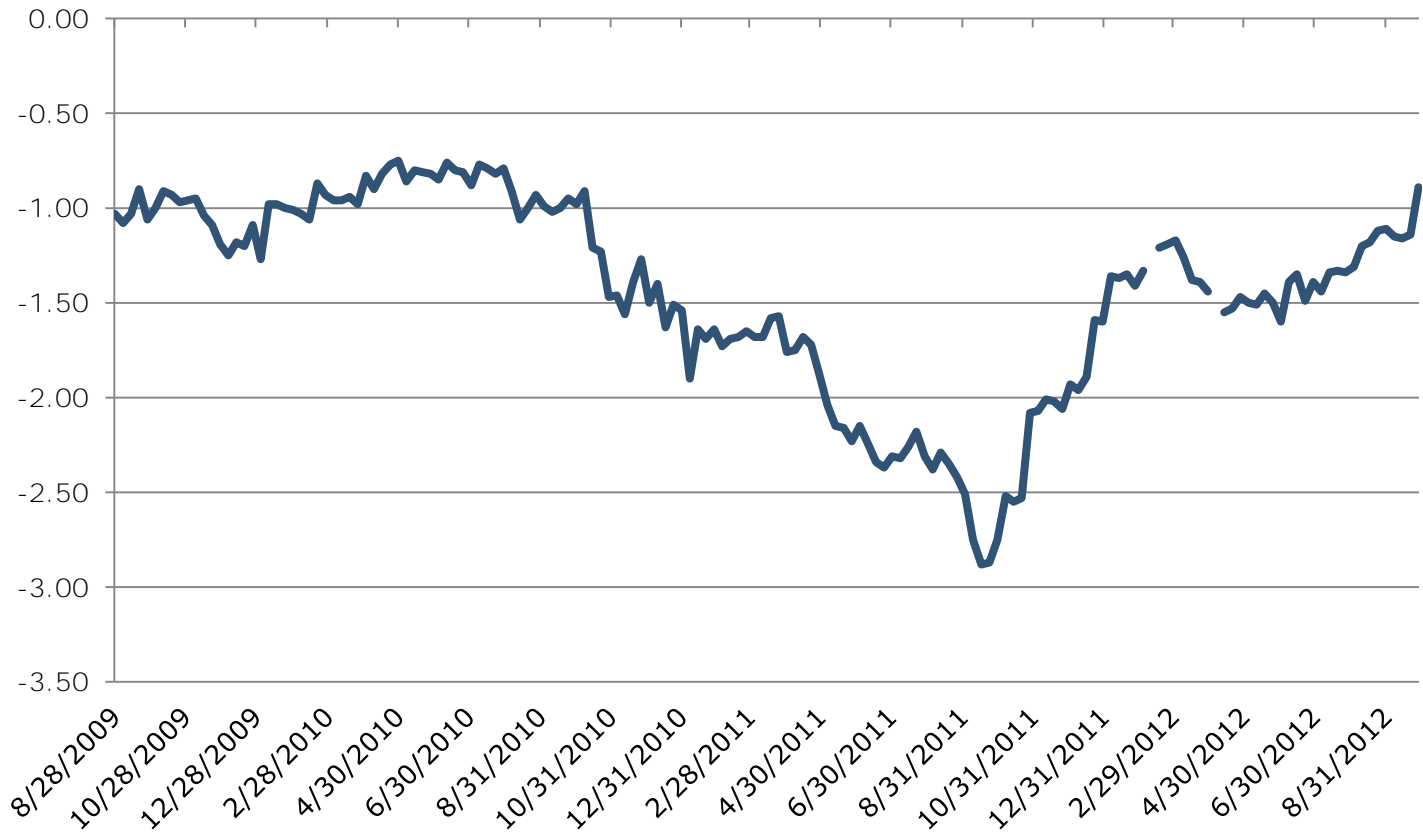
Biodiesel Blending Margin

Wholesale Diesel Price – B100 Biodiesel Price

Biodiesel cost of production and market price exceeds price of petroleum diesel.

Blending margins are negative.

Production is driven by mandates, not economics.



Source: Bloomberg, Rabobank, 2012

Renewable Fuels Standard – RFS2

RFS2

Billion gallons

Complicated

Corn ethanol production flattening.

Delta is in advanced biofuels, specifically biodiesel.

	RFS1	RFS2 Total	Advanced Biofuels Total	Cellulosic Biofuel	Biomass Based Diesel	Implied Other Advanced	Implied Corn Ethanol
2006	4	-	-	-	-	-	-
2007	4.7	-	-	-	-	-	-
2008	5.4	9	0	0	0	0	9
2009	6.1	11.1	0.6	0	0.5	0.1	10.5
2010	6.8	12.95	0.95	0.0065	0.65	0.2935	12
2011	7.4	13.95	1.35	0.0066	0.8	0.5434	12.6
2012	7.5	15.2	2	0.00865	1	0.99135	13.2
2013	-	16.55	2.75	0.01	1.28	1.46	13.8
2014	-	18.15	3.75	1.75	≥1.28	1	14.4
2015	-	20.5	5.5	3	≥1.28	1.5	15
2016	-	22.25	7.25	4.25	≥1.28	2	15
2017	-	24	9	5.5	≥1.28	2.5	15
2018	-	26	11	7	≥1.28	3	15
2019	-	28	13	8.5	≥1.28	3.5	15
2020	-	30	15	10.5	≥1.28	3.5	15
2021	-	33	18	13.5	≥1.28	3.5	15
2022	-	36	21	16	≥1.28	4	15

Source: US EPA, 2012



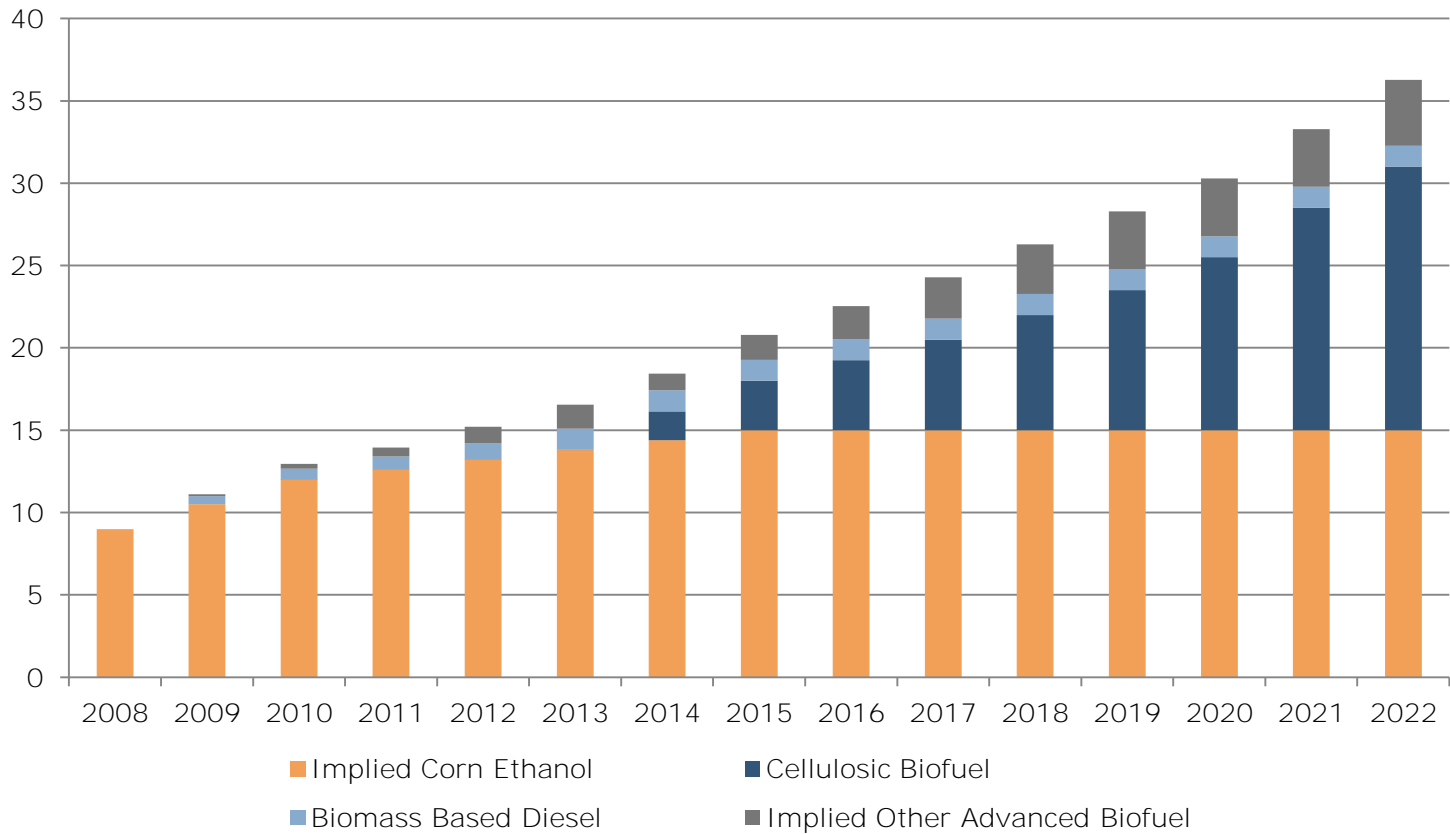
Renewable Fuels Standard – RFS2

RFS2

Billion gallons

Corn ethanol production flattening.

Delta is in advanced biofuels, specifically biodiesel.



Source: US EPA, 2012

Potential RFS Feedstocks

Classification	Minimum GHG Reduction	Potential Feedstocks
Cellulosic	60%	Cellulose, hemi-cellulose, lignin from dedicated crops (miscanthus, switchgrass), crop residue (corn stover), trees, algae, yard and food waste
Biomass-based Diesel	50%	Vegetable oils, animal fats, waste grease, animal byproducts
Other Advanced	50%	Anything that qualifies for cellulosic or bio-based diesel plus sugar cane or non-corn starches
Renewable	20%	Any of the above plus corn

Source: US EPA, 2012

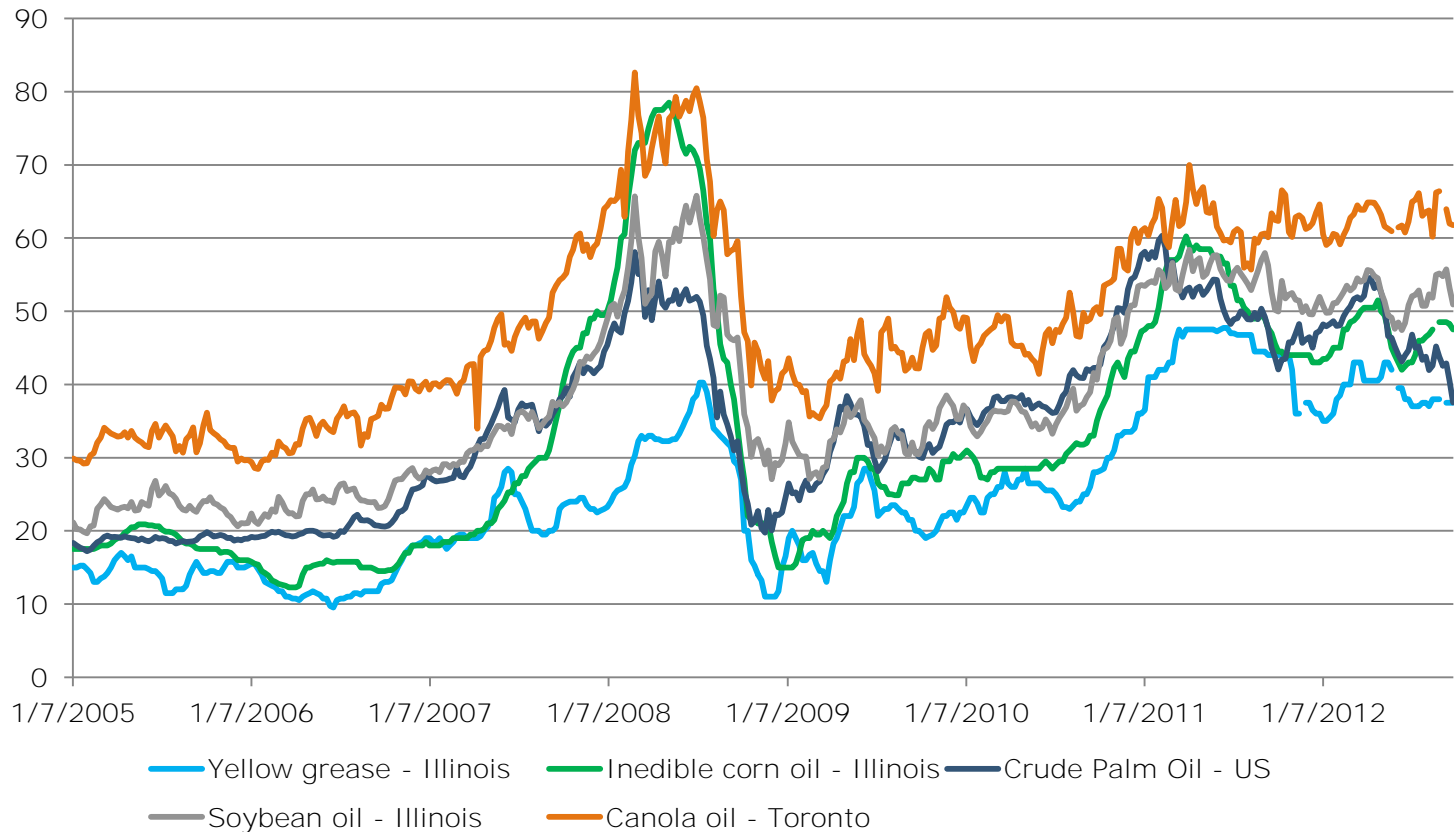
Biodiesel Feedstock Prices

US cents/lb

There are some cheaper alternatives to soybean oil...

But grease and palm oil have higher cloud points...

Better suited for renewable diesel production (provided palm can be approved as a pathway).



Source: Bloomberg, 2012

U.S. Biodiesel Industry

103/195 plants operating

Total capacity = 2.1 billion gallons installed capacity (2.9 nameplate capacity)

Top 5 = 25% market share

Top producers:
Renewable Energy Group
RBF Port Neches
AGP

Green Hunter Biofuels

Imperium Grays Harbor



Source: Biodiesel Magazine, 2012

EPA 2013 Feedstock Projection

1.28 Billion Gallons Mandated

2012 YTD run rate is 1.2 billion gallons.

Feedstock	% of total feedstock	Biodiesel production volume (gal)	Feedstock required (lbs)
Corn oil (mostly from ethanol)	23%	300,000,000	2,280,000,000
Yellow grease & rendered fats	30%	380,000,000	2,888,000,000
Virgin vegetable oil	47%	600,000,000	4,560,000,000
Total	100%	1,280,000,000	9,728,000,000

Source: US EPA, 2012





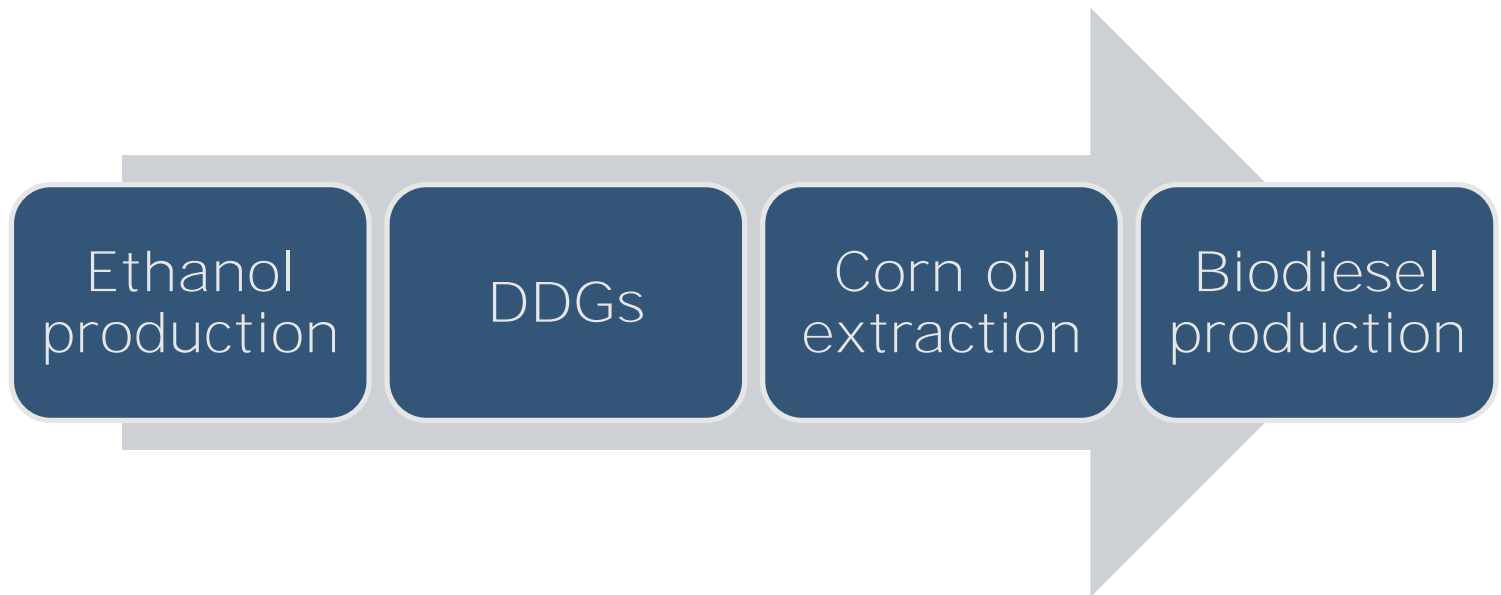
Corn Oil

Corn Oil as a Biodiesel Feedstock

Corn oil from wet mills is edible and has typically gone to higher value end users

Corn oil extracted from DDGs is inedible and is sold mostly to biodiesel producers

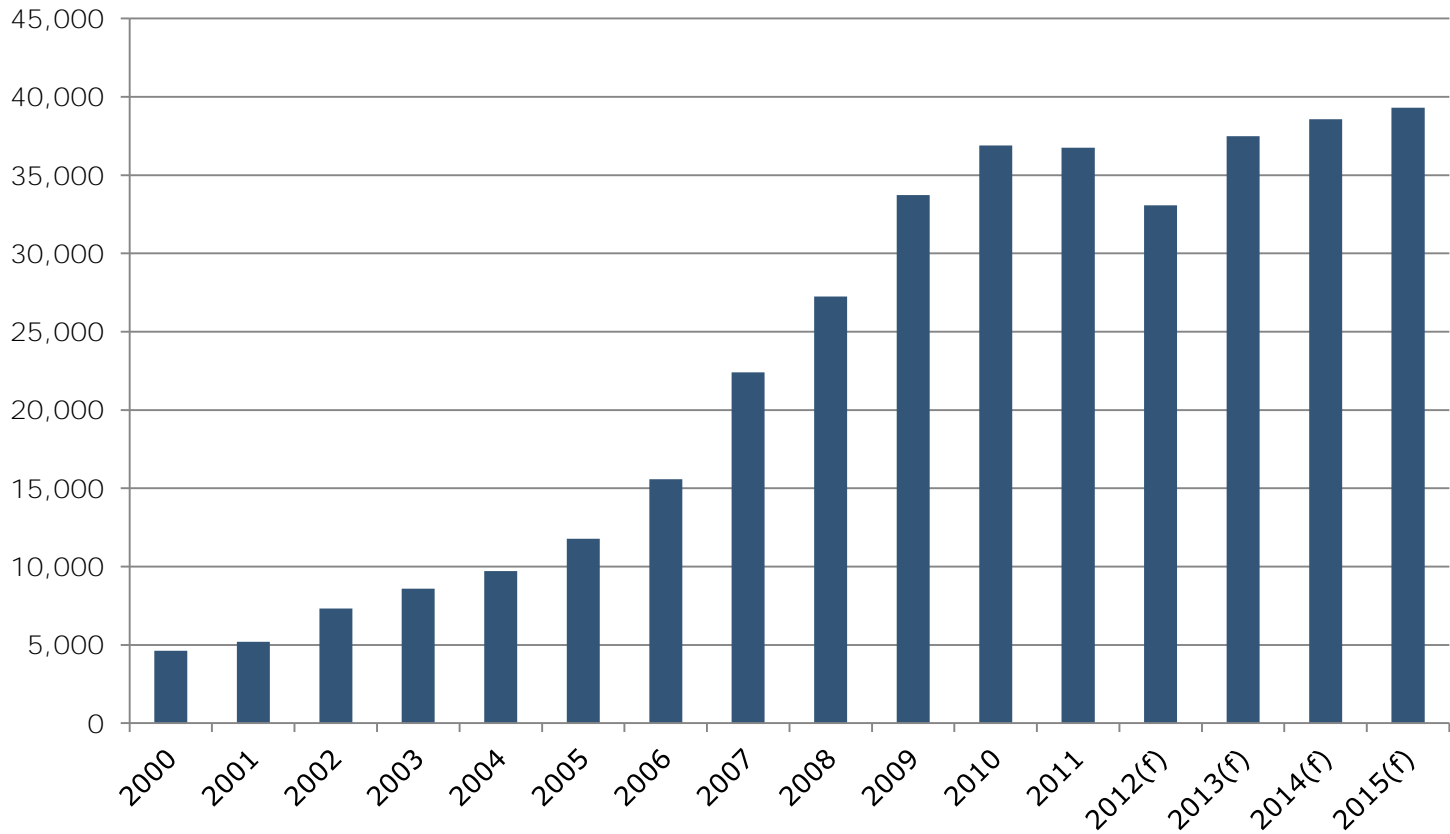
- Ethanol plants are installing corn oil extractors
- Incremental source of supply for biodiesel production



US DDG Production

1,000 mt

Assumes 18 lbs DDGs per bushel of corn



Source: USDA, Rabobank, 2012

Corn Oil

Biodiesel Production from Extracted Corn Oil

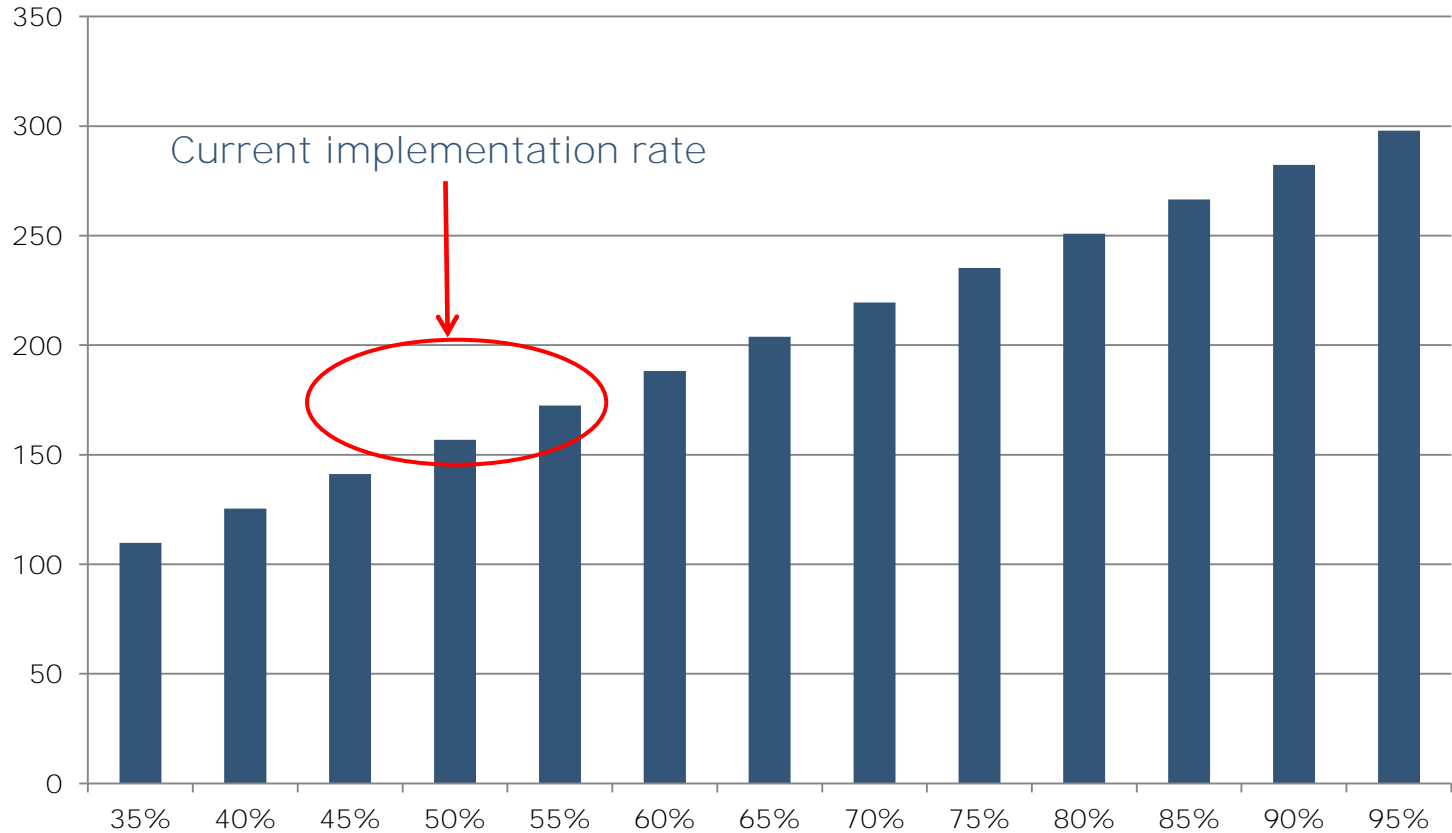
Million gallons

Chicken and pork companies have cut back use because of decreased energy value after oil is extracted.

Assumptions:

• **0.5 lbs of oil extracted per bushel of corn**

• **Ethanol industry produces at maximum nameplate capacity**



Source: USDA, Rabobank, 2012



EPA 2013 Feedstock Projection

1.28 Billion Gallons Mandated

This is a relatively cheap form of oil...

But supply is limited to what can be extracted from DDGs and DDG production is closing in on a ceiling.

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Source: US EPA, 2012



Rendered Fats and Grease

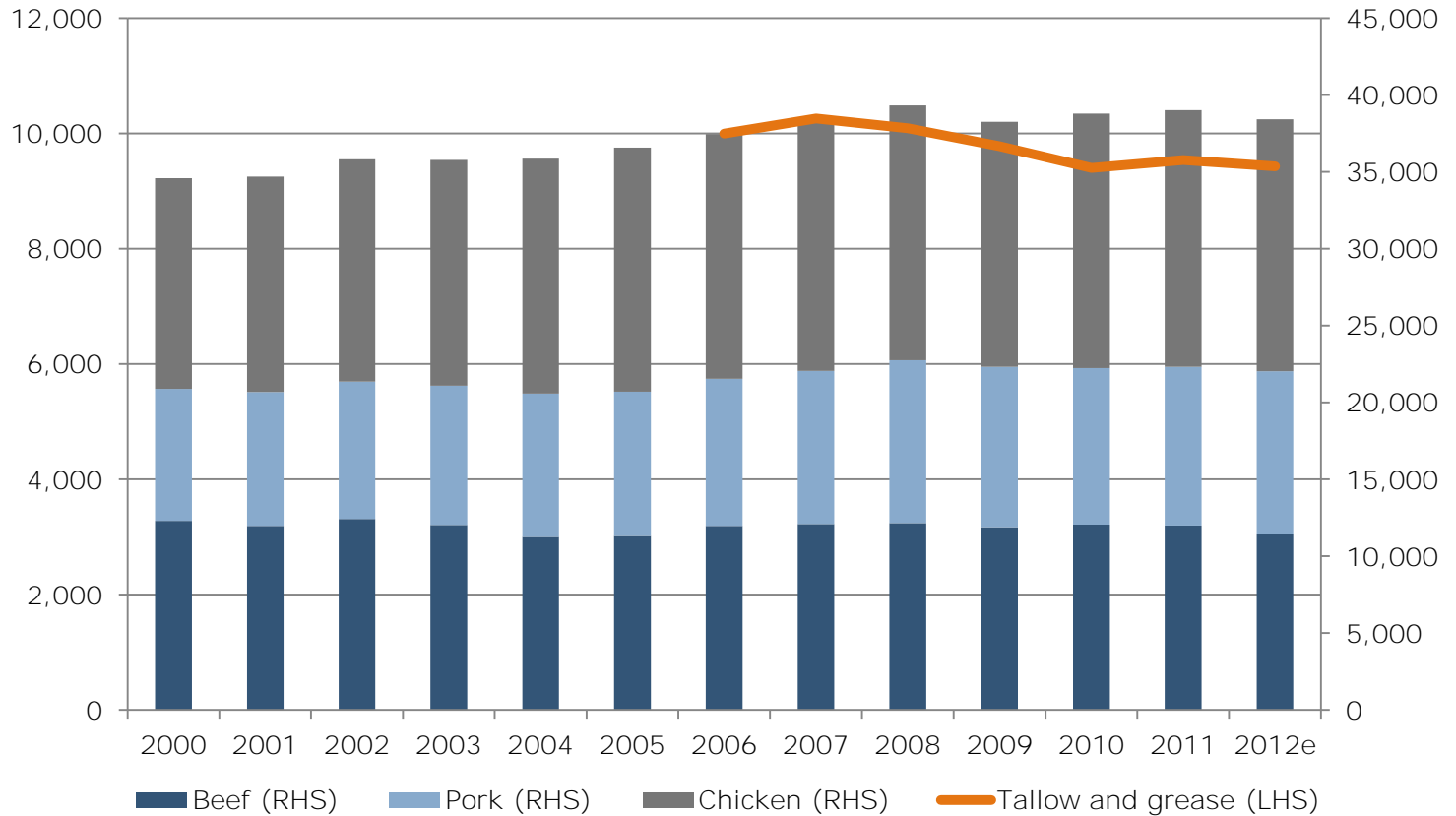
Availability of rendered fats is driven by animal protein production, which is flat.

Animal Protein and Rendered Fats Production

Tallow and grease in million lbs, animal protein production in 1,000 mt

Americans are aging and diets are shifting away from center of plate meat items.

Any recent growth in animal protein production has been to serve export markets.



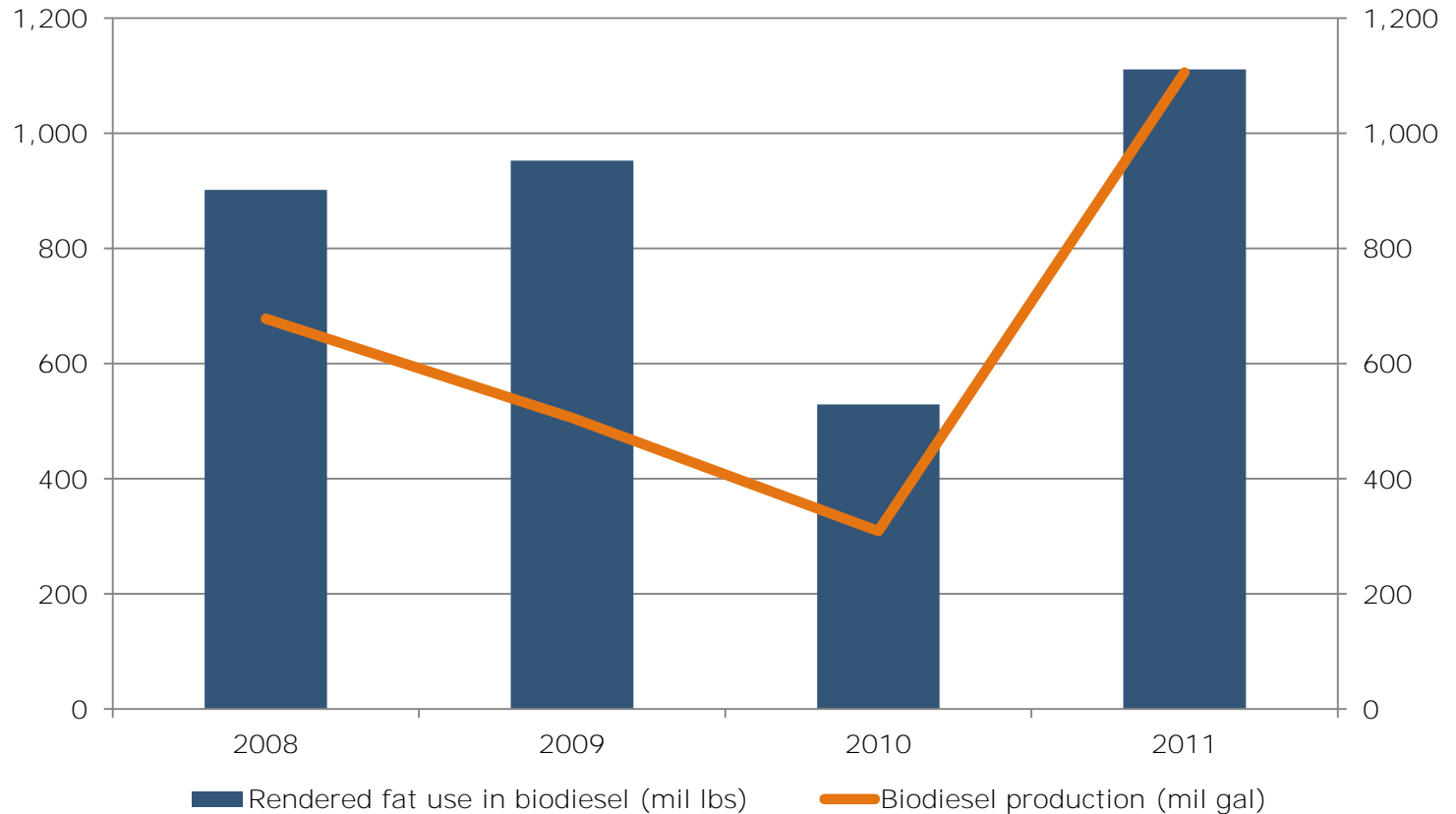
Source: USDA, Rabobank, 2012

Rendered Fat Used in Biodiesel Production

Biodiesel production in million gallons, rendered fat use in million lbs

Census Bureau does not count edible tallow and lard used for biodiesel so may underestimate actual use.

Total use likely closer to 2 billion lbs in 2011.



Source: NRA, US Census Bureau, 2012

Volume Share of Rendered Fats Sales

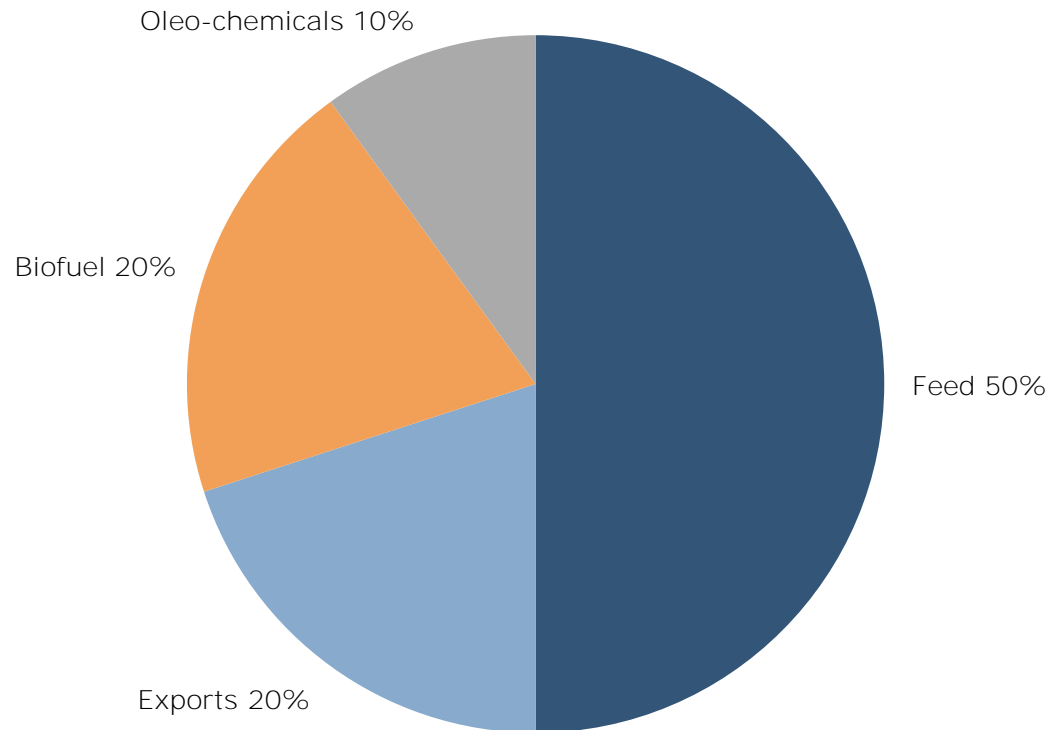
Highest and best use for rendered fats may not be traditional biodiesel.

High cloud point means only viable in warm weather.

Renewable diesel is potential game changer.

Big rendering companies investing.

Renewable diesel is molecularly same as petroleum diesel and has higher RIN multiple – better logistics and economics.



Source: Darling, Informa Economics, EIA, Rabobank estimate, 2012

EPA 2013 Feedstock Projection

1.28 Billion Gallons Mandated

Can rendered fat use really increase 50-100% without a major change in production technology, ie renewable diesel?

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Source: US EPA, 2012



Vegetable Oils

Global Vegoil Stocks to Use

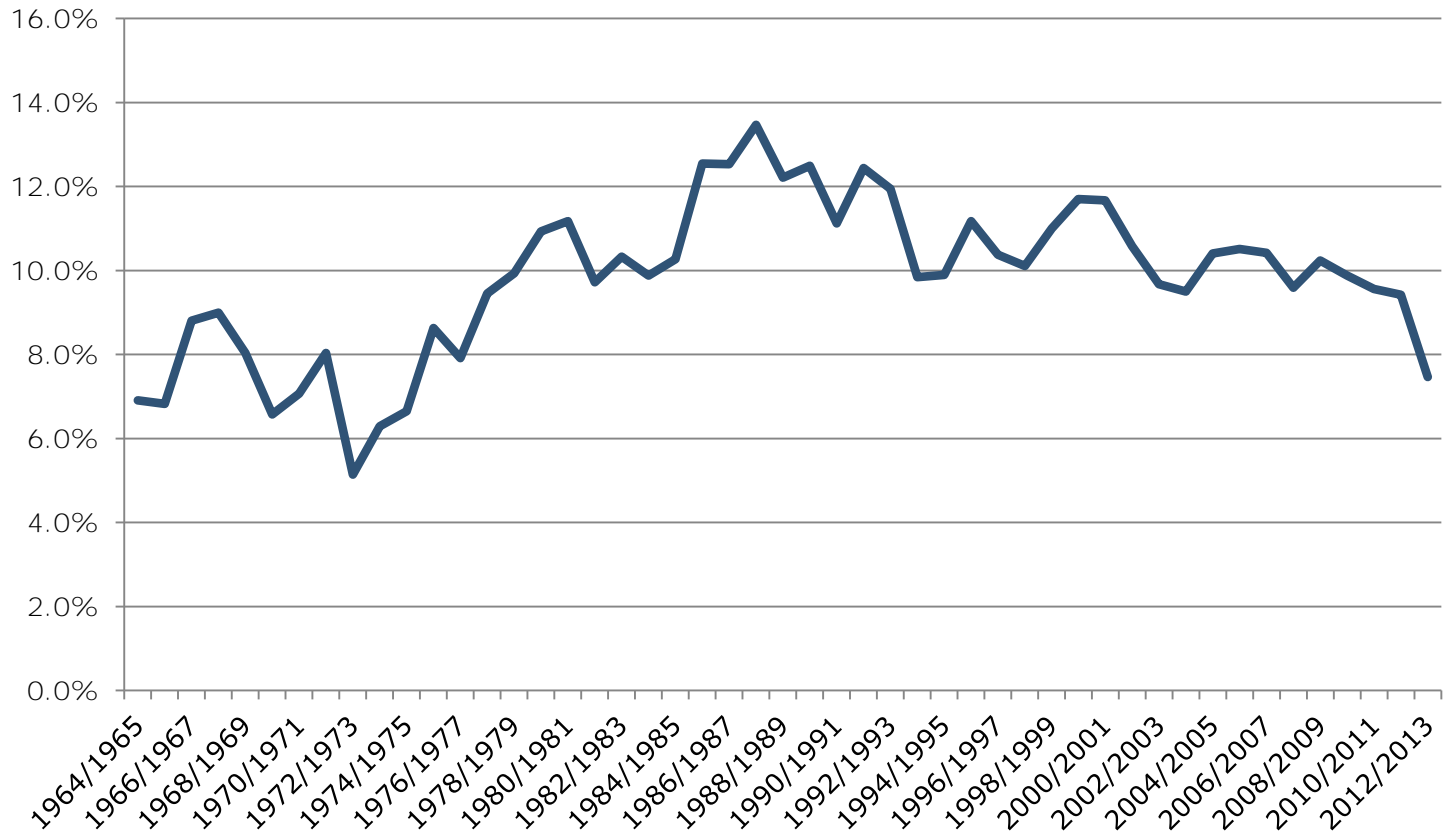
Lowest ending stocks to use since 1974/75

Growing emerging market demand

Drought in Brazil

Drought in U.S.

Rebuilding stocks will require time, better weather, and incremental land into production in South America.



Source: USDA, 2012

Farmers will need price signal if acres are going to shift to soy

Soybeans / Corn Ratio

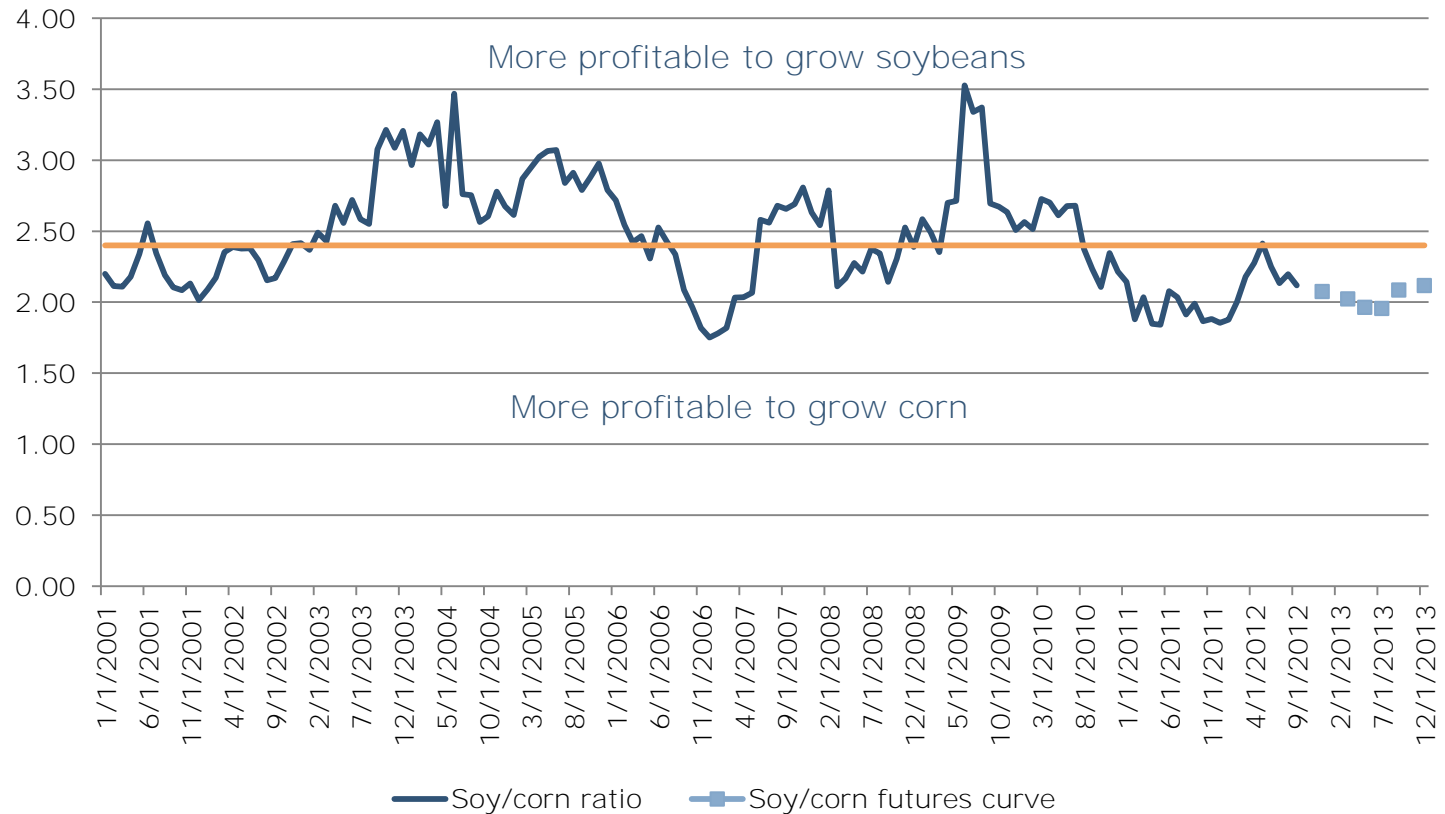
Soy / corn ratio of 2.4 is rule of thumb for breakeven.

U.S. corn stocks are extremely tight.

Farmer economics have heavily favored corn in last couple years.

2013/14 looks like another corn year.

Soy/corn ratio



Source: Bloomberg, 2012



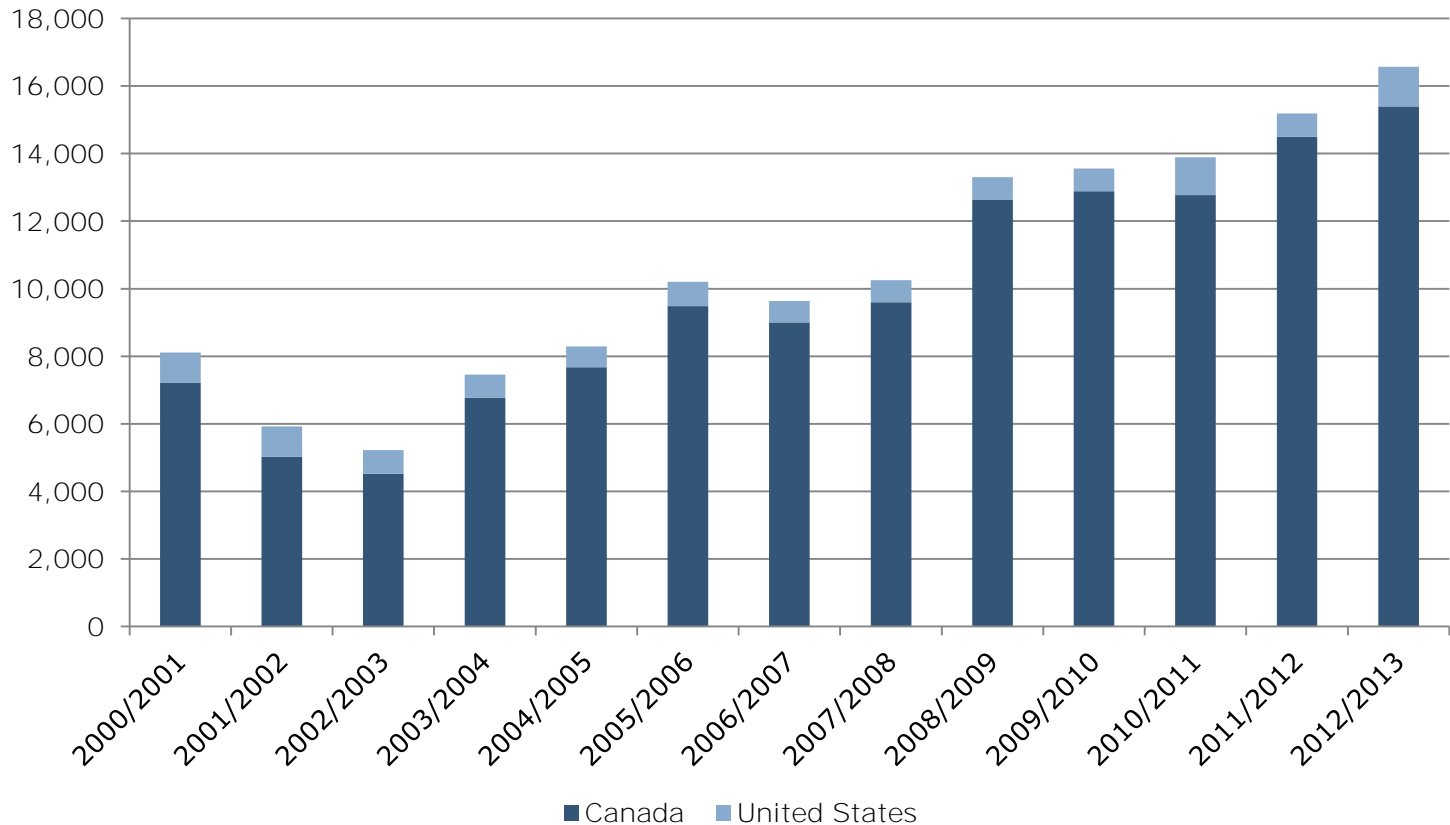
Canadian + U.S. Canola (Rapeseed) Production

1,000 mt

Farmer economics are better for canola than wheat in the prairie states.

Slow transition in the U.S., but likely to see steadily increasing production from a very low base.

Great feedstock in terms of cloud point, but higher value use in food production



Source: USDA, 2012



EPA 2013 Feedstock Projection

1.28 Billion Gallons Mandated

April WASDE was last one to report soy oil biodiesel use and showed 4 billion lbs for 2011/12.

Assuming 50% of biodiesel feedstock is derived from vegoil, biodiesel is already consuming 5 billion lbs of vegoil this year.

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Source: US EPA, 2012





Beyond 2013

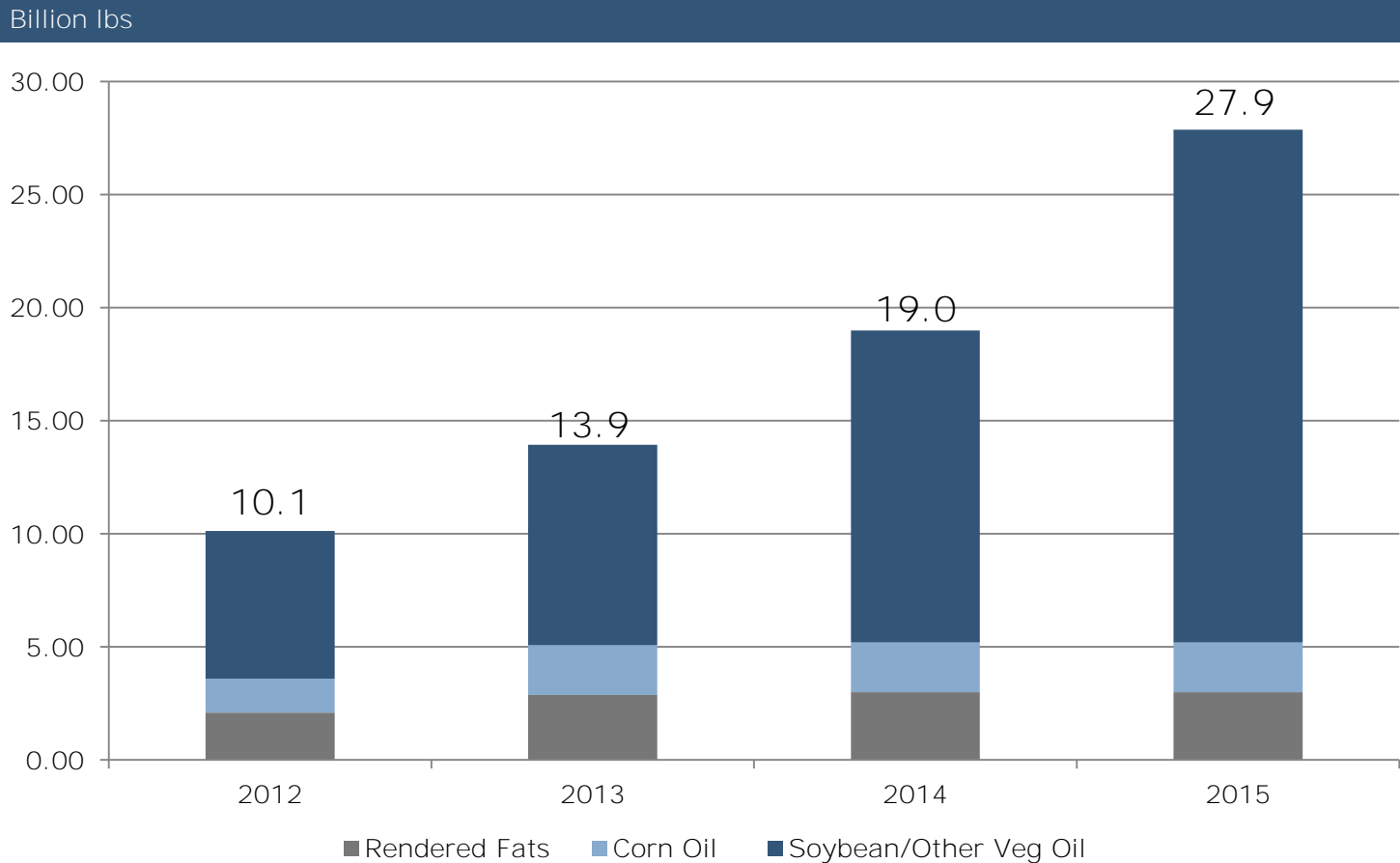
Advanced Biofuels Beyond 2013

Incremental vegetable oil requirement is impossible

Assume zero cellulosic production and entire advanced biofuel mandate is filled by biodiesel.

Assume ceilings on inedible corn oil and rendered fat availability as outlined above.

Incremental vegetable oil feedstock requirement EXPLODES.



Source: US EPA, US Census Bureau, Rababank, 2012

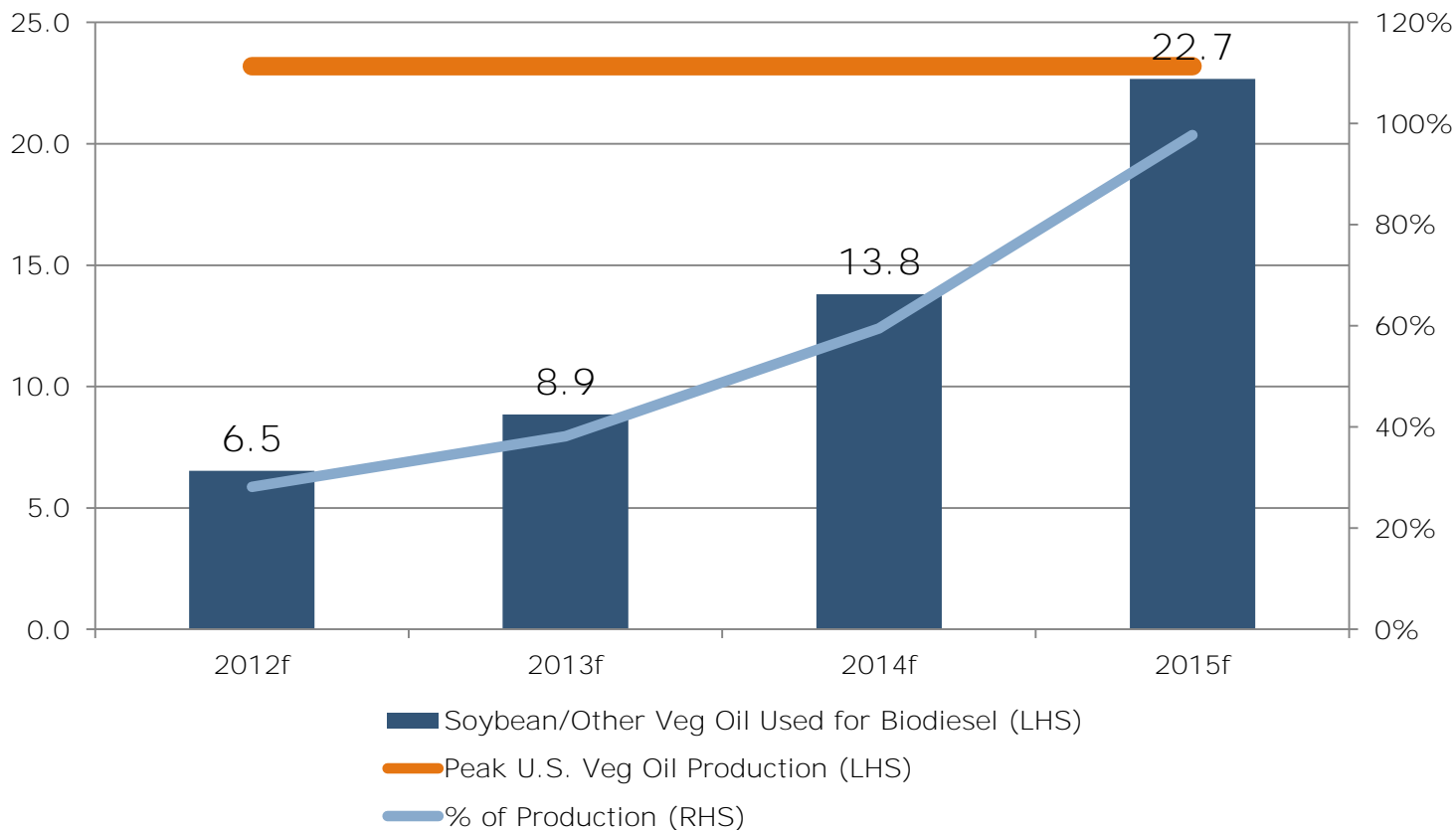
Biodiesel to consume 100% of peak U.S. vegoil production?

Vegoil Required for Biodiesel vs Total U.S. Vegoil Production

Billion lbs

Peak U.S. vegoil production (soybean oil) occurred in 2007/08.

23.2 billion lbs



Source: USDA, Rabobank, 2012

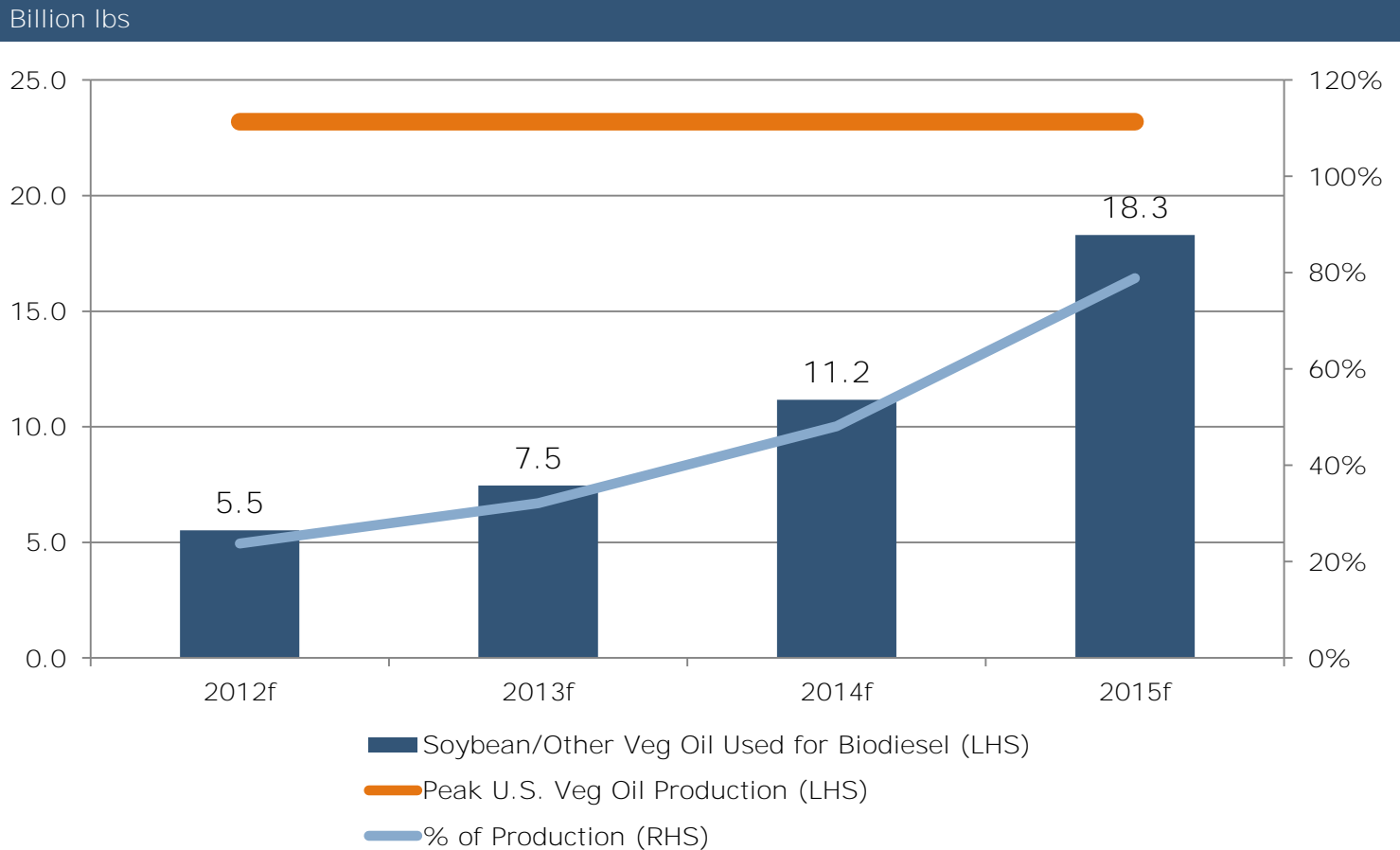
Best case scenario still not encouraging

Vegoil Required for Biodiesel vs Total U.S. Vegoil Production

New best case assumptions:

Brazilian sugarcane ethanol imports are 10% of advanced biofuel mandate.

All announced renewable diesel capacity comes on line during 2014 – 2015 and uses only rendered fats and oils for feedstock.



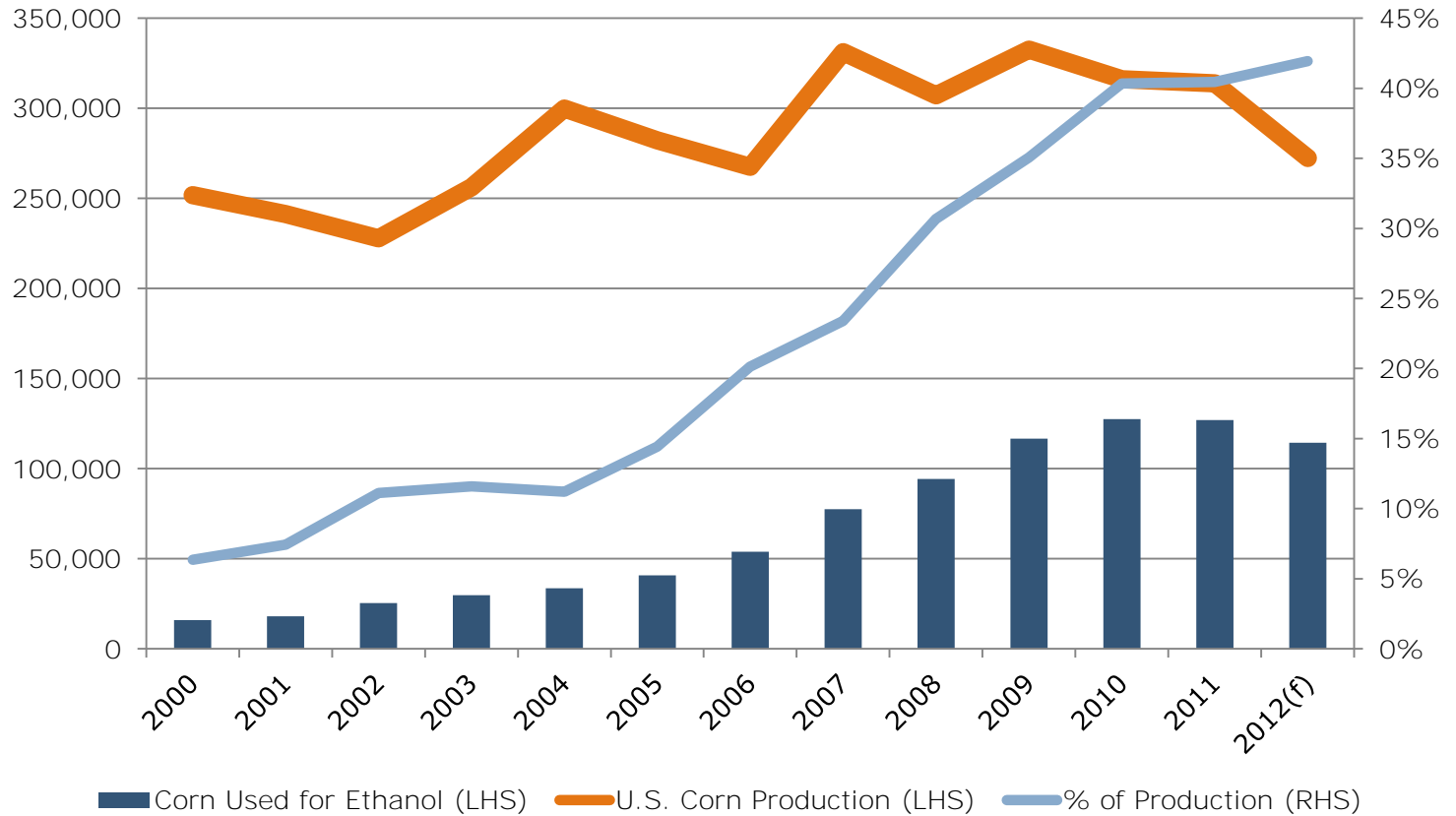
Source: USDA, Rabobank, 2012

The corn/ethanol analogy pales in comparison

Corn Used in Ethanol vs Total U.S. Corn Production

1,000 mt

This overstates total corn taken out of livestock and poultry feed use because ethanol dry mills produce 18 lbs of DDGs per bushel of corn processed.



Source: USDA, Rabobank, 2012

Waiver possibility?

Political pressure emerging in U.S. and E.U.

EPA has little sensitivity to market disruption.

4 U.S. chicken companies went bankrupt in 2011.

How high is the bar for "harm"?

- European Commission leaked proposal that would limit crop based biofuels to 5% of transport fuel, down from target of 10% by 2020.
- Proposals have yet to gain traction in U.S.
- EPA administrator may waive mandate if fulfilling it "would severely harm the economy or environment."
- Bio-based diesel mandate can be modified if there is a "significant renewable feedstock disruption or other market circumstances that would make the price of biomass-based diesel fuel increase significantly."

Source: Energy Policy Act, sec. 1501 para 7.A.i., EISA, sec. 202 para e.3.E.ii





Summary

Summary and implications for palm oil

Barring a major breakthrough in cellulosic

- Continued biodiesel production growth will mean serious dislocations in feedstock markets.
- Incremental feedstock will be vegoil unless/until renewable diesel scales up.
- Soybean oil exports decline in favor of domestic biodiesel production – positive for palm oil.
- U.S. imports low cost vegoils – positive for palm oil.
- Increased N. American canola production – negative for palm oil but canola is more commonly a food oil.

Especially if palm oil can get approval as renewable feedstock

The End