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Bioenergy Markets and Policy Situation and Outlook

David Ripplinger

Market Facilitators Meeting

Carrington, ND

September 28, 2017

Key Factors

- Ample, low cost corn –in most areas
- Growing ethanol demand
 - Domestic
 - International
- Domestic and global refinery expansion
- Growing policy uncertainty

Outlook

Domestic

15.4 billion gallons of ethanol

5,500 million bushels of corn

Exports

Ethanol shaky as Brazil increases
production

Objective

Provide a very high overview of the many, recent developments in bioenergy markets and in the policy arena.

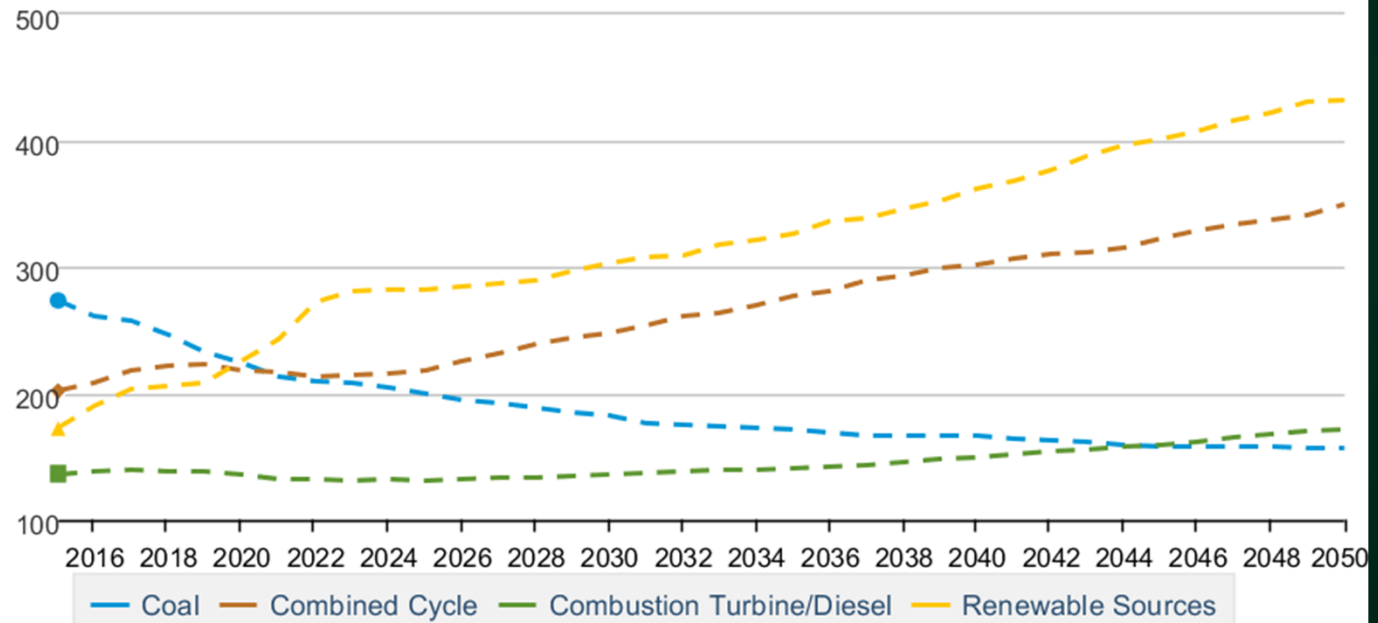
(Ask questions during, I'm covering A LOT)

All Power

Electricity Capacity: Electric Power Sector: Power Only

Case: Reference case

GW



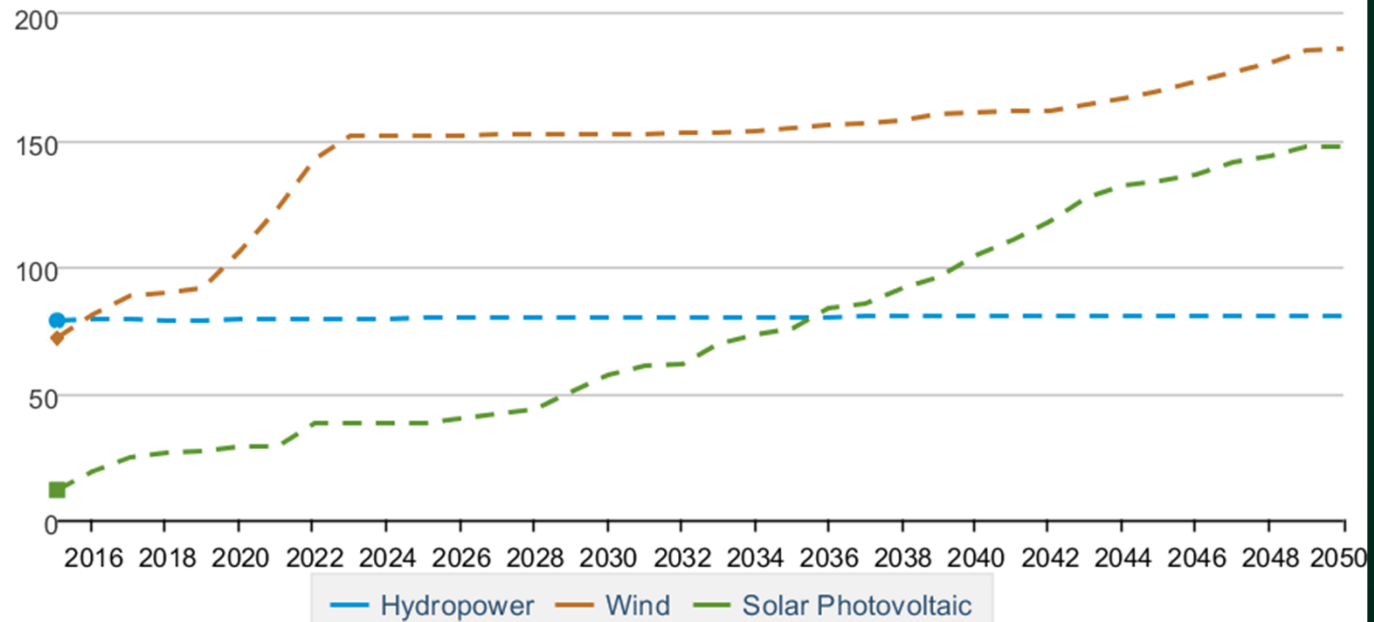
Source: U.S. Energy Information Administration

Renewable Power

Renewable Energy: Electric Power Sector: Generating Capacity

Case: Reference case | Region: United States

GW



Source: U.S. Energy Information Administration

BIOFUELS

Sugar/ Ethanol Nexus

Brazil sugar output to hit three-year low, as ethanol hits back

Sugar production in Brazil's key Centre South region will drop to a three-year low next season as a dearth of replanting takes its toll on cane yields, and with ethanol raising its take of the harvest.

Kingsman pegged sugar output in the Centre South, which is responsible for more than 90% of output in the top producing country, at 33.99m tonnes for 2018-19, on an April-to-March basis.

Sugar output at that level would represent a fall of 2.1m tonnes year on year, and would be the lowest since the 31.22m tonnes produced in 2015-16.

The decline would represent a double whammy of a lower cane crush, seen dropping to a four-year low of 575.0m tonnes, and a lower proportion of cane being processed into sugar rather than ethanol.

'Ethanol paying better than sugar'

Cane harvest hopes have been cut by lower rates of crop renovation, and so an increase to some 3.8-4.0 years in the average age of crop next season, a factor which "will lead to lower agricultural yields".

RELATED ARTICLES

Sugar prices to hit 10-year low, says Abares, raising output estimates

French sugar beet crop biggest in at least 25 years, wheat upgraded

Low EU sugar stocks 'protecting producers' from world price tumble

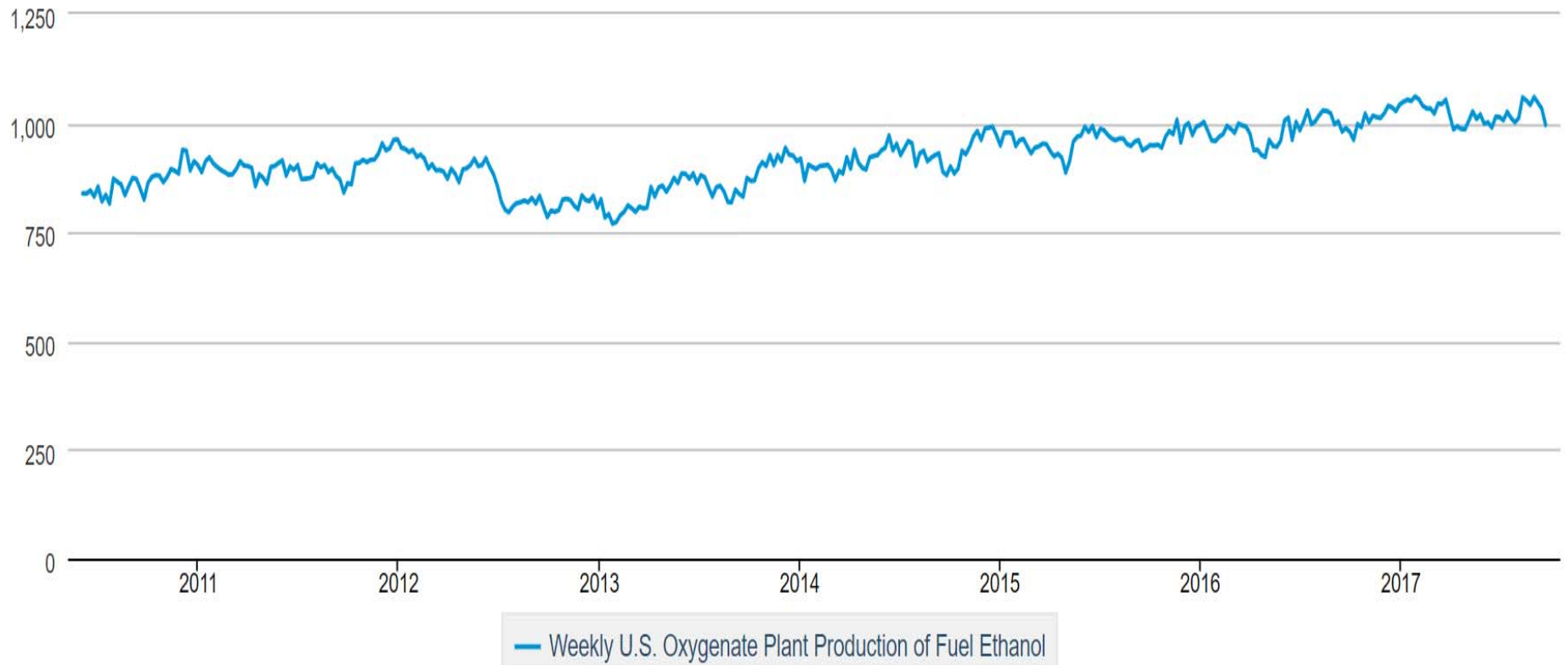
Sugar prices gain, as Brazil tax move spurs talk of political favour

Corn-ethanol Crush

South Dakota Crush (USDA/AMS)

	Last Week	Last Year
Ethanol (\$/gal)	1.58	1.48
DDGs (\$/ton)	102.65	107.40
#2 Corn (\$/bu)	2.91	2.89
Simple Crush	2.42	2.20

Thousand Barrels per Day



Source: U.S. Energy Information Administration

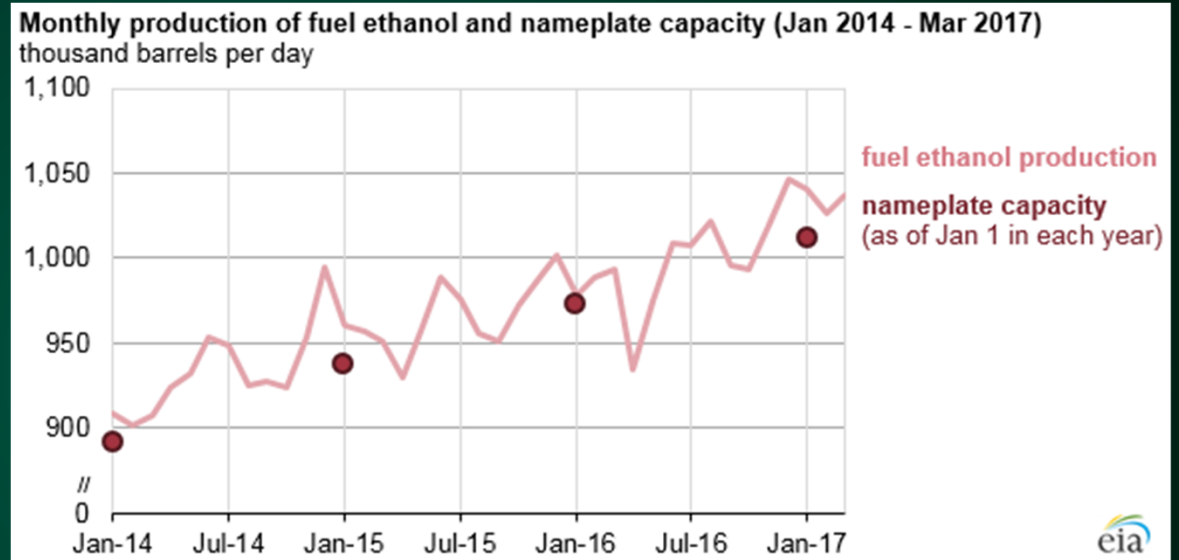
Expansion

Debottlenecking

Al-Corn, MN
+70MMGPY

Marion, OH (POET)
+80MMGPY

Ringneck, SD (NEW)
80MMGPY

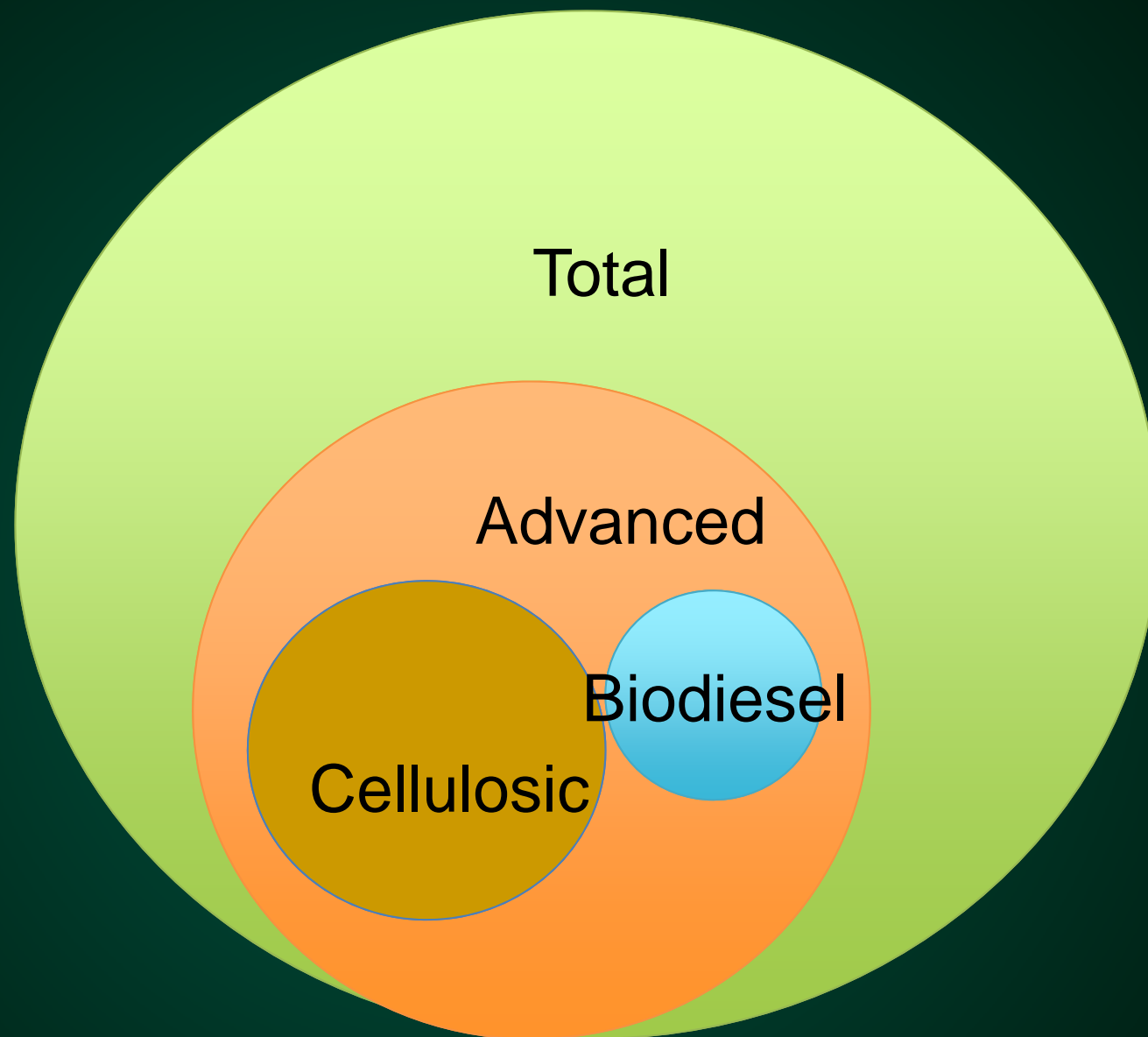


The RFS

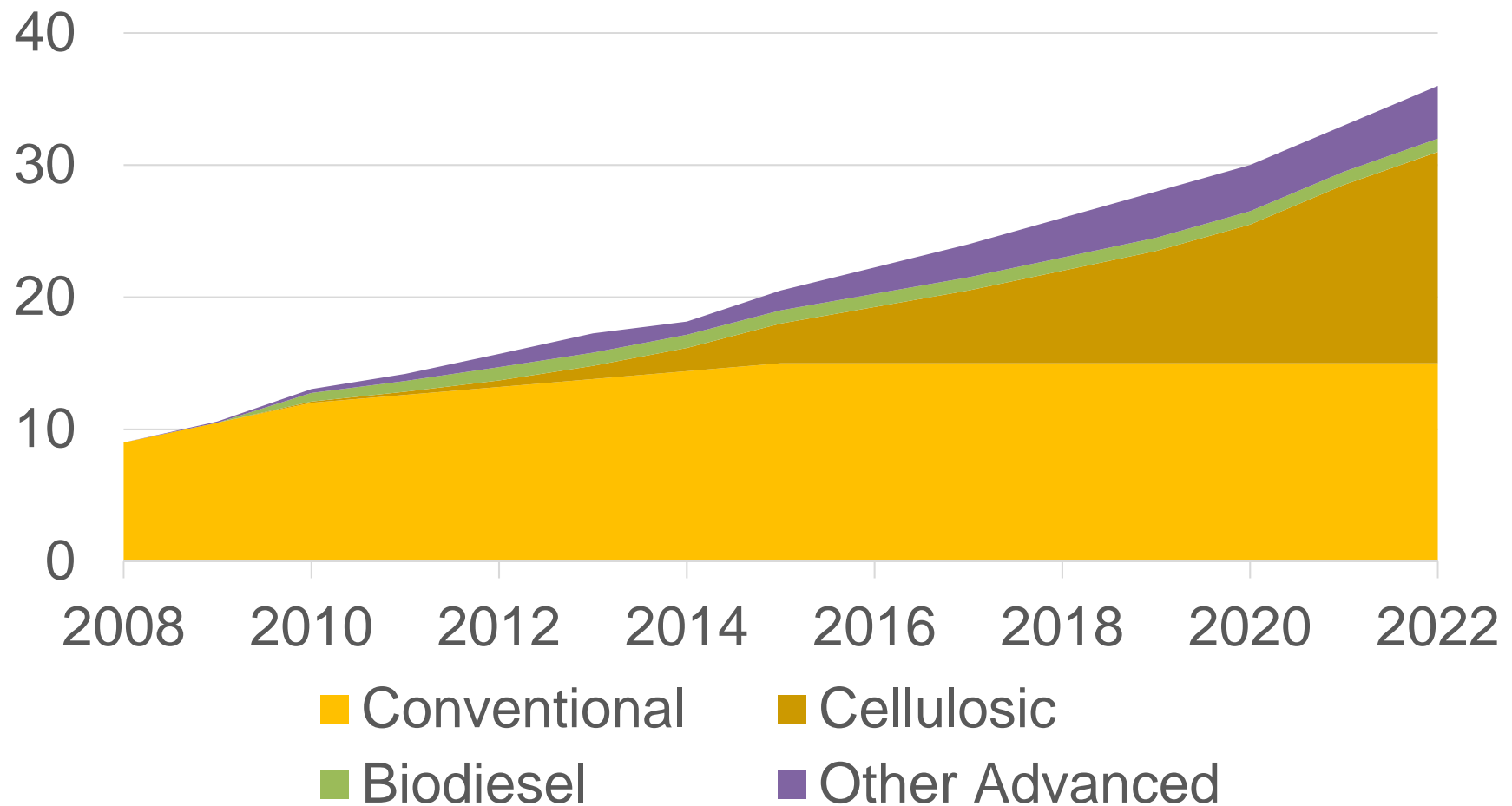
The Renewable Fuel Standard (RFS) mandates minimum use of biofuel by type and year.

There are four categories: advanced, biodiesel, cellulosic, and conventional.

There is a nested structure so advanced, biodiesel, and cellulosic can satisfy the conventional mandate...



Original Annual Mandated Levels (EISA 2007)



How is the system managed?

EPA is the regulator.

Approve new biofuel
pathways

Change the mandate

Oversee compliance



When can mandates be changed?

- i) Inadequate supply
- ii) Significant economic harm

EPA has regularly cut cellulosic mandates

EPA turned down a request after the 2012 drought

EPA has proposed reducing the conventional mandate due to the 'blend wall'

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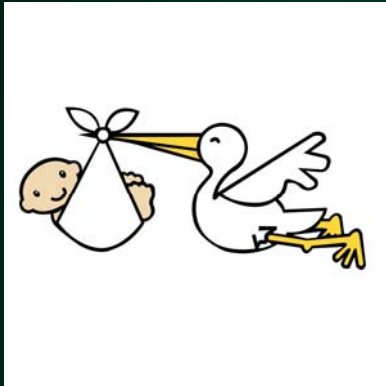
RINS & RVOs

Created an accounting mechanism – renewable identification numbers (RINS) – to track compliance. 38 digit number initially assigned to physical biofuel.

Blenders and others are required to meet their annual renewable volume obligation (RVO).

The Life of a RIN

RIN Generated



Biofuel
Imported
or Produced

RIN Separated



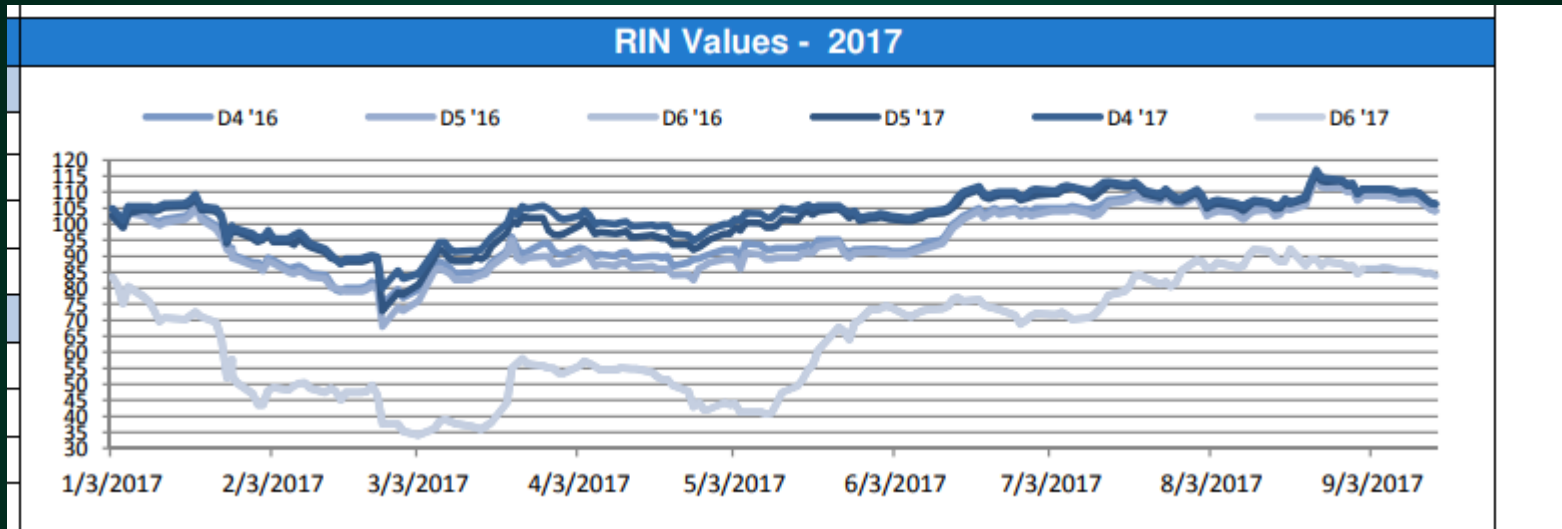
Biofuel
Blended or Used

RIN Retired



Submitted by
Obligated
Party
to EPA

RINS



- Source: Progressive Fuels

Energy Beet Pathway

Comment period for initial estimates of the GHG emissions associated with beet production and transportation closed on August 25.

EPA: Thumbs-up to 'energy beet' idea

By Mikkel Pates / Agweek Staff Writer on Sep 10, 2017 at 2:48 p.m.



Blaine Schatz, director of North Dakota State University's Carrington Research Extension Center, has been testing "energy beets" — sugar beets without the latest improvements for sugar extraction — for about eight years. Photo taken July 18, 2012, at Carrington, N.D. (Mikkel Pates / Forum News Service)

WEST FARGO, N.D. — The Environmental Protection Agency predicted it might take six months to do an initial evaluation of "energy beets" for their environmental footprint as a feedstock for biofuels.

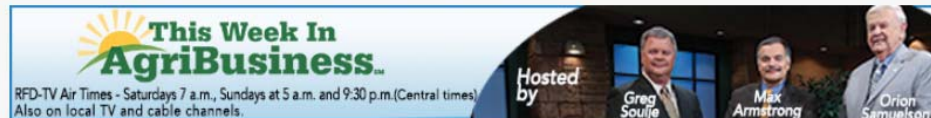
Figure 3. US Wood Pellet Exports by Port Region, 2016

Importing Country	US Port Region Exports (Metric Tons)				Cumulative Percent	
	South	West	North	Total	Percent	Percent
United Kingdom	4,242,455	-	47	4,242,503	90.32%	90.32%
Belgium	306,291	-	-	306,291	6.52%	96.84%
Denmark	95,172	1	-	95,173	2.03%	98.87%
Other EU	51,660	17	71	51,749	1.10%	99.97%
Japan	-	306	-	306	0.01%	99.98%
Hong Kong	-	32	-	32	0.00%	99.98%
China	-	23	-	23	0.00%	99.98%
Singapore	18	-	-	18	0.00%	99.98%
Thailand	-	-	9	9	0.00%	99.98%
South Korea	-	2	-	2	0.00%	99.98%
Other	577	258	55	890	0.02%	100.00%
Total	4,696,174	639	183	4,696,996		
Percent	99.98%	0.01%	0.00%			
Cumulative Percent	99.98%	100.00%	100.00%			



Source: US Import and Export Merchandise Trade Statistics

TRADE/ MARKET DEVELOPMENT

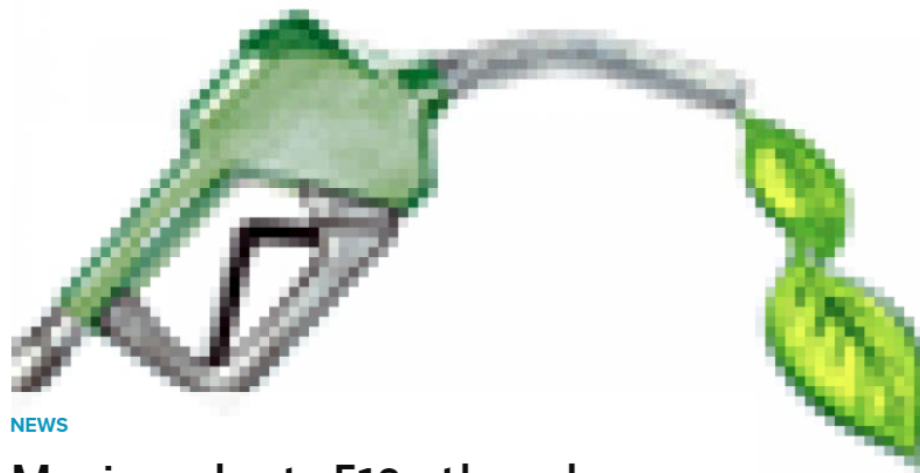


onary layer farm Kipster
opens

ARKETS: Strong soybean sales
rain market gains



NSEN



NEWS

Mexico adopts E10 ethanol policy

Ethanol organizations welcome change that will allow up to 10% ethanol to be blended in Mexican fuel supply.

Chinese Ethanol Mandate

THE ECONOMIC TIMES **Pollution** LATEST NEWS Zardari involved in B
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04:05 PM | 21 SEP **EOD**
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DSP BlackRock Opportunities NAV **₹222.2**
Direct Plan-Growth Day Change **-0.26 (-0.12%)** Class:Equity
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China aims to extend ethanol fuel usage countrywide by 2020

Sep 13, 2017, 03:11 PM IST

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 **BEIJING:** China said on Wednesday it would extend the use of ethanol fuel nationwide as it seeks to intensify anti-pollution efforts while finding a use for its huge corn surplus.

The plan will "support the use of ethanol fuel throughout the country by 2020" while strengthening the capacity of the biofuel industry, according to a document from the National Development and Reform Commission and the energy administration.

At the moment, biofuels account for just one percent of the total petroleum products consumed in China, the world's largest automobile market.

How much ethanol is that?

China uses 2.5 million barrels of gasoline each day

There are 42 gallons in a barrel

So China uses 38 billion gallons of gasoline each year

With a 10% blend that's 3.8 billion gallons of ethanol.

The US is currently producing about 15.5 billion gallons of ethanol each year and using about 14.5.

How much corn is that?

2.75 gallons of
ethanol/bushel
of corn ->
1.4 billion
bushels
33 million MT

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September 20

WASDE - 569 - 22

World Corn Supply and Use 1/ (Million Metric Tons)

2015/16	Beginning Stocks	Production	Imports	Domestic Feed	Domestic Total 2/	Exports	End Sto
World 3/	209.62	969.62	139.44	601.67	965.39	119.69	213
United States	43.97	345.51	1.72	129.91	298.79	48.29	44
Total Foreign	165.65	624.12	137.72	471.76	666.60	71.40	169
Major Exporters 4/	13.19	104.21	5.67	60.60	77.67	36.48	8
Argentina	2.90	29.00	0.01	5.90	9.20	21.64	1
Brazil	7.84	67.00	3.42	49.00	57.50	14.00	6
South Africa	2.45	8.21	2.24	5.70	10.97	0.84	1
Major Importers 5/	23.13	118.33	81.73	144.90	196.44	4.44	22
Egypt	2.30	6.00	8.78	12.45	14.85	0.01	2
European Union 6/	9.63	58.75	13.77	55.50	73.50	1.95	6
Japan	1.35	0.00	15.19	11.60	15.20	0.00	1
Mexico	4.09	25.97	14.01	20.30	37.30	1.56	5
Southeast Asia 7/	3.67	27.46	15.20	33.10	41.15	0.93	4
South Korea	1.86	0.08	10.12	7.80	10.12	0.00	1
Selected Other							0
Canada	1.40	13.56	1.37	7.07	12.35	1.74	2
China	100.47	224.63	3.17	153.50	217.50	0.00	110
FSU-12	3.16	39.87	0.38	16.62	19.33	21.49	2
Ukraine	1.52	23.33	0.03	5.50	6.90	16.60	1
2016/17 Est.							
World 3/	213.86	1,071.23	136.28	630.52	1,058.13	165.26	226
United States	44.12	384.78	1.40	137.80	312.31	58.30	59
Total Foreign	169.73	686.45	134.88	492.72	745.82	106.96	167
Major Exporters 4/	8.93	156.65	0.56	65.10	84.30	66.00	15
Argentina	1.06	41.00	0.01	7.30	11.00	27.50	3
Brazil	6.77	98.50	0.50	51.00	60.50	36.00	9
South Africa	1.10	17.15	0.05	6.80	12.80	2.50	3
Major Importers 5/	22.30	124.65	80.51	148.15	200.90	4.01	22
Egypt	2.22	6.00	9.00	12.70	15.10	0.01	2
European Union 6/	6.69	61.28	14.00	54.90	73.50	2.00	6
Japan	1.34	0.00	15.00	11.50	15.10	0.00	1
Mexico	5.21	27.40	14.50	22.00	39.90	0.75	6
Southeast Asia 7/	4.25	29.81	13.61	35.00	42.80	1.25	3
South Korea	1.94	0.08	9.80	7.60	9.90	0.00	1
Selected Other							0
Canada	2.24	13.20	1.00	7.10	12.52	1.50	2
China	110.77	219.55	3.00	162.00	232.00	0.05	101
FSU-12	2.59	47.36	0.37	17.40	20.18	27.23	2
Ukraine	1.52	23.33	0.03	5.50	6.90	16.60	1



POLITICS

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Brazil imposes tariff on US ethanol

08/23/17 10:04 PM By Sara Wyant

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China Hiking Tariffs on U.S. DDG and Ethanol, Imports Down to Trickle

MARCH 7, 2017 03:39 PM

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China's Tariffs on U.S. DDGs at a glance:

- Anti-dumping
- Countervailing
- Value Added
- Tariff percentages differ with U.S. companies
- Most companies are seeing tariffs around 90 percent

China's Tariffs on U.S. ethanol at a glance:

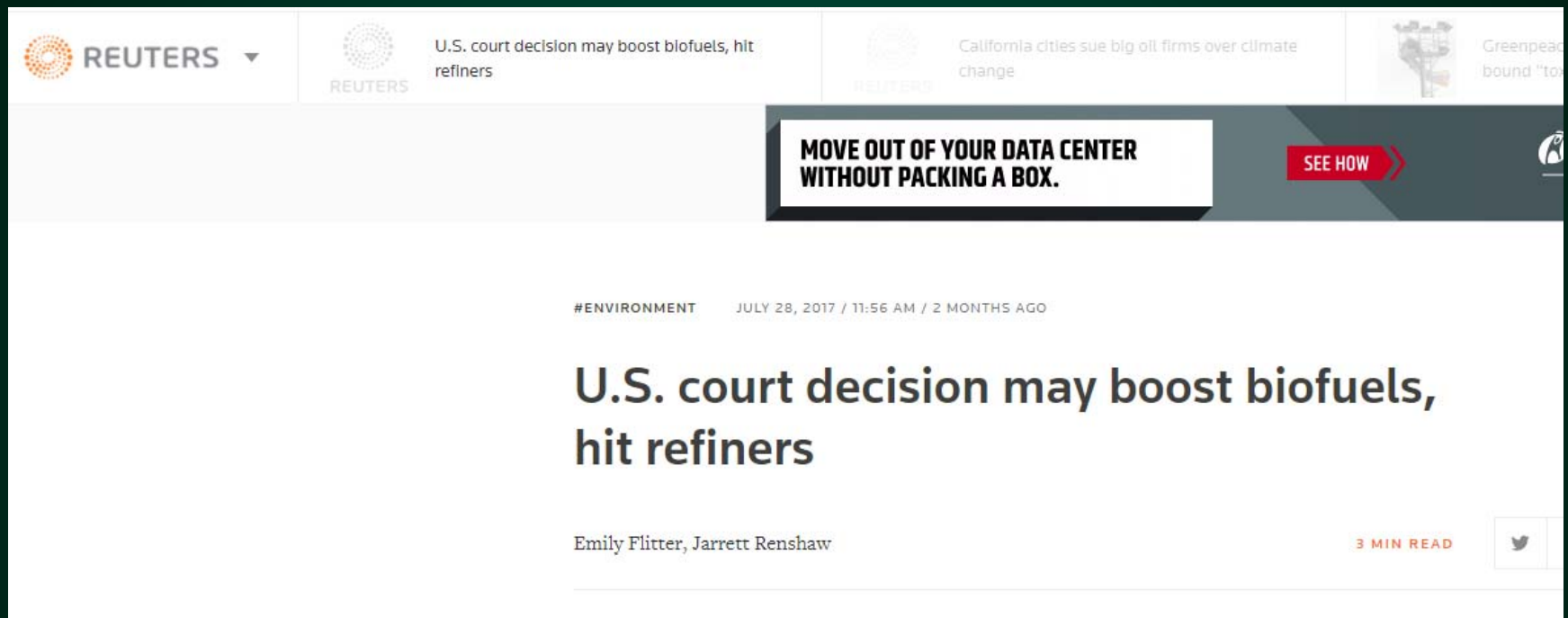
- China upped it from 5 percent
- 30 percent for denatured
- 40 percent for unnatured

POLICY

Trump & the RFS



RFS: Court Ruling



EPA erred in its determination of 2014-2016 RVOs (too low, incorrectly applied supply rule)

RFS: 2018 RVO

Proposed Volume Requirements^a

	2018	2019
Cellulosic biofuel (million gallons)	238	n/a
Biomass-based diesel (billion gallons)	2.1 ^b	2.1
Advanced biofuel (billion gallons)	4.24	n/a
Renewable fuel (billion gallons)	19.24	n/a

^a All values are ethanol-equivalent on an energy content basis, except for BBD which is biodiesel-equivalent.

^b The 2018 BBD volume requirement was established in the 2017 final rule (81 FR 89746, December 12, 2016).

RFS: 2018 RVO Update

EPA announced on Tuesday that they would looking to reduce the biodiesel and advanced biofuel numbers due to inadequate supply...

Biodiesel tax credit have expired

41-68% tariffs are pending on Argentine and Indonesian biodiesel

Moschini and Lapan

- AJAE 2017

Market Effects of Alternative Policy Scenarios

	Laissez Faire	No RFS	2015 Mandates	2022 Mandates	Optimal Mandates
Corn price (\$/bu.)	3.08	2.75	3.68	3.85	3.88
Soybean price (\$/bu.)	9.26	9.23	10.10	11.18	9.66
Soybean meal price (\$/ton)	378.42	382.07	368.49	362.09	368.20
Soybean oil price (¢/lb.)	22.20	21.17	31.60	42.44	27.81

The Future

Higher blends E15? E20 or E30?

Death of the internal combustion engine.

Review

Bioenergy (renewables) hasn't gone and isn't going anywhere

Major news and very promising developments in bioenergy

- In the last year - domestically

- in the last two weeks - internationally

Questions?