Green Plains Inc. (NASDAQ:GPRE)

January 14th, 2022

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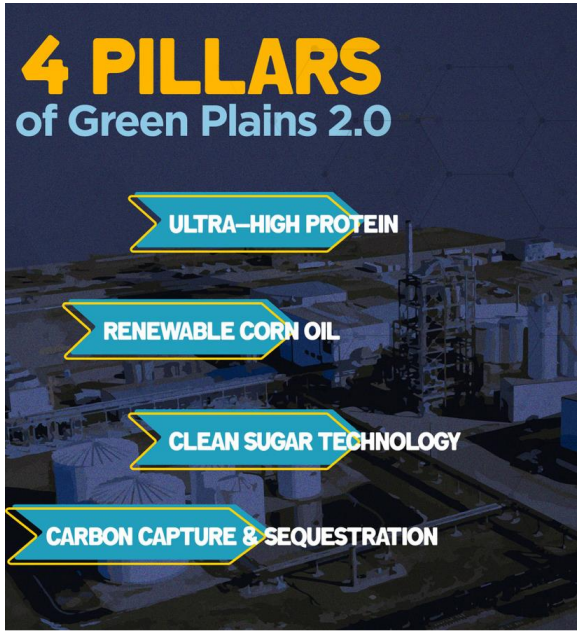
Executive Summary

Green Plains Inc. (NASDAQ:GPRE) ("Green Plains" or the "Company") produces, markets, and distributes ethanol, high protein animal feed, corn oil, and other products.

The Company owns 11 corn biorefineries in the United States Midwest and is transforming their business via technology enable value added products relative to historical products. Green Plains was founded in 2004 and is headquartered in Omaha, Nebraska.

Source: Green Plains Presentation December 2nd, 2021



Source: Green Plains twitter account January 10th, 2022

Green Plains Executive Summary

Green Plains Inc. (NASDAQ:GPRE) ("Green Plains" or the "Company") provides the opportunity to invest in a technology transformation underway at an agricultural products producer.

- Green Plains high protein and corn oil system unit economics are stellar. Global protein and renewable diesel (corn oil as feedstock) are secularly growing end markets with mid to high single digits annual growth for the next 10+ years.
- Base case return is 100%+ over 12 to 24 months with multiple return drivers.

Green Plains Current Metrics ($MMs except per share values)			
Share Price (Jan. 14th, 2022)	$32	Street Consensus 2024E EBITDA	$425
Fully Diluted Shares (1)	68.7	EV to Street 2024E EBITDA	3.9x
Market Cap	$2,200	GrizzlyRock 2024E EBITDA	$465
+ Debt (1)	$174	GrizzlyRock EV to 2024E EBITDA	3.6x
- Cash	$721	GrizzlyRock 2024E Free Cash Flow	$276
Enterprise Value	$1,654	GrizzlyRock 2024E FCF Yield	13%

Intrinsic Value ($MMs except per share values)			
Intrinsic Value Share Price (2)	$76	EV to 2024E EBITDA (2)	10.0x
Fully Diluted Shares (1)	68.7		
Implied Market Cap	$5,211		
+ Debt (1)	$174	Equity Upside	137%
- Cash	$721		
Intrinsic Enterprise Value	$4,664		

(1) Shares outstanding, debt, and cash figures shown pro forma full convertible bond conversion.

(2) Intrinsic value estimate as shown does not include value from carbon sequestration nor more than one small Clean Sugar / Renewable Dextrose plant. Additional value likely exists, yet the purposes of this discussion we are focusing on the legacy business.

Valuation Summary (1)

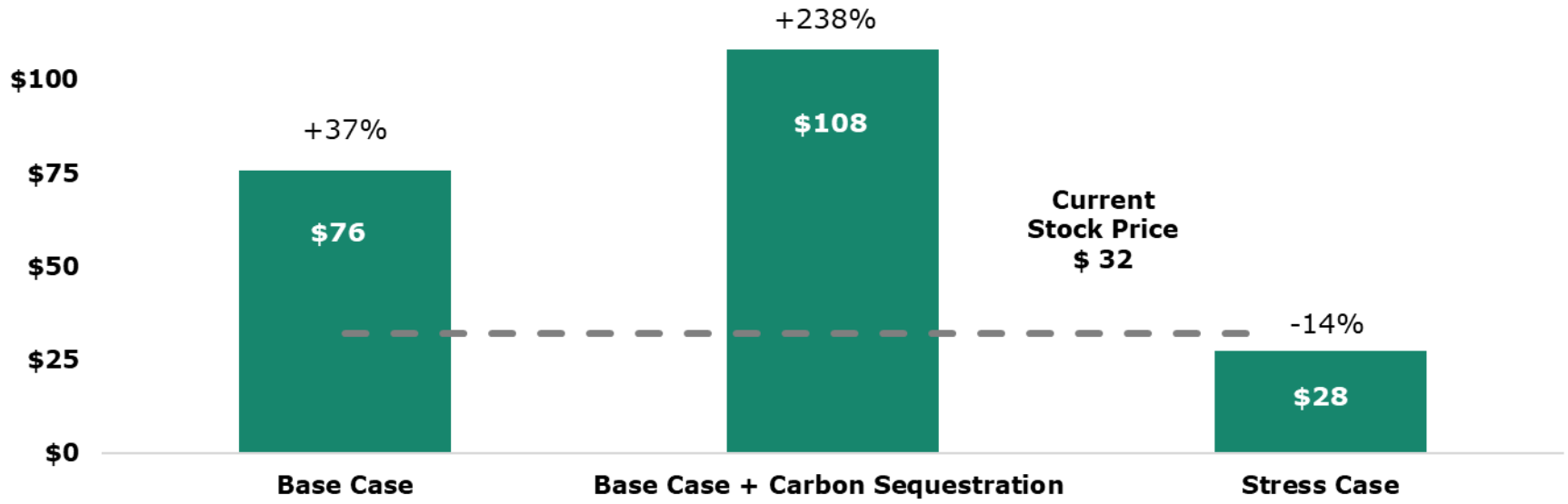
- **Base Case:** High protein corn meal sells at $500 per ton which earns $292 million EBITDA from high protein corn meal in 2024E. Incremental corn oil from the new technology systems generates $100 million of annual EBITDA at a price of $0.75 per pound. EBITDA multiples of 10.0x High Protein & Corn Oil EBITDA, 11.0x Clean Sugar EBITDA, 7.5x Specialty Alcohol EBITDA, 7.5x Agribusiness EBITDA, 8.0x Corporate, Ethanol & Clean Sugar and Green Plains Partners EBITDA. In the base case we assume only one Clean Sugar / Renewable Dextrose plant and no value to carbon sequestration.

- **Base Case + Carbon Sequestration:** High protein corn meal sells at $500 per ton which earns $292 million EBITDA from high protein corn meal in 2024E. Incremental corn oil from the new technology systems generates $100 million of annual EBITDA at a price of $0.75 per pound. EBITDA multiples of 10.0x High Protein & Corn Oil EBITDA, 11.0x Clean Sugar EBITDA, 7.5x Specialty Alcohol EBITDA, 7.5x Agribusiness EBITDA, 8.0x Corporate, Ethanol & Clean Sugar and Green Plains Partners EBITDA. In this case we assume only one Clean Sugar / Renewable Dextrose plant.

  This case includes a probabilistic Carbon Sequestration value of $32.2 per share.

- **Stress Case:** High protein EBITDA of $117 million and $40 million EBITDA uplift from corn oil. 8.0x High Protein & Corn Oil EBITDA, 7.0x Specialty Alcohol EBITDA, 7.0x Agribusiness EBITDA, 10.0x Corporate, Ethanol, Clean Sugar and Green Plains Partners EBITDA.

  No value ascribed to Clean Sugar / Renewable Dextrose or Carbon Sequestration.



(1) GrizzlyRock estimates and assumptions

Green Plains Business Overview

Green Plains is an environmentally sustainable business with a market leading presence in the protein market (growing 4% to 7% annually) and the renewable diesel market (growing 8% to 12% annually). Green Plains will grow significantly over the next three years as they transform into a quality, stable cash flowing high-protein feed, corn oil, and specialty alcohol producer.

Segments	Products	Industries Served	2024E EBITDA in $ millions (1)	% Total EBITDA	Per Share Value
High Protein	High Protein Corn Meal	Pet Food / Aquaculture	$292 million	63%	$42
Corn Oil	Distillers Corn Oil	Renewable Diesel / Low Carbon Fuel Standards	$100 million	22%	$15
Clean Sugar / Renewable Dextrose	Bioplastics & Renewable Chemical Feedstock	Renewable Industry	$37 million	8%	$6 (2)
Specialty Alcohol	High-Grade Alcohols	Cleaning Supplies, Beverage Alcohol	$19 million	4%	$2
Agribusiness	Commodity Transport, Marketing, & Storage	Ethanol, Grains, Other Commodities	$20 million	4%	$12
Ethanol, Green Plains Partners, and Corporate	Ethanol, Logistics Distillers Grains	Gasoline, Renewable Diesel, Livestock Feed	-$3 million	-1%	(Ethanol, Agribusiness Green Plains Partners, Corp. Overhead, Net Cash)
Total			**$465 million**		**$76**
Carbon Sequestration	Carbon capture & removal	Environmental / Low Carbon Fuel Standards	Refer to Carbon section for further info		$32

(1) GrizzlyRock base case estimates pro forma system wide carbon sequestration, high protein, and corn oil system implementation. Corn oil segment presented as additional volume from new Fluid Quip systems.

(2) Base case per share value with one clean sugar plant in 2024. Our estimate is for far more out past 2024E.

Why Does the Opportunity Exist?

Legacy Business Uninspiring

- The industry is known for shareholder value destruction from empty promises and poor returns on capital.
- Green Plains has historically been perceived and valued as an ethanol company. Ethanol is an asset-intensive cyclical industry which has not historically earned its cost of capital.
- Many investors avoid the ethanol industry altogether, which leads them to miss the current high protein and corn oil (i.e. renewable diesel) transformation.

Proven Technology Transforming Free Cash Flow

- As the upgrades to ethanol plants are completed, Green Plains will generate consistent free cash flow which will be recognized by public markets and drive stock price re-rating.
- In addition, exclusive partnerships with top innovators give Green Plains a lead in niche markets of aquaculture and pet food.
- Conversations with industry experts give positive feedback for private ethanol producers who have implemented the technology such as Flint Hills Resource, Badger Ethanol, and United Wisconsin Grain Producers.

Investor Misperception

- Niche market penetration of aquaculture and pet food is complicated and not yet readily obvious to market participants.
- High value end markets with high protein corn meal that can be widely produced.
- Investors are not fully valuing the high protein corn meal value until the product produces meaningful cash flow.
- Carbon sequestration is in early stages of industry development and being given little / no credit despite material value creation.

Technology is Transforming Green Plains Unit Economics

Plant Economics[1]	Single Plant	Single Plant with MSC	Increase (Decrease)
Products Per Bushel[2]			
Ethanol (gallon)	2.87	2.87	
Distillers Corn Oil (pounds)	0.8	1.2	0.4 pounds
Dried Distillers Grains (pounds)	15.2	11.3	(3.9 pounds)
High Protein Feed (pounds)	N/A	3.5	3.5 pounds
			0.0 pounds
Product Selling Price [3]			
Ethanol (gallon)	$1.69	$1.69	
Distillers Corn Oil (pounds)	$0.45	$0.45	
Dried Distillers Grains (ton)	$115	$115	
High Protein Feed (ton)	N/A	$500	
Plant ($ in millions)			
Ethanol	$169.0	$169.0	$0.0
Distillers Corn Oil	$12.5	$18.8	$6.3
Dried Distillers Grains	$30.5	$22.6	($7.7)
High Protein Feed	N/A	$30.5	$30.5
Revenue	$212.0	$240.9	$29.0
Plant Input & Operational Costs	$211.5	$216.5	$5.0
Plant EBITDA	$0.5	$24.4	$24.0

(1) 100 million gallon plant processing 34.843 million bushels per year (2.87 gallons per bushel).
(2) Given by Green Plains. Corroborated industrywide by GrizzlyRock.
(3) Current product pricing.

MSC System utilizes a ring drier to separate ethanol co-product from 16 pounds of corn oil and dried distillers grains to 16 pounds of higher protein feed, distiller's grains and corn oil. Product simply differentiated into higher value end markets.

High protein feed sold into the pet food and aquaculture markets at ~3x the price of legacy DDGs which are sold to the livestock market (cows, pigs, chicken, etc.)

Many in the industry believe that this protein can trade at a $100 - $200 per ton premium to soybean meal which has historically traded around $300 per ton and is currently ~$400 per ton leaving additional upside to our pricing estimates.

Corn oil price increases expected as the renewable diesel market continues its massive secular growth.

Decrease in dried distillers grains more than offset by increase in higher profit corn oil and high protein feed

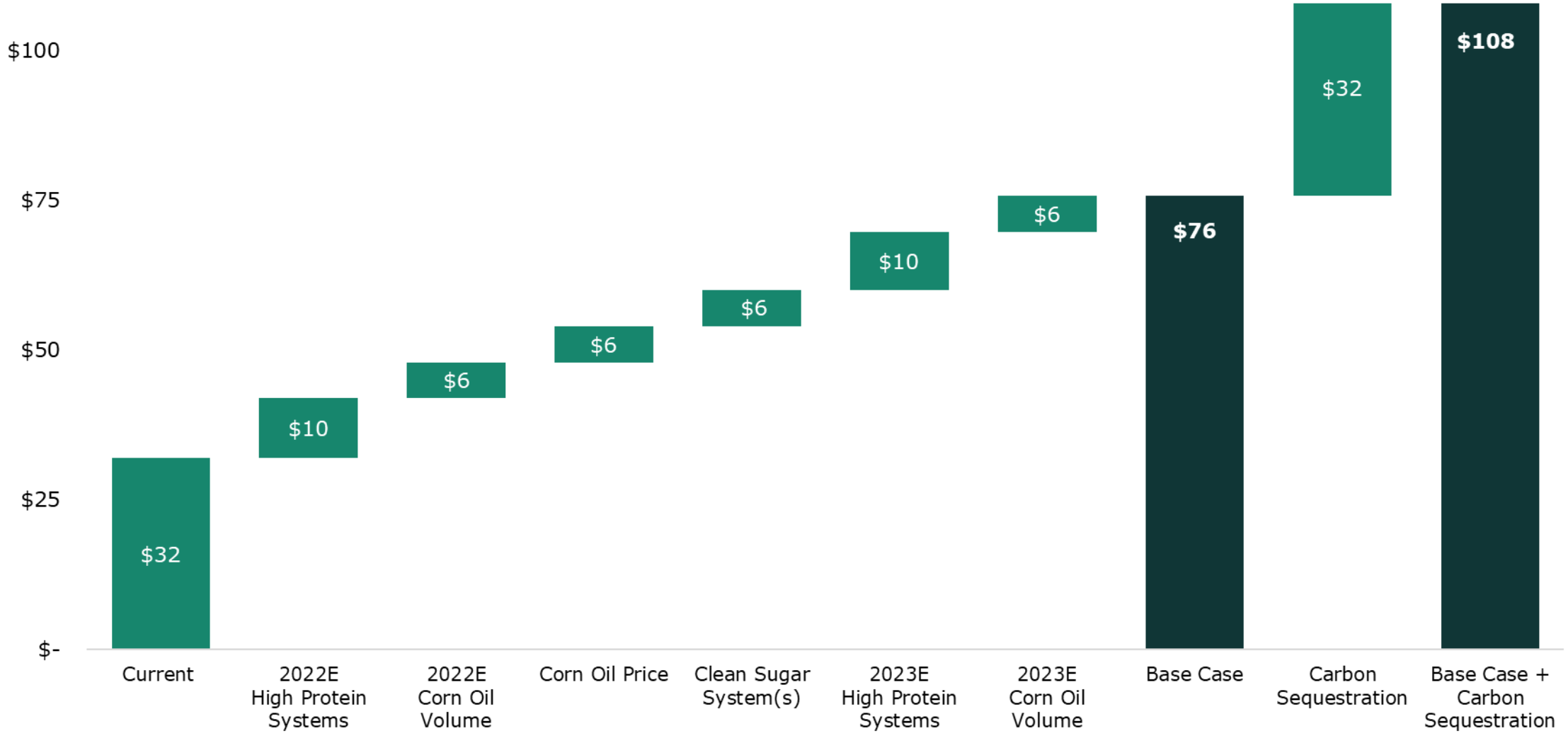
Largest financial gain is from high protein feed

No additional annual operating costs other than system CapEx ($0.40 per gallon, $40 million in this example)

60% incremental return on capital for MSC technology implementation

High Protein Feed is 73% incremental EBITDA and Corn Oil is 27% incremental EBITDA

Sum of the Parts Value Per Share

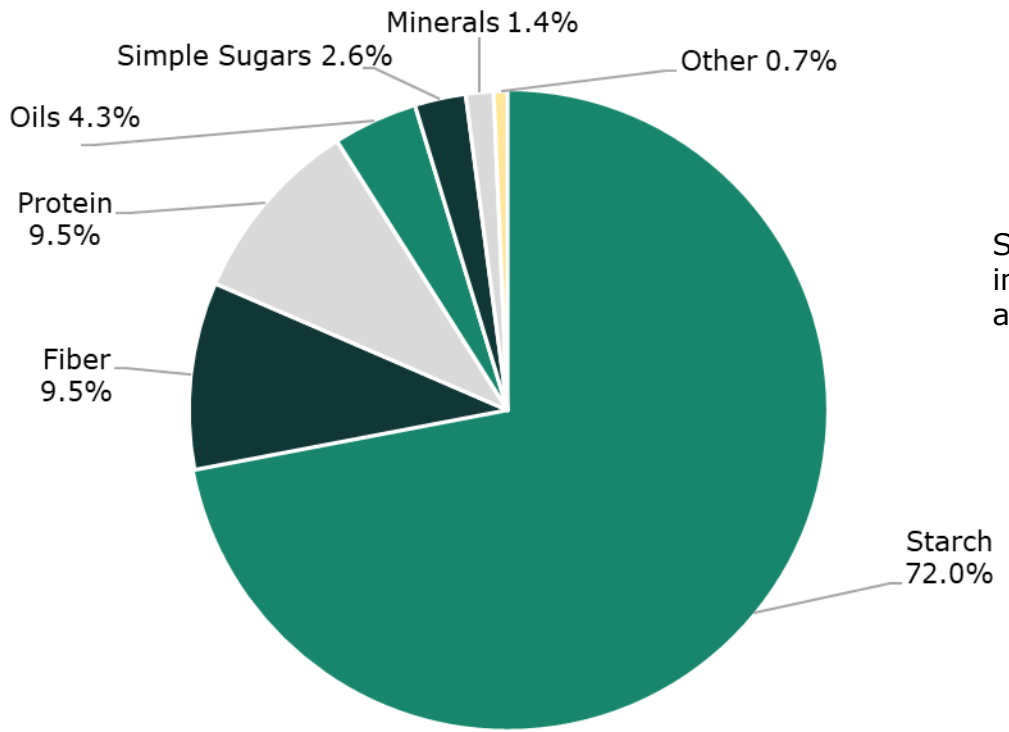


Source: GrizzlyRock estimates

Corn Biorefinery: Starch and Co-Products

Corn Components & Products

Non-Starch Corn component value primarily fiber, protein, and corn oil



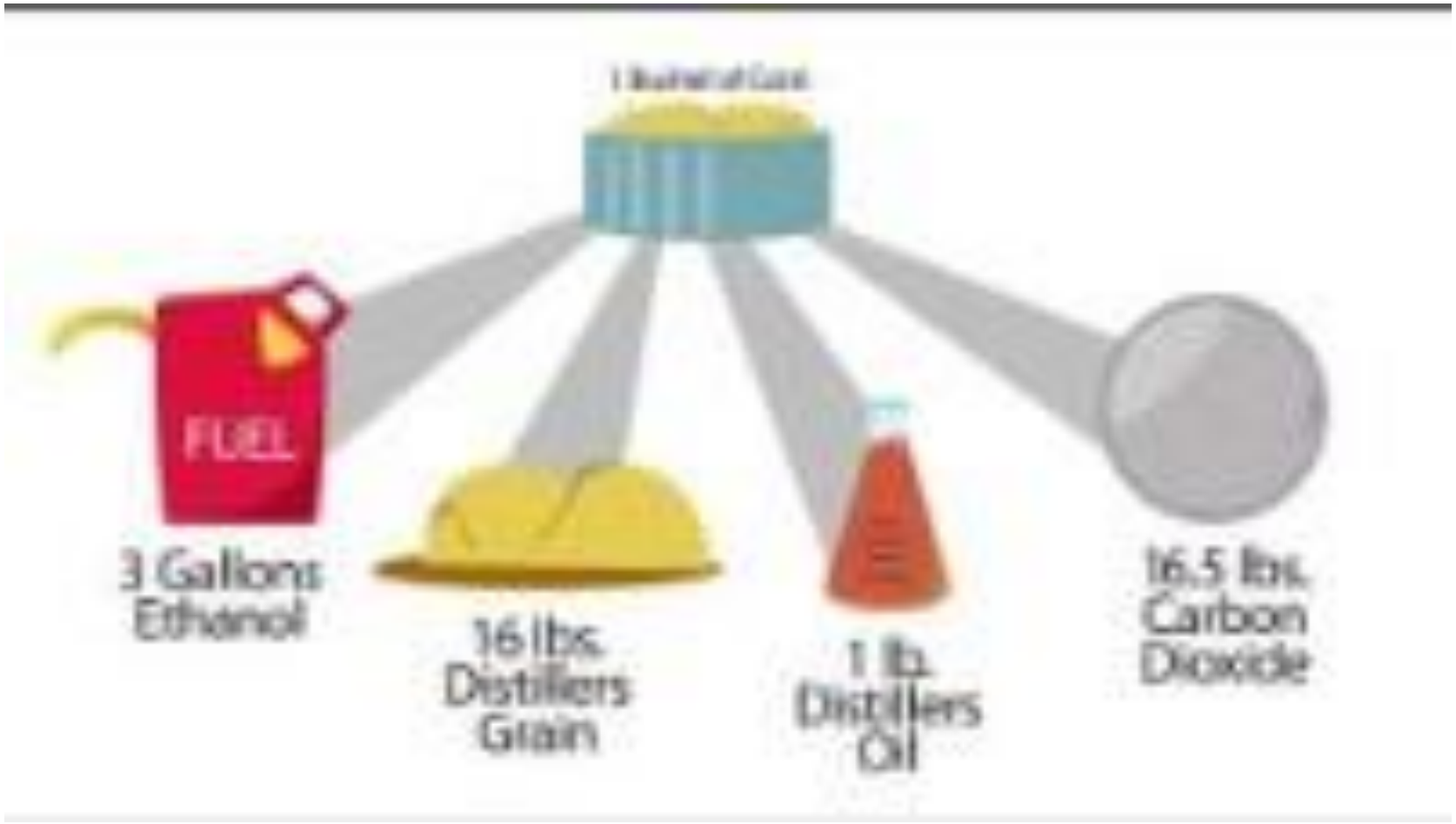
Starch, a carbohydrate, can be converted into value added food products for humans and animals or processed into biofuel

Green Plains Protein, Fiber, & Oil Products
- High protein animal feed for pet food and aquaculture
- Corn oil (renewable diesel feedstock)
- Cattle, poultry, and swine feed

Green Plains Starch based Products
- Industrial alcohol
- Clean Sugar
- Ethanol

Starch Process & Co-Product 5 Minute Video

Link: https://youtu.be/0h09Ei4Aqqg



Business Transformation: High Protein Technology & Implementation

Biorefinery Transformation: Co-Product Value Increasing

Green Plains
Historical Products

Green Plains Products with
high protein & corn oil system

- Green Plains is installing new technology to dramatically increase current biorefining product value (60% incremental return on capital).
- The new high protein technology is called an MSC System manufactured by Fluid Quip (Green Plains subsidiary). MSC Systems "bolt on" to existing biorefining plants and mechanically enable increased extraction of high value protein and corn oil co-products.
- These higher value added products should lead the shift from a volatile commodity producer to a more stable cash flow generator.
- Over time, investors will recognize this transition and value Green Plains in line with other stable protein producers.

Technological Vertical Integration

OMAHA, Neb., Jan. 05, 2021 Green Plains Inc. (NASDAQ:GPRE), today announced that it has acquired a majority interest in Fluid Quip Technologies (Fluid Quip) in a joint transaction led by Ospraie Management LLC (Ospraie). The acquisition capitalizes on the core strengths of the partners to develop and implement proven, value-added agriculture, food and industrial biotechnology systems, and to rapidly expand installation of Ultra-High Protein production across Green Plains' facilities in parallel with offering these technologies to partnering biofuel facilities. The terms of the transaction were not disclosed. As part of the transaction, Ospraie acquired 550,000 warrants for Green Plains stock (each warrant equal to one share of stock) with a strike price of $22 per share.

"We believe the Fluid Quip IP portfolio has many game changing valuable technologies that the world needs right now," said Dwight Anderson, managing partner of Ospraie. "Whether it's their clean sugar patent suite that creates new, low cost carbohydrate sources for potential use in synthetic biology, food production, or industrial biochemical fermentation, or their patent library on creating high protein ingredients for pet food, aquaculture and other high value feed products, this all improves the environmental impact of feed solutions using inputs from farmers. Sustainable protein solutions are healthier, more efficient and less harmful to the global food system including, reducing the carbon footprint of production agriculture."

"The partnership between Fluid Quip, Ospraie, and Green Plains will accelerate our path to our 2023 transformation from a commodity-processing business to a value-add agriculture, food technology and industrial biotechnology company focusing on creating diverse, non-cyclical, higher margin products while improving the environmental and carbon footprint of food and feed," said Todd Becker, president and chief executive officer of Green Plains. "This partnership will help advance the installation of Ultra-High Protein technology across our platform, significantly increase our renewable corn oil production to participate in the growing low carbon fuel markets and the renewable diesel value chain, further drive reduction of our operating expenses and significantly expand our product offerings. This transaction is a vital step in our evolution as it enhances our intellectual property portfolio, deepens our engineering expertise and maximizes operational efficiencies through powerful technology capabilities, while achieving significant financial return opportunities for our shareholders."

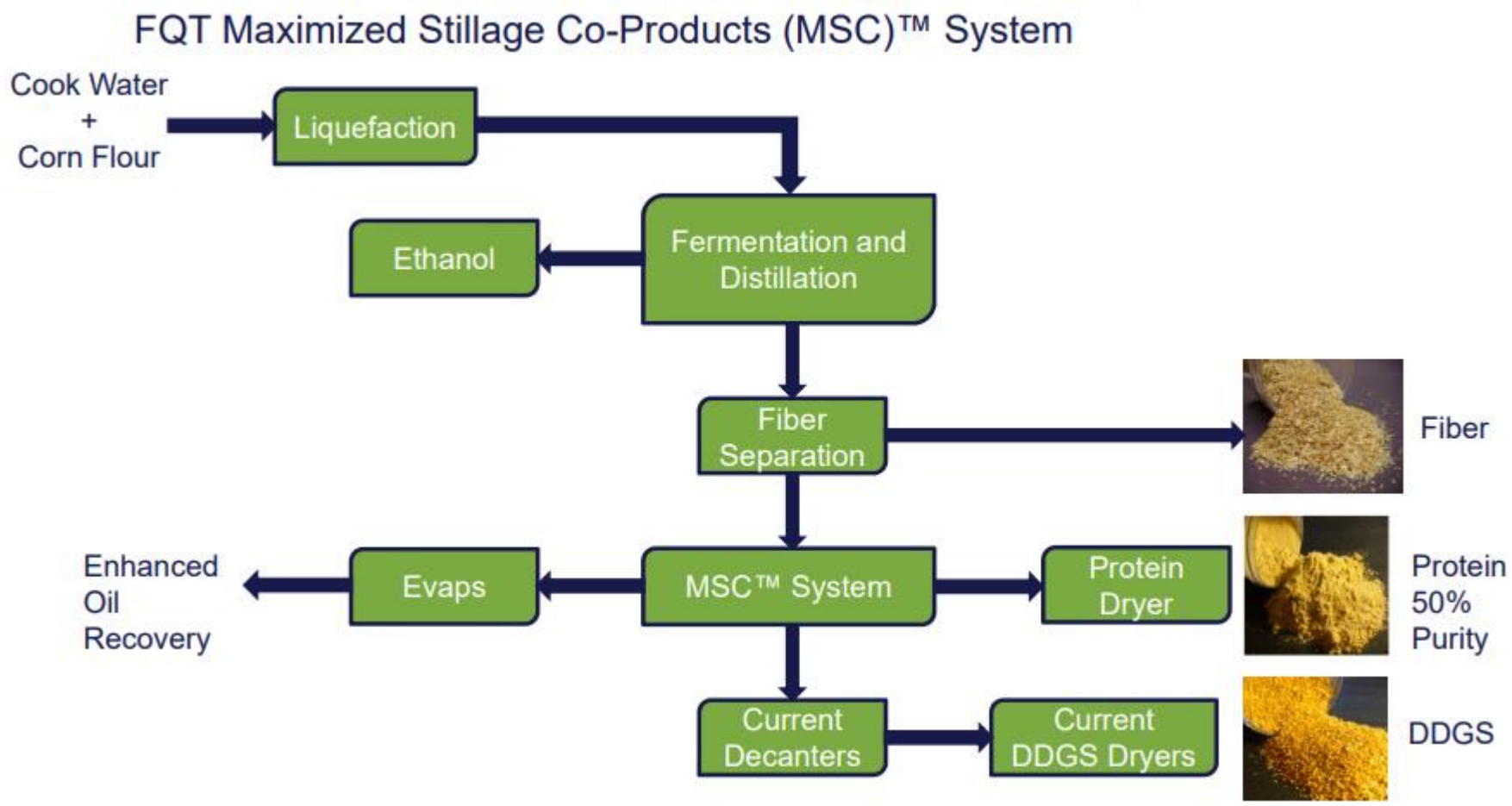
"This transaction offers a unique opportunity to bolster Fluid Quip's growth trajectory and financial strength through Ospraie's and Green Plains' expanded footprint, industry experience and worldwide relationships," said John Kwik, partner of Fluid Quip Technologies. "We will now be able to accelerate the development of revolutionary technologies that will drive transformational change to how agricultural products get used. With growing interest in the protein space, this partnership will leverage strong capabilities to help defend and protect the Fluid Quip IP portfolio from infringement. Finally, we will continue the implementation of our market leading flex-plant patented technologies, value added protein technologies and bolt-on processes that increase plant efficiencies for Fluid Quip's large global customer base as well."

"When you combine all of our partnerships into one innovation and financial engine with the rapid advancements that are already taking place, we believe the results will be truly revolutionary," stated Becker. "Through this combination, we believe we are squarely positioned to deliver unmatched value as a leader in sustainable, nutritious products created through fermentation of renewable resources using a full suite of world-class technologies."

Over the last two years, Green Plains has made strategic investments to significantly transform the business from an ethanol and commodities processor, to a leading technology focused, innovative producer of sustainable, value-added ingredient solutions. The partnership will retain all Fluid Quip employees.

Purchasing technology developer Fluid Quip and partnering with agriculture technology investor Ospraie further transforms Green Plains into an innovative agriculture technology business

High Protein System: Maximized Stillage Co-Products (MSC)™



High protein & corn oil system patented by Fluid Quip Technologies, a Green Plains subsidiary

Single Plant Unit Economics

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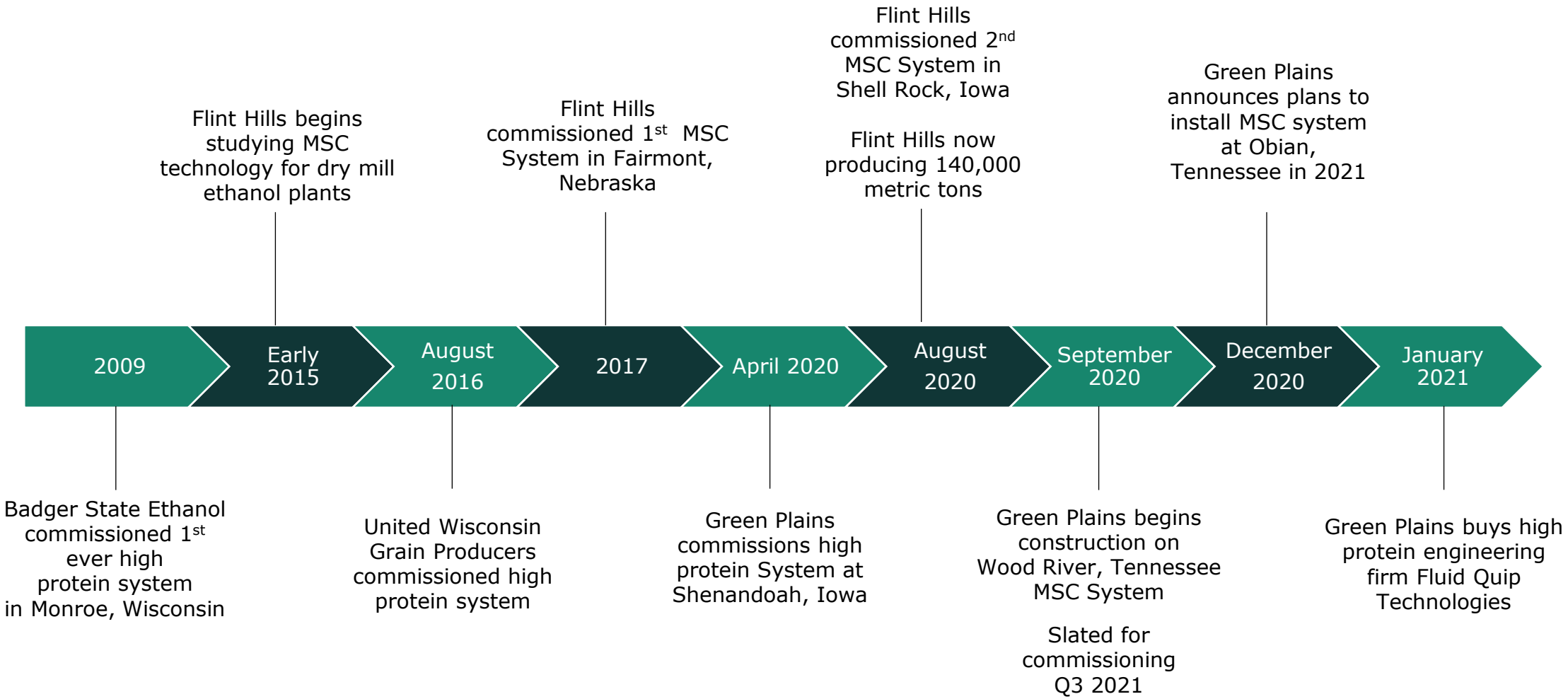
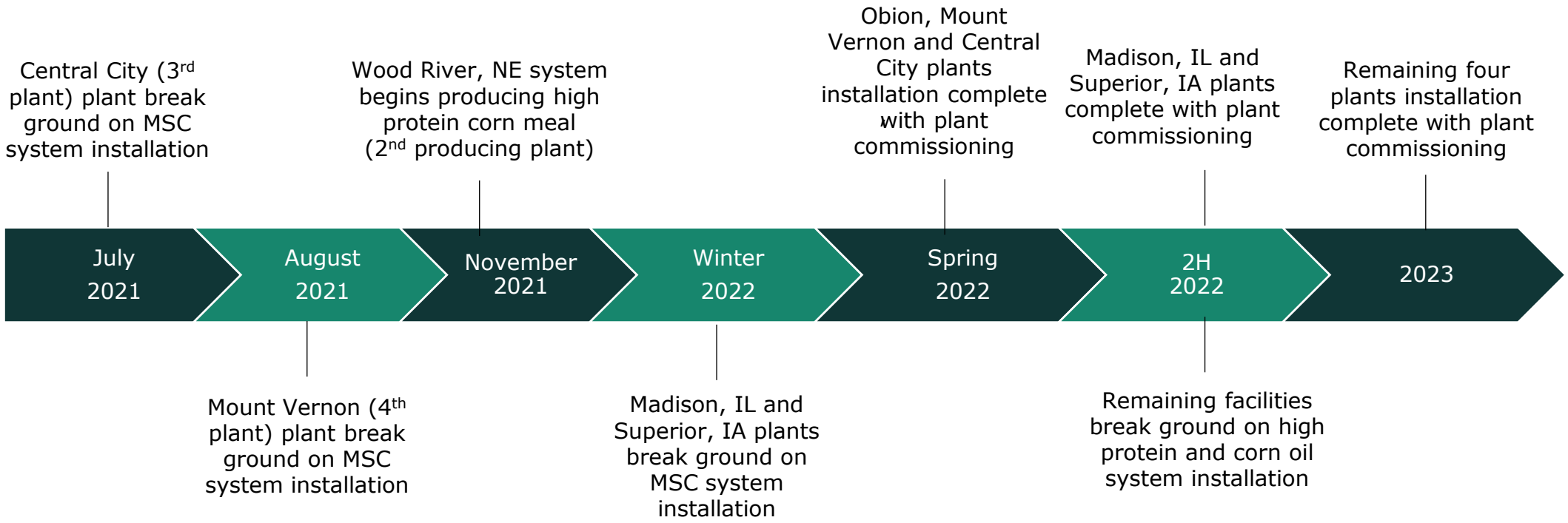
High Protein & Corn Oil System History (MSC™)



High Protein & Corn Oil System Buildout



High Protein Systems	Summer 2021	Fall 2021	Spring 2022	Summer 2022	2023
Complete	2	2	5	7	11
Under Construction	3	5	2	4	0
Total	5	7	7	11	11

Green Plains Announces Fagen, Inc. as Exclusive Construction Partner

June 17, 2021

Green Plains Inc. (NASDAQ:GPRE) today announced it has selected Fagen, Inc. as the general contractor to construct and install Fluid Quip Technologies' MSC™ system for its biorefining platform. This technology represents the cornerstone of Green Plains' transformation into a leading global ag tech company focused on sustainable, value added products. This exclusive partnership complements Green Plains' technology with a world class construction company, advancing the execution of its 2024 transformation plan. Furthermore, this partnership will facilitate marketing of the MSC™ technology solution to potential partners across the industry.

"Selecting Fagen to complete the construction of MSC technology across our platform is another pivotal milestone in delivering on our 2024 objectives," said Todd Becker, president and chief executive officer of Green Plains. "Fagen is the premier engineering and construction firm in the biorefining space with an unrivaled history as a high quality, reliable construction partner capable of large scale, duplicative and complex project management. When combined with the innovative technology from Fluid Quip, we believe we have created a world class partnership to deliver on the expansion of Ultra-High Protein across our platform by 2024."

Construction on the Obion, Mount Vernon and Central City locations will begin over the next several weeks with each facility being completed over a 9 – 12 month time frame. Construction at the Madison and Superior locations is expected to begin later this year and the four remaining facilities are anticipated to begin construction in 2022. Upon completion, Green Plains' anticipated annual Ultra-High Protein production capacity will be approximately 600,000 tons with protein concentrations of 50% or greater. Renewable corn oil capacity is also expected to increase by 50% as a result of the MSC™ technology.

"We are excited to work with Green Plains and Fluid Quip on implementing their leading technology portfolio in Ultra-High Protein, renewable corn oil and clean sugar, helping them create the biorefinery platform of the future," said Evan Fagen, chief operating officer of Fagen. "This exclusive partnership enhances execution of these projects across their platform and opens the door to additional industry partnership opportunities, allowing Fagen to once again play a vital role in meeting surging global demand for renewable ingredients to feed and fuel a growing world."

"As more of our biorefineries come online with Ultra-High Protein in 2022, we believe we will reach an inflection point driven by expanded high protein production capacity and increased renewable corn oil yields," added Becker. "We believe that by engaging a trusted general contractor and construction expert to reliably build out the remaining locations, we will drive added value and certainty of successful achievement of our 2024 financial goals. As each new site comes online, we will increase redundancies, allowing for our innovation engine to start to accelerate around higher protein concentrations and better nutritional outcomes while taking advantage of the growing demand for renewable corn oil."

http://www.fageninc.com/

Fagen, Inc. has a strong reputation in the biorefinery space

Green Plains now has a firm timeline for high protein and corn oil buildout

Green Plains Output Before High Protein System Installation

Location	Ethanol Capacity (million gallons)	Distillers Grains (thousand tons)	Corn Oil (million pounds)
Atkinson, Nebraska	55	146	15
Central City, Nebraska	116	307	32
Fairmont, Minnesota	119	315	33
Madison, Illinois	90	238	25
Mount Vernon, Indiana	90	238	25
Obion, Tennessee	120	318	33
Otter Tail, Minnesota	55	146	15
Shenandoah, Iowa	82	217	23
Superior, Iowa	60	159	17
Wood River, Nebraska	121	320	34
York, Nebraska	50	132	14
Total Capacity	**958**	**2,537**	**267**

- Industry dynamics lead to a persistent oversupply in ethanol and distillers grains market which should continue to weigh on pricing
- Due to the muted pricing and increasing input costs, margins are unlikely to improve on a sustainable basis for the foreseeable future
- Green Plains produces 2.87 gallons of ethanol, 15.2 pounds of distillers grains, and 0.8 pounds of corn oil per bushel of corn leading to the following platform wide economics
- Based on current plant economics and out of an abundance of caution, we model legacy Green Plains (ethanol focus) roughly EBITDA neutral.

Legacy ethanol focused platform has volatile, low returns

High protein technology was developed to diversify and stabilize revenue sources

Green Plains Output With High Protein System Installation

Location	Ethanol Capacity (million gallons)	Distillers Grains (thousand tons)	Corn Oil (million pounds)	High-Protein Feed (thousand tons)
Atkinson, Nebraska	55	108	23	34
Central City, Nebraska	116	228	49	71
Fairmont, Minnesota	119	234	50	73
Madison, Illinois	90	177	38	55
Mount Vernon, Indiana	90	177	38	55
Obion, Tennessee	120	236	50	73
Otter Tail, Minnesota	55	108	23	34
Shenandoah, Iowa	82	161	34	50
Superior, Iowa	60	118	25	37
Wood River, Nebraska(1)	121	238	51	74
York, Nebraska(2)	50	98	21	30
Total Capacity	**958**	**1,886**	**401**	**584**

(1) Wood River produces 25 million gallons of specialty alcohol and 96 million gallons of ethanol.
(2) As a former beverage alcohol plant, York has been fully converted to producing specialty alcohol. This is 50 million gallons per year at $1.00 of EBITDA per gallon for 2021E.

- The MSC high protein technology shifts 3.9 pounds of distillers grains production per bushel to 3.5 pounds of high protein feed and 0.4 additional pounds of corn oil
- These co-products are higher value add than distillers grains and command premium pricing in the markets
- The shift to higher value co-products increases system profitability. Additional corn oil projected to add $78 million and further separating the dried distiller's grains into high protein (pet food and aquaculture end markets) and legacy dried distiller's grains (livestock end markets) increases co-product EBITDA by more than $200 million over the 958 gallon, 11 plant system.

High protein transformation vastly improves plant economics and drives material cash flow generation

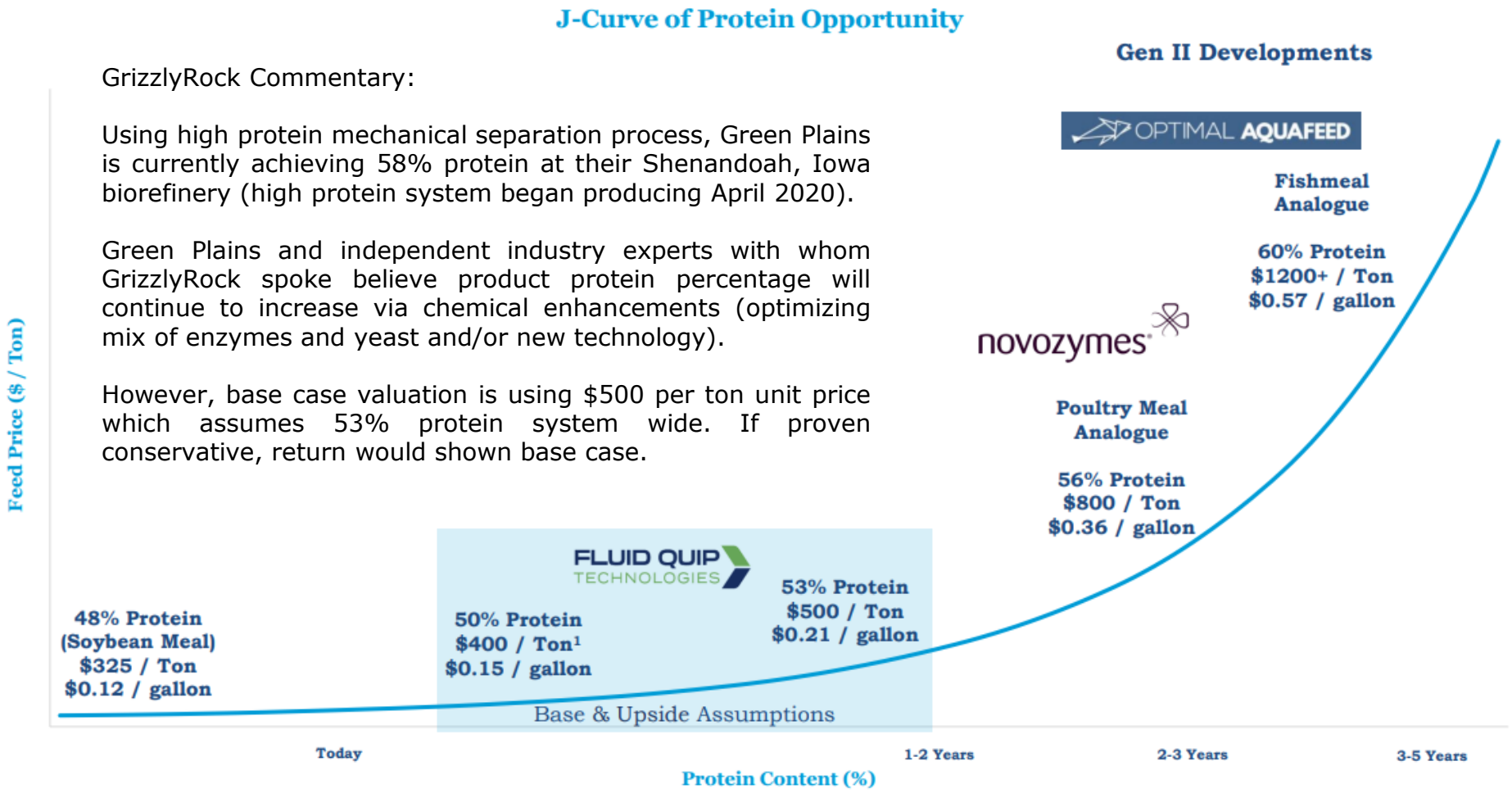
Margins Increase as Protein Increases

GrizzlyRock Commentary:

Using high protein mechanical separation process, Green Plains is currently achieving 58% protein at their Shenandoah, Iowa biorefinery (high protein system began producing April 2020).

Green Plains and independent industry experts with whom GrizzlyRock spoke believe product protein percentage will continue to increase via chemical enhancements (optimizing mix of enzymes and yeast and/or new technology).

However, base case valuation is using $500 per ton unit price which assumes 53% protein system wide. If proven conservative, return would shown base case.



[1]Value per ton of protein is based on underlying Dried Distiller's Grain (DDG) of $150 per ton and should be adjusted based on current DDG values.
[2]Upon reaching redundant scale and moving through commercial contracting year and inclusive of 50% improvement in corn oil yields at historical pricing.

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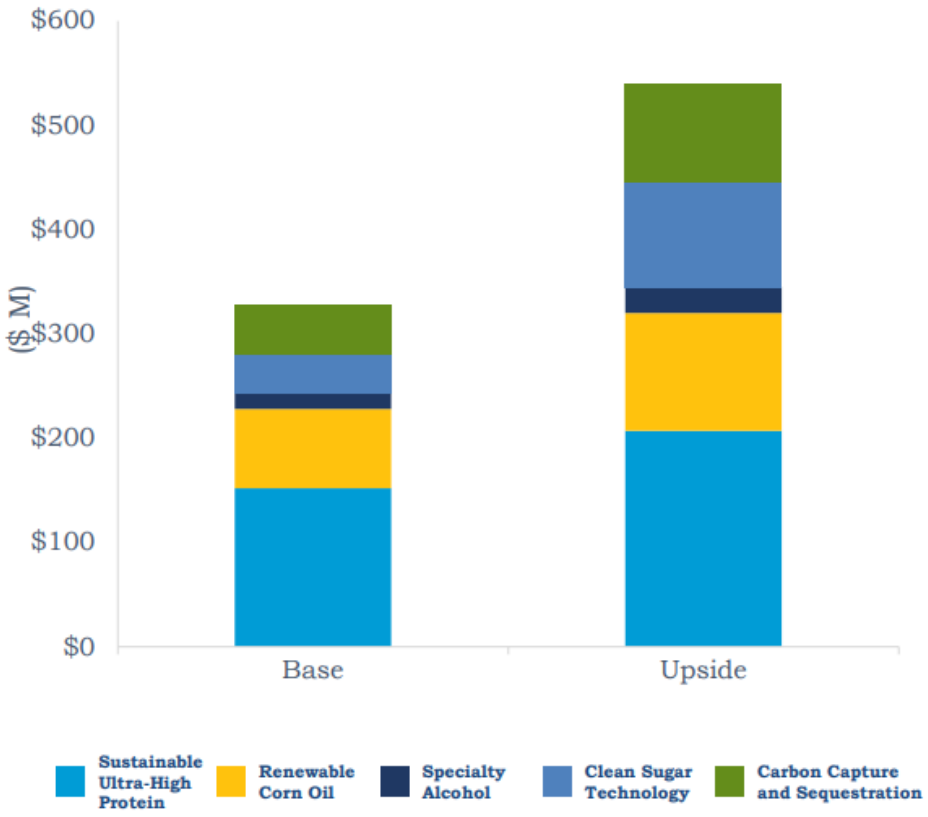
Chart source: Green Plains Investor Deck, December 2nd, 2021.
Commentary source: GrizzlyRock Capital.

Green Plains Management EBITDA Slide

Assumptions for 2024E* Run-Rate EBITDA



Assumptions

- Assets produce at 95% of capacity on 958 MGY of capacity
- Potential contributions from fuel ethanol business, ancillary businesses and corporate overhead are excluded

Sustainable Ultra-High Protein and Turnkey Initiatives

- Protein capital investment of ~$520M to achieve ~ 680k tons of capacity including Tharaldson JV, with ~$420M remaining to be spent
- Protein crush margin uplift of $0.15 to $0.21 per gallon
- Higher renewable corn oil yields at historical pricing is part of structural advantage of MSC technology and included in protein uplift

Renewable Corn Oil

- Incremental $0.20 to $0.30 per pound over base business; gross price of $0.55 to $0.65 per pound
- Renewable corn oil capacity increased by 50% to ~396 million pounds

Specialty Alcohol

- Premiums to fuel ethanol of ~ $0.25 to $0.40 per gallon on ~ 65 MGY of specialty alcohol capacity

Clean Sugar Technology

- Capital investment of ~ $1.00 per gallon of capacity converted
- 55 MGY to 150 MGY converted to CST with $0.67 per gallon margin uplift

Carbon Capture and Sequestration

- ***Assumed to begin in 2025**, CO_2 offtake of 658 MGY of capacity with SCS lowering carbon footprint of facilities; potential margin of $0.15 per gallon, net, due to lower CI
- Base assumes 50% online by end of 2024
- Excludes potential direct injection opportunities and option to invest in

Source: Green Plains December 2nd, 2021, Investor Presentation

Exceptional Returns on Capital

Product	Price Per Ton	Margin / Gallon	Convertible Gallons	EBITDA Generation	CapEx	ROIC
Distillers Grains	$110	$0.06	958	$64	$400	16%
50% Protein	$400	$0.16	958	$234	$400	58%
53% Protein	$500	$0.21	958	$292	$400	73%
56% Protein	$800	$0.36	958	$467	$400	117%

- Based solely on mechanical protein and oil separation, platform is generating corn meal with 53% protein.
- On current pricing, this represents a $0.21 uplift in margin per gallon which could generate $292 million of EBITDA annually.
- Across all 11 plants, high protein and corn oil system installation requires $400 total million growth capital expenditures. The additional $350 million will be funded with current cash on hand and cash flow generation.

At current protein levels, high protein systems are returning 60% on invested capital

Pet Food & Aquaculture

Pet Food and Aquaculture End Markets

- Green Plains is focusing on developing high protein feed to serve the pet food, aquaculture, and dairy markets.
- Corn gluten meal and fish meal, which sell at large premiums, are a key protein source for these markets. Green Plains can add economic value to customers by substituting high protein corn meal as a lower cost than corn gluten mean or fish meal while dramatically increasing their co-product economics and cash flow.
- Characteristics such as improved nutrition and digestibility are an important focus for Green Plains at their R&D labs and in trials as they work with customers to develop products and relationships to be able to make inroads in the industry.

"We are very happy to announce that we are almost sold out of Shenandoah's 2021 production to the pet food space and continue to work with customers in pet, aquaculture and dairy to take the remaining production over the next few weeks. What we are producing is a better and higher protein with very unique amino acid profiles and yeast characteristics than others are producing in the space."

"Finally, we have inclusion in all veg animal feeding diets as the custom - consumer is tired of seeing animals being fed to animals, and our high-protein products will help solve that dilemma, which brings me to our partnership with Novozymes and now Hayashikane that are going to distinguish our protein production from competing technologies and other proteins. We believe we can move quickly to higher protein purity levels and even more important, add nutritional upgrades unmatched by other technologies and producers."

"In dairy, we have very interesting amino acid profiles that have been proven to increase milk yields in studies already. That's on top of the yeast benefit in our ultra high-protein products."

- All Quotes Green Plains CEO Todd Becker, November 5th, 2020

Strategic focus on pet food and aquaculture moves Green Plains up the value curve

Protein Growth

"**United States** feed additives market projected to register a **CAGR of 5.6%**"

"Yields are expected to improve by way of adoption of better feed management practices and the augmented use of compound feed, which, in turn, promotes the feed industry to use optimum quantities of feed additives."

- US Feed Additives Market: Growth, Trends and Forecasts (2020 - 2025)

Alternative Protein Ingredients Market Growth Per Year

- North America **+5.3%**
- Western Europe **+4.2%**
- Asia **"up over 7%"**

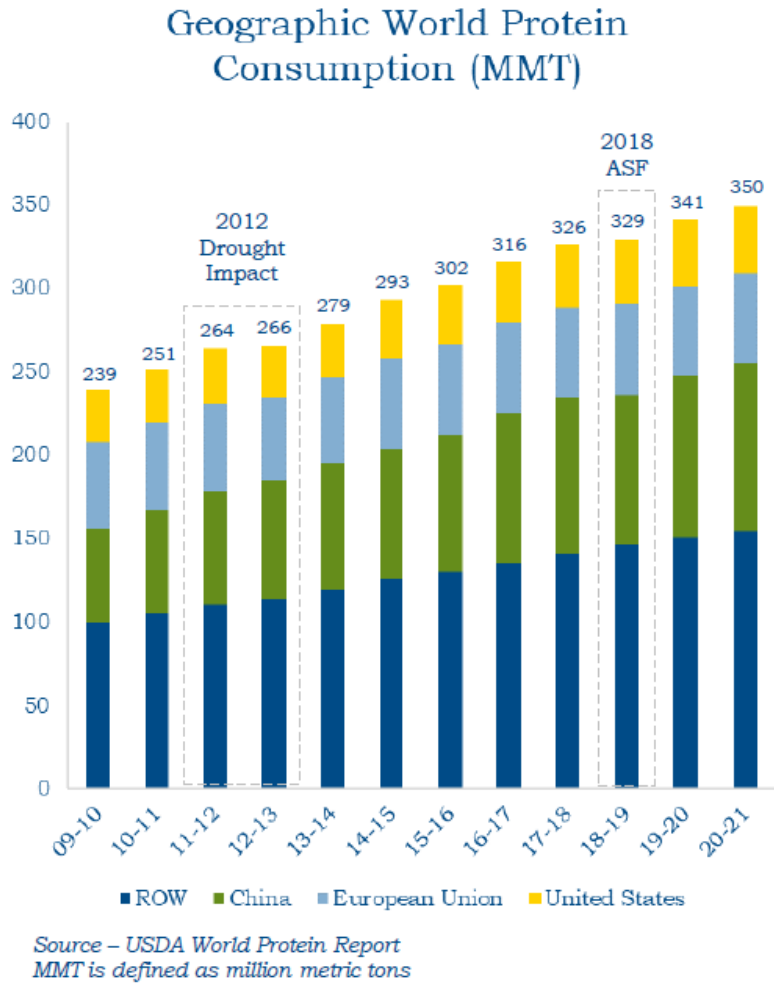
- Ethanol Magazine Webinar May 2018

"Aquaculture markets are expected to grow 4.5% annually for the next five years"

- Albert Tacon, Aquaculture industry expert

"**Global retail sales of pet food** are projected to grow at **4% per year**, reaching $120 billion by 2024"

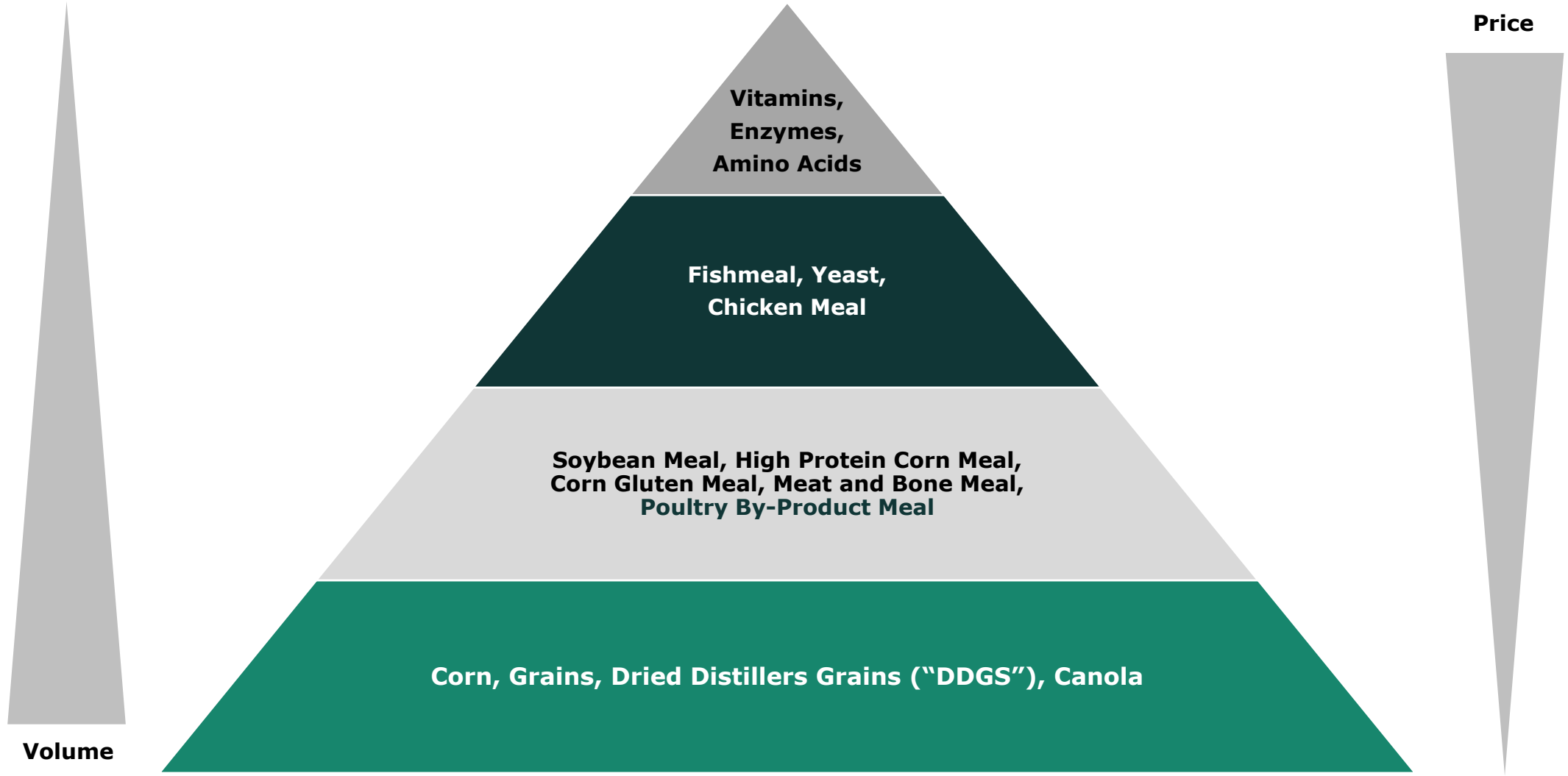
- Vincent Macciocchi, Archer-Daniels-Midland, President of Nutrition



Source – USDA World Protein Report
MMT is defined as million metric tons

Protein is a secular growth, under supplied market

Feed Ingredient Spectrum



Pet Food Protein Sources

Feed	Source	Protein Content	Lysine Content (Amino Acid)	Percentage Digestible	Price Per Ton	Comments
Fishmeal	Ground Whole Fish (sardines etc.)	60% - 70%	4.6%	90%+	$1,600	Balanced amino acid profile Digestible lipids and fatty acids
Chicken Meal	Ground Whole Chicken	65%	4.4%	90%+	$1,000	Primary protein for high grade pet food
Poultry By-Product Meal	Poultry Rendering	64%	2.5%	90%+	$700	Primary protein for mid grade pet food
Corn Gluten Meal	Processed Human Food Corn	60%	0.9%	85%	$550	High energy value in addition to protein
High Protein Corn Meal	**Biofuel Co-Product**	**53%+**	**2.1%**	**88%**	**$500**	**75% corn protein 25% yeast protein**
Meat and Bone Meal	Cattle & Swine Rendering	48% - 52%	2.6%	90%+	$315	Primary protein for mid grade pet food
Soybean Meal	Soybeans	47%	3.2%	85%	$425	Anti-nutritional issues GMO concerns in Europe
Brewers Yeast	Beer Production	40%	2.3%	90%+	$1,200	High value derives from essential amino acids

Source: Jacobsen, industry expert conversations, academic papers

Pet Food

Pet Food Basics

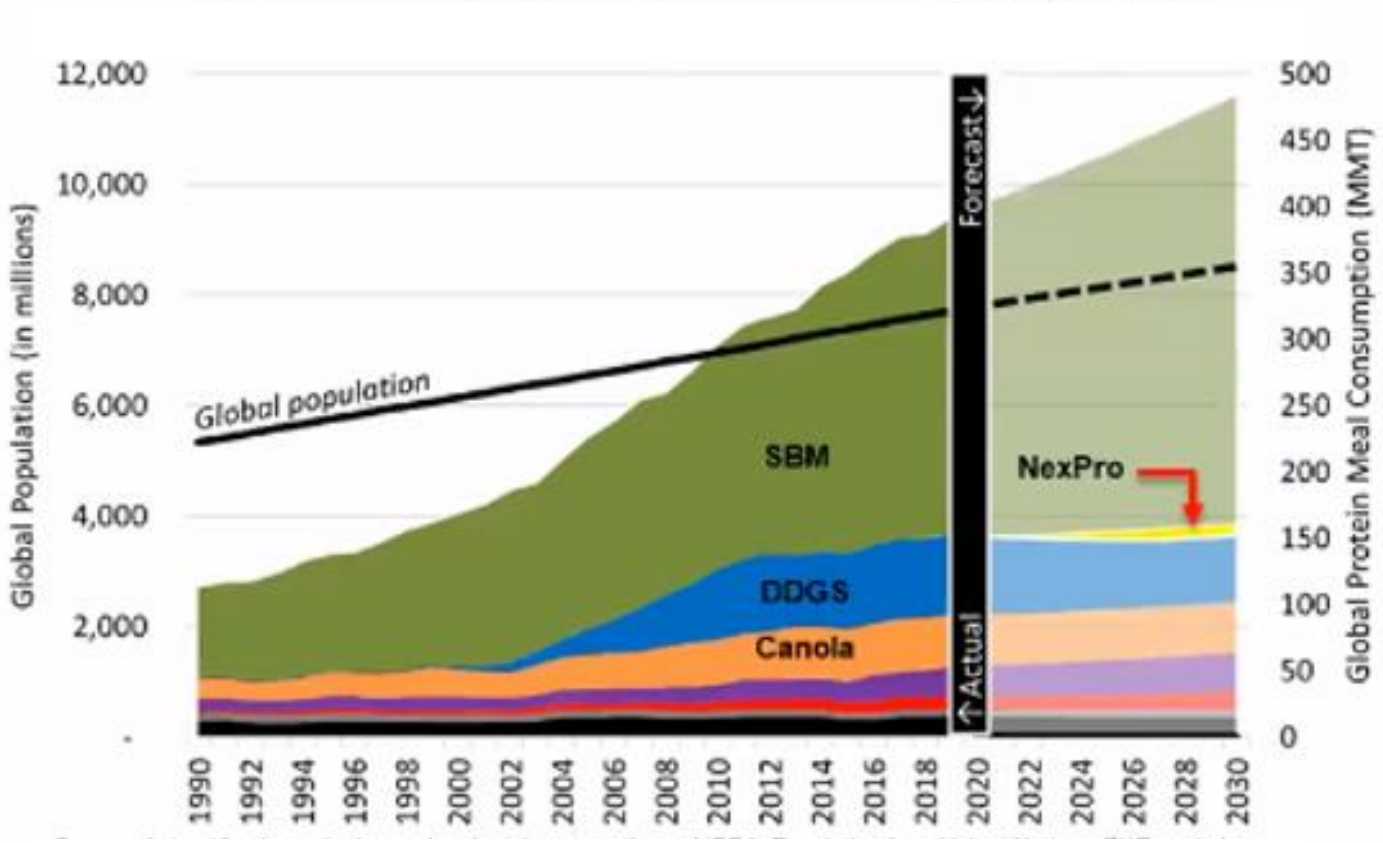
- Pet food demand continues to grow and focuses on quality, digestibility, and nutrients.
- Nutritionists work to formulate the diet for the pet and once the ingredients are chosen they are generally fixed for product life.
- Many buyers view corn in a negative manner and see it as a filler so if it is shown on the pet food labels they may look to avoid.
- Premium pet foods are mostly animal based proteins which are high in cost and have strong nutritional value.
- Product success will be based on (1) animal nutritional value, (2) consumer preference, and (3) food manufacturer economics.
- Green Plains is working directly with pet food buyers to formulate products and entire 2021E production is sold out.

Buyer Focus

- Pet food buyers are looking to buy ingredients that meets nutritional requirements at the lowest cost possible.
- Consistent, repeatable testing is expensive yet valuable as buyers will pay for product consistency and quality.
- Buyers recognize testing costs and will pay for quality, replicable products with production assurance and back-up.
- "Novel" is risky with pet food. Proven ingredients are highly valuable (highlights Shenandoah testing facility importance).
- Suppliers often sign year long contracts with commodity price hedging used to mitigate commodity price profit margin impact.
- For pet food, product ingredient quality, taste, and consistency (most important) drive decisions rather than cost.

Pet food is a high value market where quality and consistency are vital

Global Protein Meal Historical and Forecasted Demand



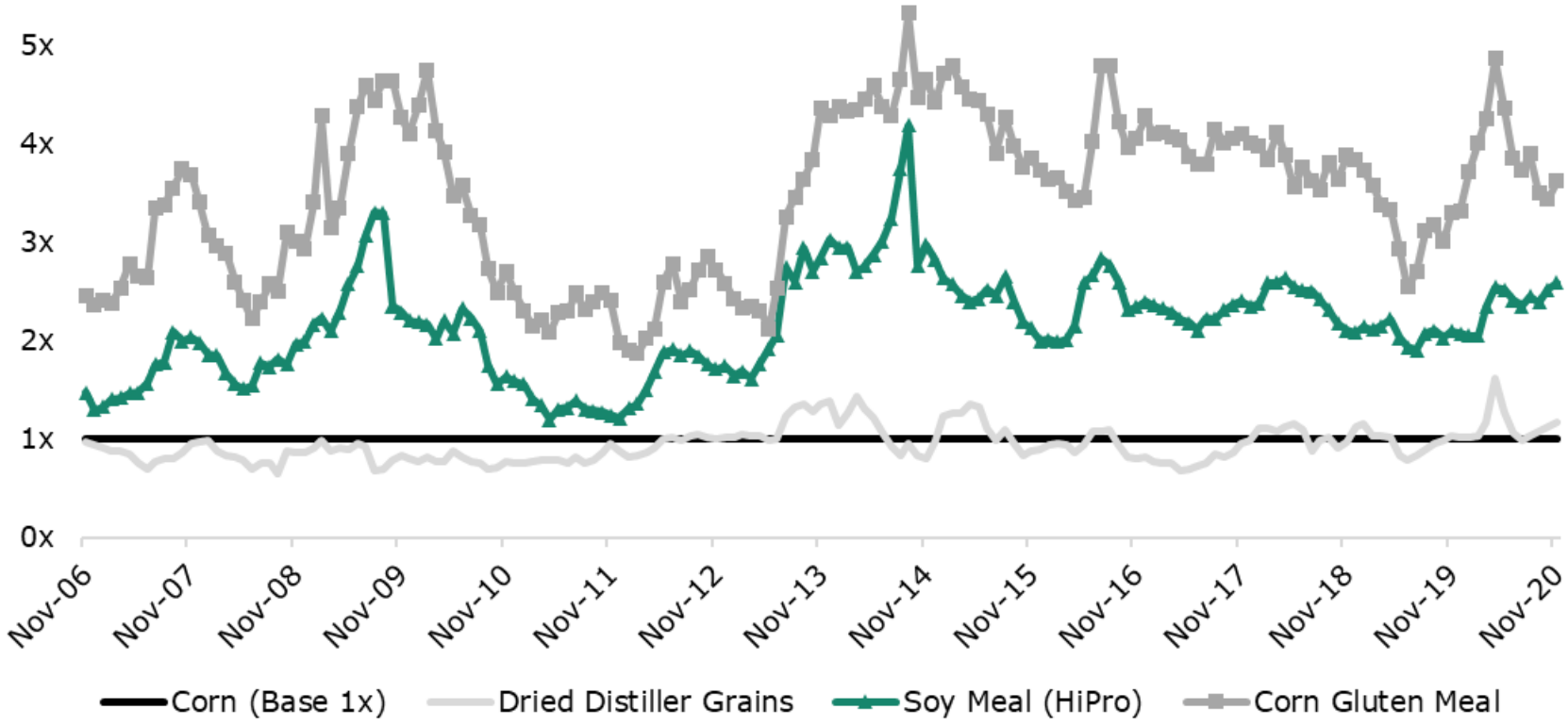
Source: Animal feed protein demand and pricing according to USDA. Population from United Nations. Chart and forecasts from Flint Hills Resources. NexPro is Flint Hills branded high protein technology using the same MSC systems as Green Plains is installing

- Soybean meal ("SBM") is a key protein source globally for feeding pets, aquaculture, and livestock such as cattle, swine, and poultry.
- "NexPro" is Koch Industries brand name for high protein corn meal. Product manufactured using Fluid Quip MSC technology with product interchangeable with Green Plains' high protein corn meal.
- Dried distiller's grains ("DDGS") and Canola meal are used as caloric equivalent to corn to feed livestock.

"Even if we converted every ethanol plant in the United States, we would not have enough of this protein to fill demand."

- Neil Jakel, VP of Technology at Fluid Quip Process Technologies

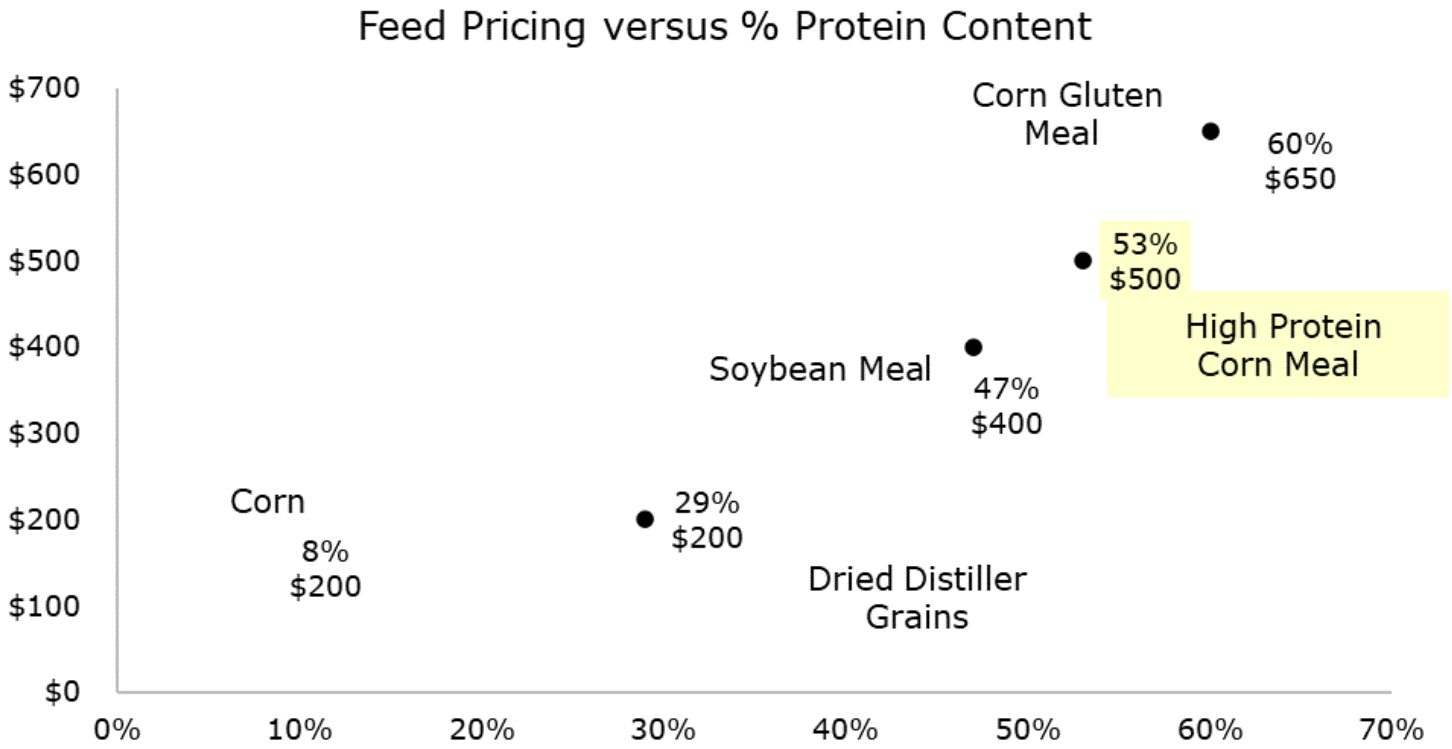
Vegetable Protein Pricing



Feed	Protein Content	Average Historical Price ($ per short ton)
Corn	14%	$160
Dried Distillers Grains	29%	$151
Soybean Meal	47%	$332
Corn Gluten Meal	60%	$528

Source: Jacobsen

Pricing Improves with Higher % Protein



"Product is somewhere between soybean meal and corn gluten meal in terms of value, with a much higher nutrient content than your traditional ethanol feed coproducts."

- Scott Tilton, Manager of Nutrition Services Flint Hills Resources Fairmount, Nebraska

"Commercially the traded soybean markets is going to drive (pricing). Whether (high protein corn meal) trades for $100 a ton over soybean meal, or $50 over, or $200 over will be determined by customer product specification."

- Mike Sticklen, Ex Flint Hills Resources Executive

Green Plains Reaches Protein Milestone

OMAHA, Neb., Feb. 24, 2021 (GLOBE NEWSWIRE) -- Green Plains Inc. (NASDAQ:GPRE) today announced that development efforts between Green Plains, Fluid Quip Technologies and other innovation partners have led to the **production of 58% sustainable Ultra-High Protein at Green Plains' Shenandoah, Iowa biorefinery**. The breakthrough development was achieved using Fluid Quip's proprietary MSC™ protein technology and improved operating parameters at full commercial run rates. The company has delivered initial quantities of the new product to its pet food partners for use in formulation and palatability studies to confirm improved taste and nutritional characteristics.

"Achieving these protein purity levels at full commercial scale is further validation that our transformation strategy is on track, and we believe our financial goals for 2024 can be realized as we accelerate our plan to consistently produce premium products," said Todd Becker, president and chief executive officer of Green Plains. "From the onset of this initiative, we anticipated achieving higher protein levels and we are reaching these goals much earlier than expected**. This breakthrough is a game changer, and to the best of our knowledge has never before been accomplished in a dry mill biorefinery.** Utilizing the power of this innovative platform, we are developing solutions for a world that is deficient in proteins while accelerating the development of value-added ingredients."

The initial Ultra-High Protein system, installed in Shenandoah, Iowa, began production in April 2020 and has seen consistent protein concentration and purity improvement since inception. Green Plains has announced plans to install this revolutionary technology at Mount Vernon, Ind., Obion, Tenn. and Wood River, Neb., with the intent to implement the technology across its entire biorefinery platform. **The company also announced initial offtake and sales agreements for most of its 2021 Ultra-High Protein production for use in pet food, poultry feed, aquaculture feed and dairy rations.**

"While we are very excited about the potential of the protein purity levels achieved, the ability to use our base sustainable Ultra-High Protein product as a preferred delivery mechanism in multiple markets with the ability to layer in precise nutritional characteristics at scale is achievable today," commented Becker. "This is a great example of what is attainable through the use of this cutting-edge agricultural technology and the strategic partnerships we have in place. We believe these innovations will help reduce land use for food production and decrease the amount of raw materials it takes to produce affordable high protein products for global consumers. We are rapidly creating an ag tech based company with valuable intellectual property, while simultaneously delivering low carbon ingredients and fulfilling our commitment to sustainability for our shareholders."

Aquaculture

- Aquaculture is primarily in Asia with more than 90% of production in the region
- China is the largest producer at 60% of world's production
- Fish is a much cheaper option for protein in Asia so balancing increased supply with cost is important for producers
- However, Asia is heavily reliant on imported feed ingredient sources with 50-80% of most aquafeeds composed of imported feed ingredients
- In addition, there is an increasing concern for environment and sustainability as farms operate within public water bodies so digestibility and sustainable ingredients play a key role
- With traditional fish meal priced at a large premium, it leaves an important role for feed manufacturers to develop products that meet the above goals and corn protein is both cost effective and nutritionally meets the needs

Aquaculture meets global protein demand in an environmental, nutritional and safe manner

Green Plains is working directly with fish protein producers to meet these needs

Aquaculture Feed

- Farming of over 300 aquatic species and is the fastest growing food sector globally at ~6% per year.
- Aquaculture is primarily in Asia with 91% of global production.
- Over 44 million metric tons of fed species and over 51 million metric tons of aquafeed (especially for high end fish like salmon)
- Most Asian countries must import their feed as they can't produce it locally.
- Fishmeal is the gold standard and is often priced above $1,000 per ton due to its 60-70% protein content, amino acid profiles, nucleotides, highly digestible marine lipids and energy, omega-3 fatty acids, cholesterol, phospholipids, minerals, absence of anti-nutritional factors, good palatability, source of fat soluble and water soluble vitamins.
- In order to compete with fishmeal, products must support similar growth profiles and fish consistency while also lowering cost.
- Green Plains is developing a product that contains high protein and nutritional content as well as 20-25% spent brewers yeast which is a good source of essential amino acids and growth factors such as polysaccharides, nucleotides, and B-Vitamins that could result in a lower cost profile for the feed.
- For aquaculture, cost is the largest factor while product consistency, quality, and nutrients are important.

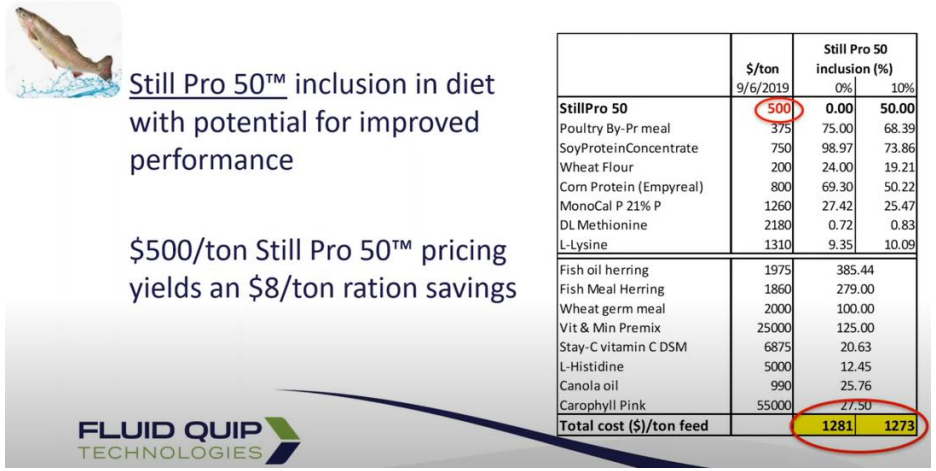
High protein corn meal feed can be used to replace fishmeal in a healthy feed ration while lowering overall feed cost

Aquaculture Feed

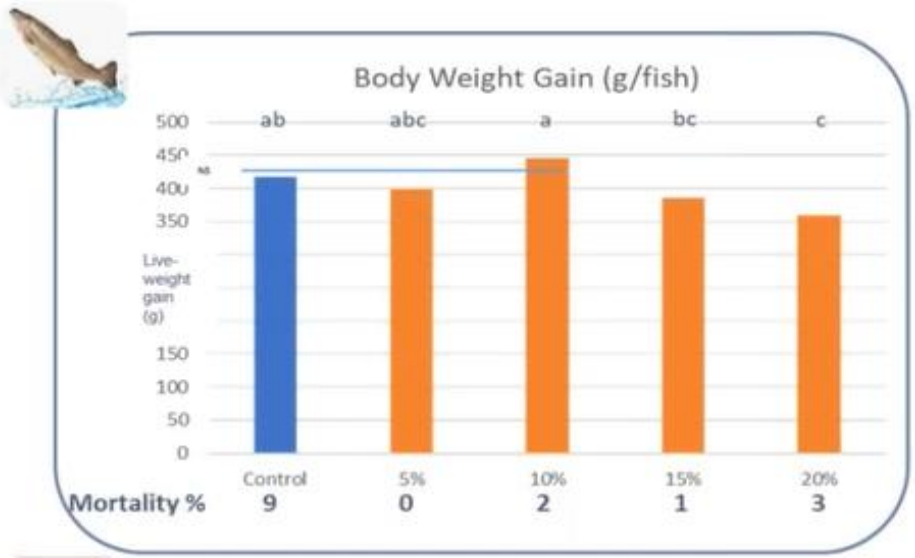
- Long-term trials are necessary to prove long term high protein corn meal value to aquaculture feed buyers.
- "We have completed several aquaculture trials at our world-class aqua lab in Shenandoah, and we have seen very interesting results in taste and rate of gain. We are starting several more as we speak for ourselves and customers who are also using our lab for trials."

  - Green Plains CEO Todd Becker November 5th, 2020

- In addition, Fluid Quip has done more than 30 university and contract research trials replacing fishmeal and soy isolates in aquaculture.
- Trials have shown that including 10% of the high protein corn meal product in a diet can save $8 per ton compared to legacy diets.
- 10% inclusion resulted in better body weight gains vs. the control group showing that this product can be a value add to aquaculture feed diets.
- As more trials and research takes place, we believe that there could be increased adoption of the products Green Plains is looking to produce

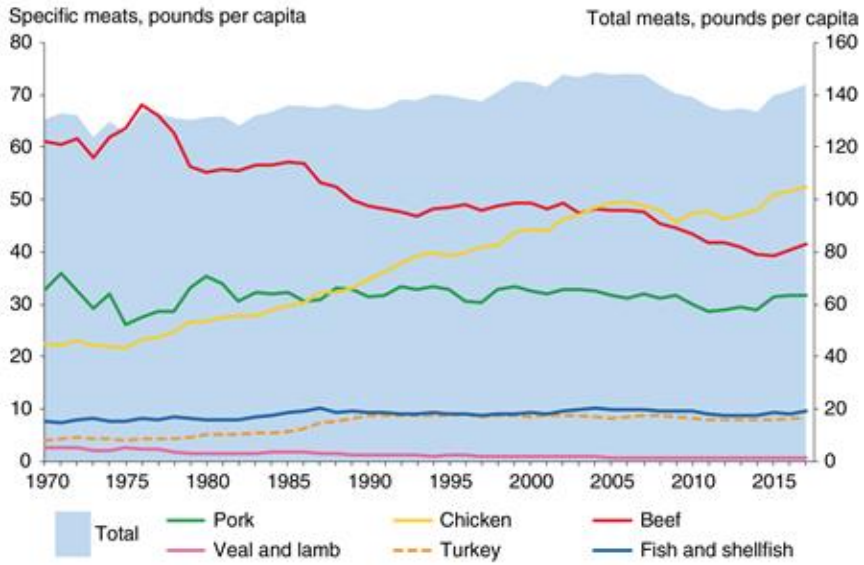


	$/ton 9/6/2019	Still Pro 50 inclusion (%) 0%	10%
StillPro 50	500	**0.00**	**50.00**
Poultry By-Pr meal	375	75.00	68.39
SoyProteinConcentrate	750	98.97	73.86
Wheat Flour	200	24.00	19.21
Corn Protein (Empyreal)	800	69.30	50.22
MonoCal P 21% P	1260	27.42	25.47
DL Methionine	2180	0.72	0.83
L-Lysine	1310	9.35	10.09
Fish oil herring	1975	385.44	
Fish Meal Herring	1860	279.00	
Wheat germ meal	2000	100.00	
Vit & Min Premix	25000	125.00	
Stay-C vitamin C DSM	6875	20.63	
L-Histidine	5000	12.45	
Canola oil	990	25.76	
Carophyll Pink	55000	27.50	
Total cost ($)/ton feed		**1281**	**1273**

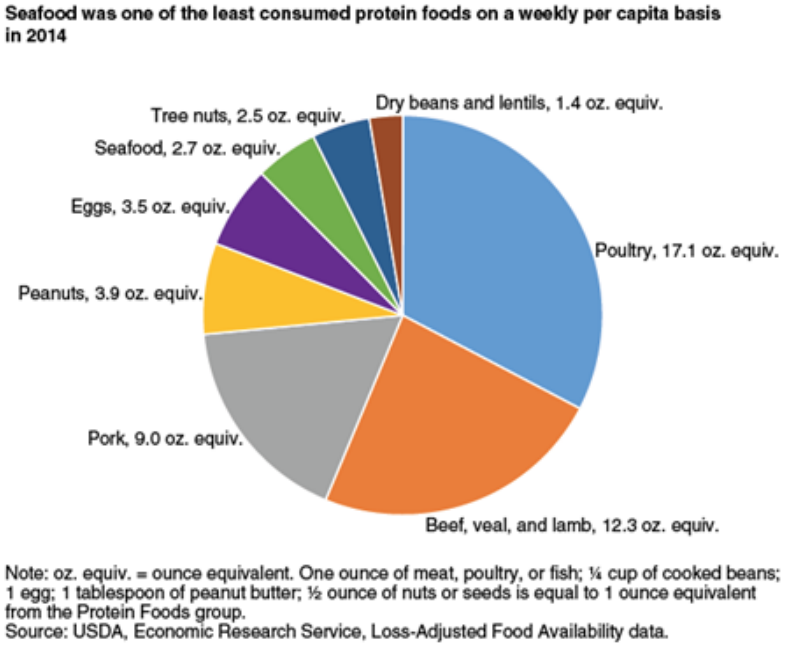


Source: https://www.youtube.com/watch?v=0X-H5OIQJk4

Seafood Demand is Secularly Growing



Source: USDA, Economic Research Service using loss-adjusted food availability data from its Food Availability (Per Capita) Data System.



Note: oz. equiv. = ounce equivalent. One ounce of meat, poultry, or fish; ¼ cup of cooked beans; 1 egg; 1 tablespoon of peanut butter; ½ ounce of nuts or seeds is equal to 1 ounce equivalent from the Protein Foods group.
Source: USDA, Economic Research Service, Loss-Adjusted Food Availability data.

- Seafood remains one of the least consumed protein foods in the United States.
- Health trends continue to shift consumption from red meat towards seafood which provide better health benefits to consumers.
- Recognition of the important role played by seafood in human nutrition and health, global food security, and need for safe foods.
- 25% of protein consumption in Asia is fish so there is considerable upside as seafood becomes a larger component of US diets.

Health benefits should continue to drive per capita seafood consumption in Western Regions

Yeast, Enzymes and Amino Acids

- Yeast is an important differentiator in aquaculture as it can supply essential amino acids, polysaccharides, nucleotides, and B-Vitamins.
- Increasing the content of protein, yeast and enzymes in the feed reduces the negative contents such as fiber that are not digestible for aquaculture and pets.
- These characteristics are differentiators vs other products such as soy which can cause gut inflammation in fish and pets.
- Yeast (both from breweries and ethanol plants) is highly valued for use in animal nutrition. Yeast based feed ingredients command a premium price ($1,000 to $1,200 per ton which is more than a 150% premium to soybean meal).
- Green Plains has formed an exclusive partnership with Novozymes (OMX:NZYM-B) aimed at aquaculture and pet food markets.
- The partnership will help Green Plains further enhance the protein products by creating different, higher value outputs.
- They can increase protein content through use of enzymes, develop beneficial amino acid profiles, and enhance nutritional qualities to better meet the needs of the consumers in end markets.
- As this partnership develops, Green Plains could increase the value of the feed per-ton with no incremental capital expenditures which would further increase margins and returns on invested capital.
- Announcements over the coming year regarding enzymes and yeast partnerships should highlight continued technical progress towards value enhancing yeast and enzymes product value. Accordingly, we expect Green Plains to continue to move up the J-Curve (slide 23).

Exclusive partnership with Novozymes puts Green Plains in a leading innovative position to further move up the value curve

Corn Oil (Renewable Diesel Feedstock)

What are the Low Carbon Fuel Standards?

What are the Low Carbon Fuel Standards?

- Low Carbon Fuel Standards ("LCFS") programs are intended to reduce emissions of greenhouse gases by lowering the average carbon intensity of transportation fuels used in each geographical area.
- Program key is that the alternative fuels track the carbon intensity including the lifecycle of generating, producing, and transporting the fuel. This is often enumerated with a carbon intensity figure ("CI Score").
- California was the first jurisdiction to enact a LCFS program with Sweden, Norway, and Finland following quickly behind. Programs now exist in the EU, UK, Canada with many additional mandates forthcoming.
- Low Carbon Standards Legislation is separate and distinct from the United States Renewable Fuel Standards (i.e. Blender's Tax Credit).

Renewable Diesel is the #1 Global Fuel Used to Meet LCFS Mandates

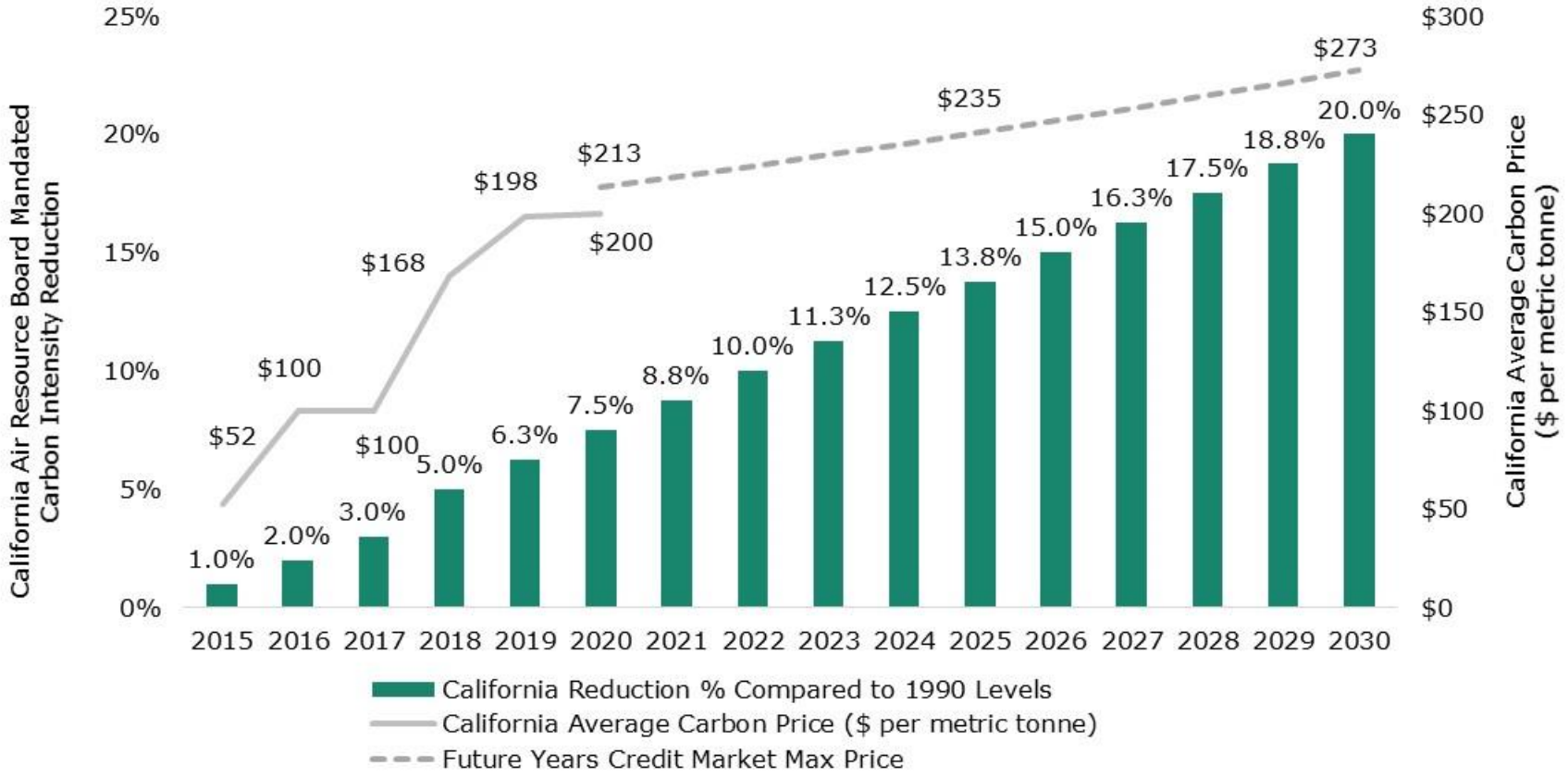
- Product has a combination of low CI score and compatibility with current transportation infrastructure (i.e. diesel engines)
- Emits 85% less greenhouse gases than fossil fuel-based diesel.
- Chemically similar properties to fossil-based diesel.
- "Drop in" fuel to any diesel car (Europe) or truck (North America) leveraging current transportation infrastructure.
- Renewable Diesel can be transported via existing pipeline networks and configurations.
- Renewable diesel is easily used and stored in cold weather climates whereas biodiesel can freeze in diesel tanks and must be blended with high amounts of fossil-based diesel to ensure fuel does not create customer issues.
- Superior to electricity as LCFS mandates track the carbon intensity of energy from the source. As much of the world's energy is carbon-based, electricity is not currently a major factor in meeting LCFS mandates.
- Diesel trucking requires significant torque which requires significantly larger, more costly batteries than currently practical.
- Electricity may pressure renewable diesel over the long term yet industry estimates are 10+ years from today.

Corn oil is one of three main feedstock into renewable diesel production

California Low Carbon Fuel Standards

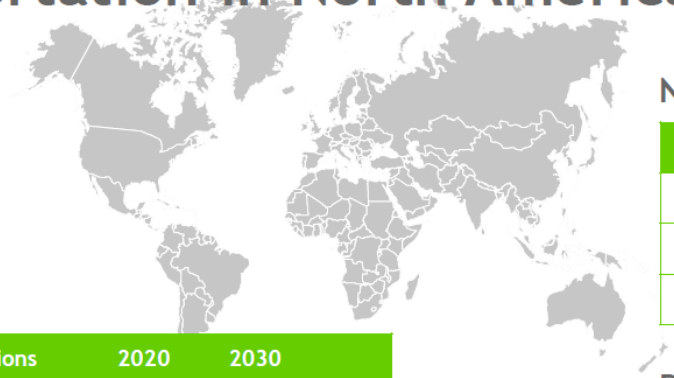
California enacted their LCFS program in 2011 with the following goals:

- Decreasing carbon dioxide emissions from transportation fuel (reduction from 1990 levels).
- Encouraging the development and use of alternative transportation fuels.
- Credits are generated when low carbon fuel is sold.
- Sellers of fuel (refiners) are fined for non-compliance.



Global Renewable Diesel Initiatives Support LCFS Market Growth

High ambition level to reduce emissions in transportation in North America and Europe



NORTH AMERICA

Carbon intensity reductions	2020	2030
British Columbia	10%	20%
Oregon	2.5%	10% *2025
California	7.5%	20%
Canada		10-12% *Ambition
United States	Ongoing efforts in Washington State and New York to pass Clean Fuels Programs in the near term	

NORDICS

Mandate obligations	2020	2030
Norway [1]	20%	40% *Ambition
Sweden [2]	21%	65.7% *Ambition
Finland [3]	20%	30%

REST OF EUROPE

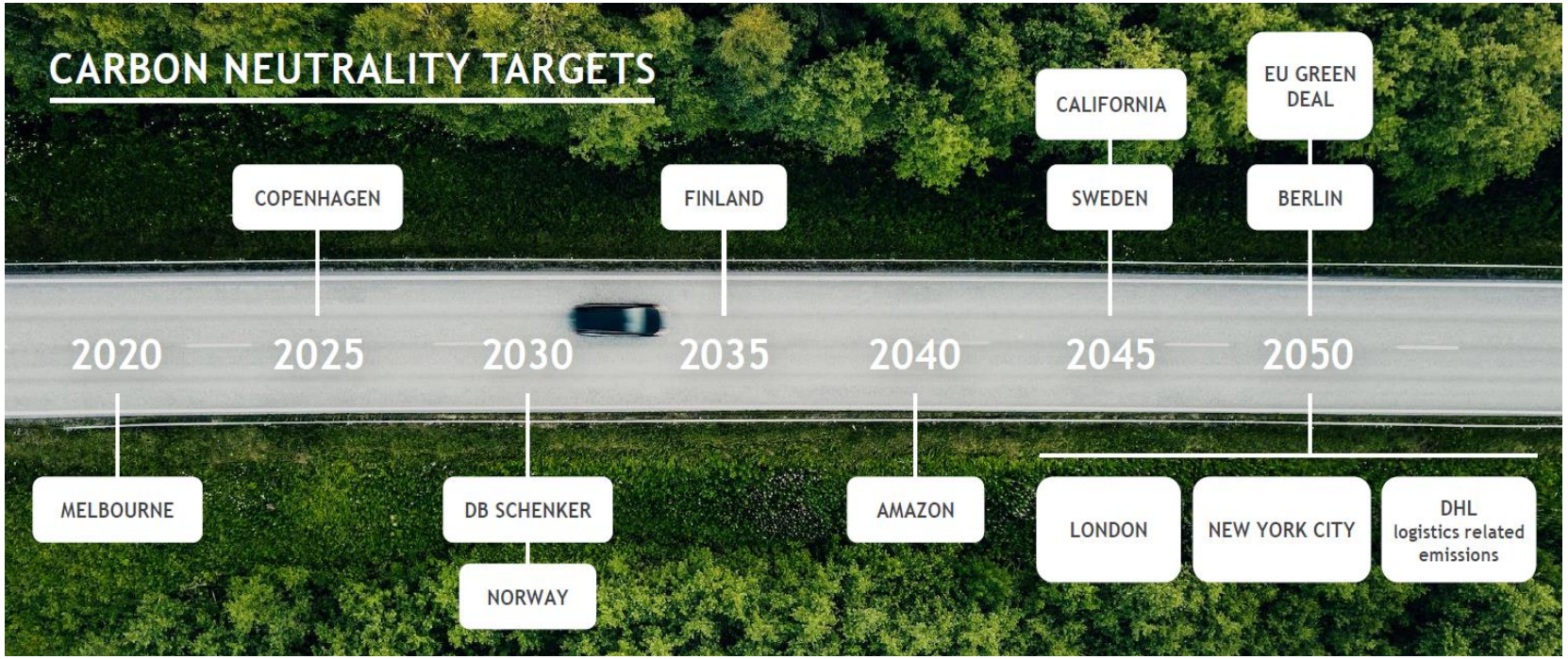
	2020 Mandate	2030 Ambition
France [3,4]	8%	15%
Italy [3,4]	9%	22%
Netherlands [3]	16.4%	1.4 Mton
Spain [3,4]	8.5%	28%
EU RED II [4]		14%

1) Volumetric mandate. 2) GHG reduction mandate for diesel. 3) Energy content based mandate. 4) 2030 ambition for renewables share for road and rail

Source: Nestle Oil Analyst Presentation

Low Carbon Fuel Standards expected to drive demand growth for renewable diesel as additional regulatory mandates aimed at improving sustainability and reducing green house gas emissions are implemented on a global scale

Global Carbon Neutrality Targets



Source: Nestle Oil Analyst Presentation

Low Carbon Fuel Standards are a core step towards global carbon neutrality

United States National Low Carbon Fuel Standard

Potential United States National LCFS

- On July 1st, 2020, the US congressional committee on climate change published a recommendation for US Federal policy to develop from the currently enacted Renewable Fuel Standards to a national Low Carbon Fuel Standard.
- US Federal transportation fuel policy is highly political with Republicans tending to enact pro-fossil fuel polices and Democrats tending to mandate more climate friendly fuel. With the now current "Blue Wave" across Congress, the Senate and the Executive branch, the likelihood of a national LCFS has risen considerably.. In this scenario, a national LCFS is highly likely.
- A national LCFS would likely mirror California's plan which focuses on carbon emissions during both fuel production and usage (Renewable Fuel Standards focus on carbon emissions during usage only). The reason renewable diesel scores well on the production side is the input materials are waste oils and fats. This is a main reason renewable diesel is the #1 fuel used to meet California's LCFS mandate.

How material would a national LCFS be to Green Plains valuation?

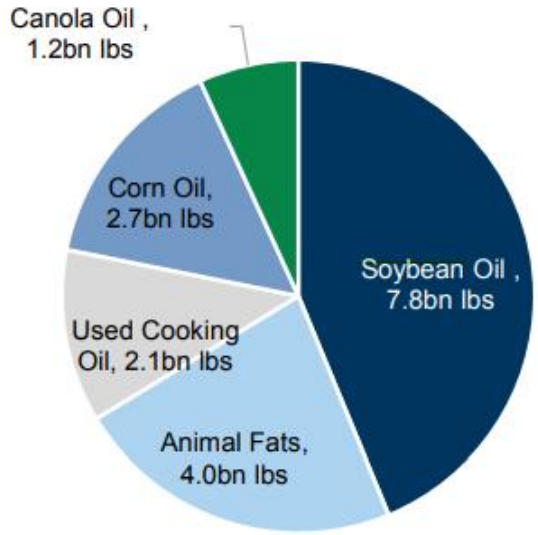
- While this answer depends on the degree of mandated carbon reduction and over what time frame, the change would be a material beneficiary for all renewable diesel feedstock producers including Green Plains. Even a modest national LCFS would dramatically increase demanded volumes and prices.
- If a US national LCFS was enacted the value of renewable diesel feedstock would be materially higher. Corn oil currently priced at ~$0.43 per pound would likely rise far above $0.75 per pound. (For conservativism, we model $0.55 per pound in the base case and $0.65 per pound in the upside case).
- A national LCFS would increase Green Plains per share intrinsic value $10 to $15 per share depending on the magnitude of the national LCFS mandate.

Renewable Diesel Feedstocks

Feedstock	Source	Carbon Intensity Score(1)	Virgin Product or Waste
Animal Fat	Animal Rendering	32	Waste
Used Cooking Oil	Restaurant Waste Cooking & Frying Oil	20	Waste
Corn Oil	Biofuel Manufacturing	32	Waste
Soybean Oil	Crushed Soybeans	55	Virgin Product

(1) The lower the carbon intensity score the more economic value a feedstock has for renewable diesel production.

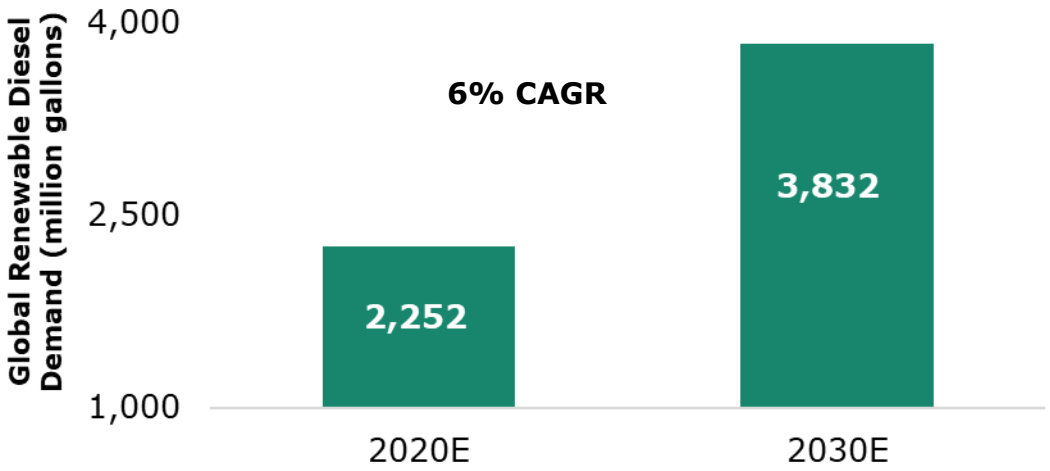
Estimated feedstock mix of renewable diesel + biodiesel in 2019



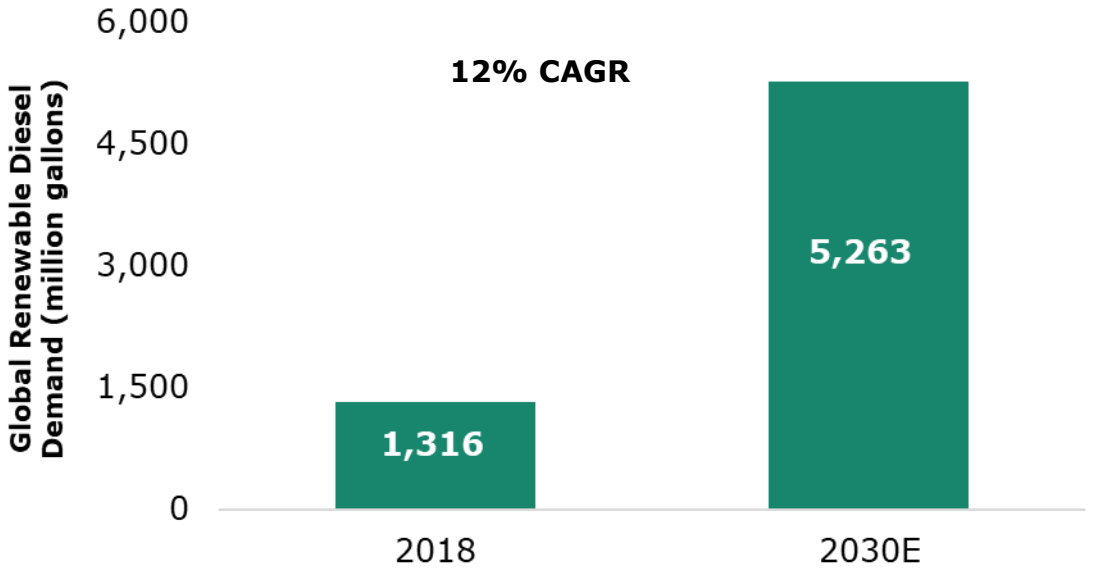
Source: Goldman Sachs Global Investment Research, USDA

Corn oil is one of the three most valuable renewable diesel feedstocks based on its status as "waste" from biorefining activities

Renewable Diesel Demand Growth



Source: Darling Ingredients, LMC International



Source: Wood Mackenzie

Demand expected to grow high single to low double digits for the next decade

Renewable Diesel Supply Growth

Renewable Diesel Global Supply (million gallons)					
Company	**2019**	**2021**	**2023**	**Feedstock**	**Geography**
Neste Oil	711	1,184	1,303	Corn Oil, Used Cooking Oil, Animal Fat	Singapore & Europe
Diamond Green Diesel	275	675	1,075	Corn Oil, Used Cooking Oil, Animal Fat	Louisiana, US
Ryze / Phillips 66	54	169	186	Corn Oil, Used Cooking Oil, Animal Fat	Nevada, US
Renewable Enegry Group	90	90	340	Corn Oil, Soybean Oil	Louisiana, US
Marathon Petroleum	0	180	735	Corn Oil, Soybean Oil	North Dakota, US
Sinclair Co-Processing	115	115	115	Corn Oil, Soybean Oil	Wyoming, US
World Energy	0	0	116	Soybean Oil	California, US
Holly Frontier	0	0	210	Soybean Oil	New Mexico and Wyoming US
CVR Energy	0	0	100	Soybean Oil	Oklahoma, US
Various	40	60	90	Corn Oil, Used Cooking Oil, Animal Fat, Soybean Oil	Various
Production Volume	**1,285**	**2,473**	**4,270**		
Growth from 2019		93%	232%		

With production capacity exploding higher (200%+ growth from 2019 to 2023, production feedstocks including corn oil should increase materially in price

Corn Oil

- Corn oil is another important co-product of the ethanol process and provides additional value to crush margin.
- The ethanol plants have systems that extract non-edible corn oil from thin stillage evaporation process before the production of distillers grains.
- Corn oil is produced by processing the syrup through a centrifuge that separates the relatively light corn oil from the heavier components of the syrup.
- On their legacy plants, Green Plains extracts ~0.8 pounds of corn oil per bushel of corn used to produce ethanol which leads to annual production of ~267 million pounds of corn oil.
- Industrial uses for coin oil include feedstock for renewable diesel, biodiesel, livestock feed additives, rubber substitutes, rust preventatives, inks, textiles, soaps and insecticides.
- Corn oil pricing has been strong recently with renewable diesel buildouts and we believe there is material upside to pricing over time as producers look to secure supply in the spot market from green plains.

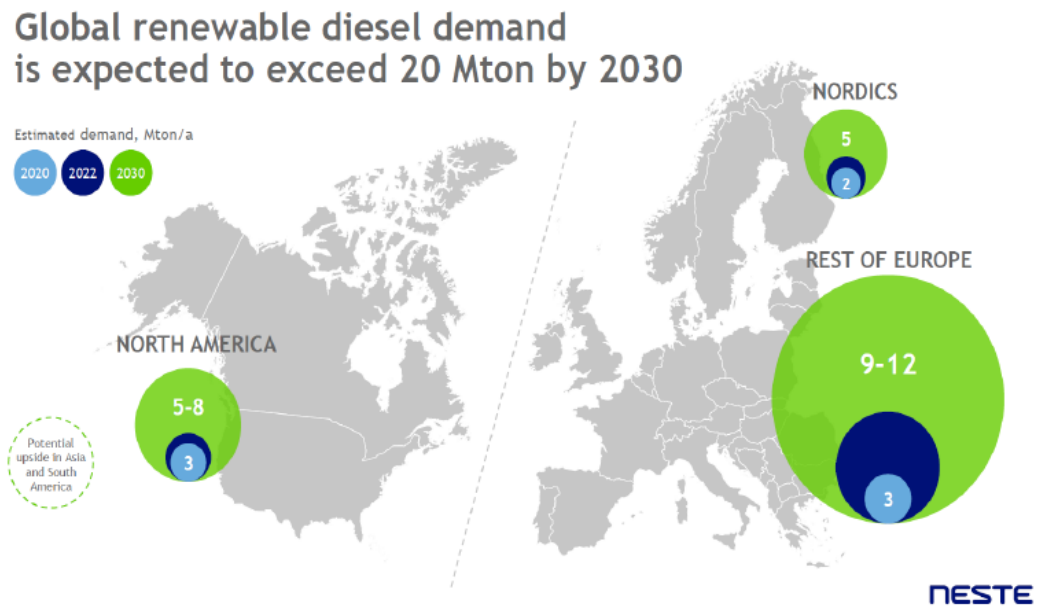
Corn oil is a valuable co-product with demand drivers that could lead to material pricing upside

Corn Oil Production Increase

- Green Plains estimates that once the high protein technology is implemented across the entire platform they will be able to increase corn oil production per bushel from 0.8 pounds to 1.2 pounds.
- The increased yields are due to taking the current ethanol plant output and putting it through an entirely new high protein and corn oil process (in an adjacent new building). The second oil extraction results in an additional 0.4 pounds of corn oil per bushel as well as producing high protein corn meal.
- Across their current ~1 billion gallons production capacity, Green Plains could increase corn oil production by more than 130 million pounds.
- With 400 million pounds of corn oil production at scale, a $0.10 increase represents $40 million of additional EBITDA
- Further corn oil prices are likely as it has unique demand drivers from ESG trends such as renewable diesel.
- The upside to corn oil pricing is 100% incremental margins as it is a core co-product to the ethanol process.
- In addition, the maximum amount of corn oil per bushel of corn is 2 pounds. Green Plains believes that with the recent acquisition of Fluid Quip they can continue to increase yields.
- Application of additional technologies in the future could result in renewable corn oil capacity expansion to 1.8 lbs, a 50% increase or ~200 million pounds
- Acquisition of Fluid Quip has enabled implementing new technology that could further increase yields, thereby enhancing margins without additional capital investments
- Green Plains believes renewable diesel demand could increase corn oil price by $0.35 per pound up to $0.75 per pound which represents an additional $140 million of EBITDA

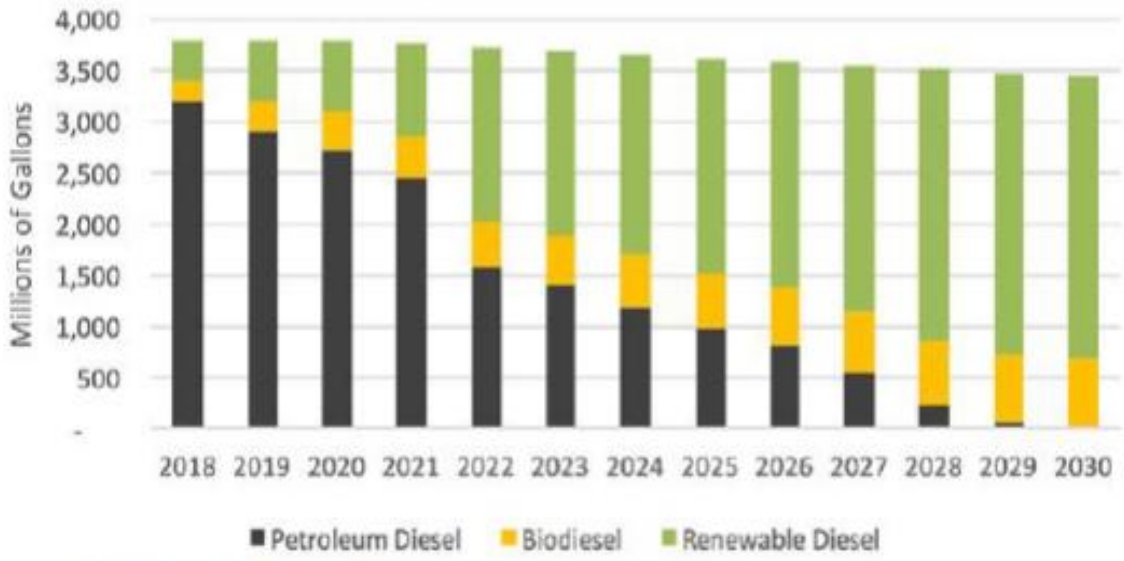
Unique drivers for corn oil are not being appreciated by public markets

Corn Oil Demand Driven by Sustainability Initiatives



Source: Nestle Oil Analyst Presentation

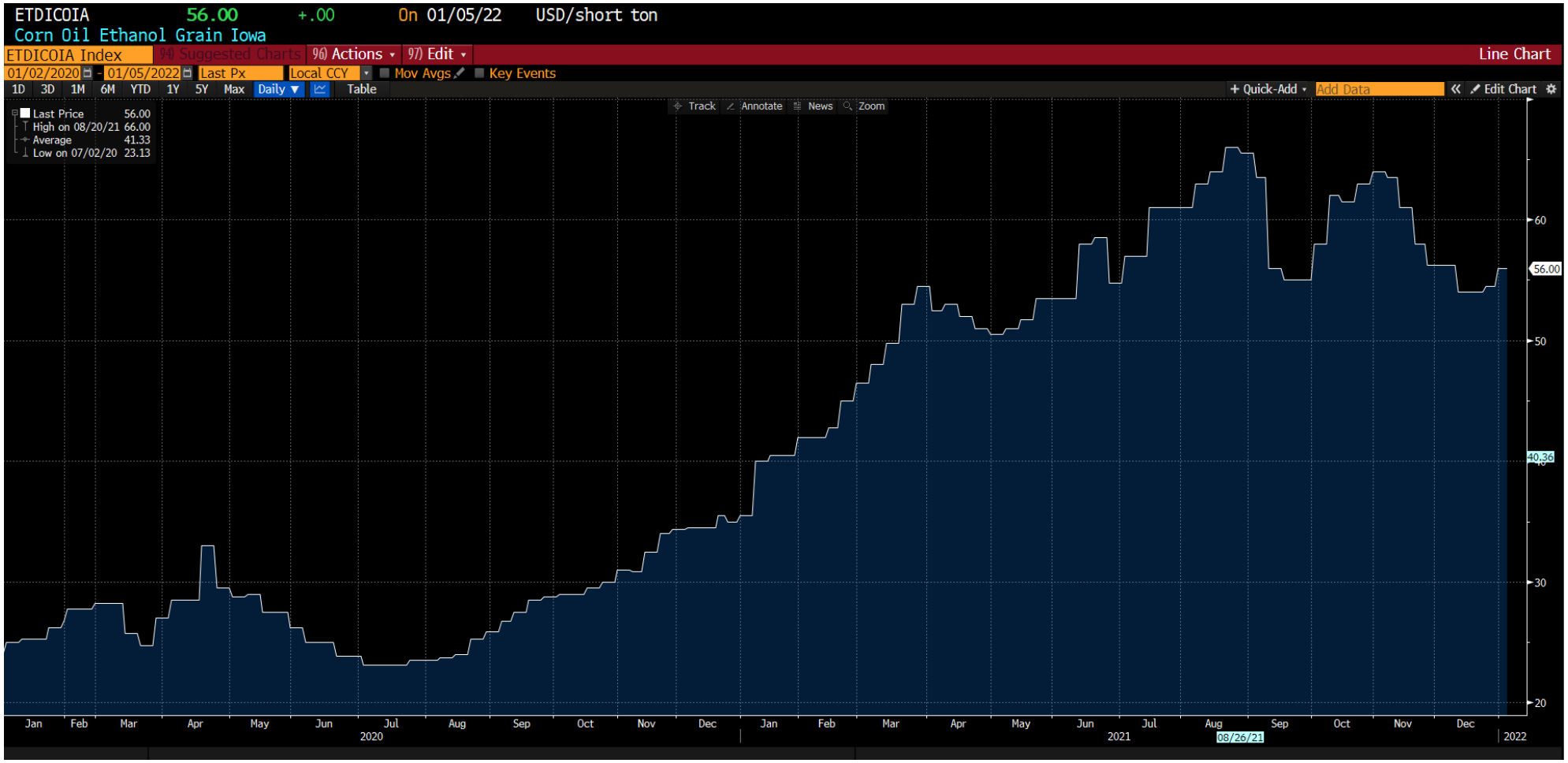
California Annual Diesel Demand Forecast



Source: California Advanced Biofuels Alliance

Renewable diesel volumes are growing exponentially with corn oil being a core production feedstock

Corn Oil Pricing



Corn oil pricing has increased with increased renewable diesel production

Material upside expected when renewable diesel production begins

Corn Oil Pricing & Volume Upside

- Renewable diesel driven demand continues to drive feedstock prices higher (see below picture). With corn oil prices already at $0.65 per pound and Diamond Green Diesel II slated to come online mid Q4 2021, we anticipate further price appreciation this year and into 2022.

- Note: Diamond Green Diesel Q1 2021 EBITDA margins were $2.75 per gallon (22% above Street estimates). At these margin levels, feedstock suppliers are going to be able to exert material pricing increases as North American renewable diesel production supply ramps 250% by year end 2021 (per Jacobsen).

- Goldman Sachs estimates renewable diesel production capacity is expected to grow from 533 million gallons to 2.65 billion gallons by 2024 (5x). The report also estimates a 13-billion pound feedstock deficit by 2024 as more processing capacity for renewable diesel comes online. Sustainable aviation fuel production would further increase demand for renewable feedstock. https://www.reuters.com/business/energy/us-renewable-fuels-market-could-face-feedstock-deficit-2021-04-09/

- With new producers building facilities supplied with soybean oil (55 carbon intensity score), corn oil with a 33 carbon intensity score should become the "next" focused fuel now that used cooking oil is already tapped out and tallow supplies are limited as well. Thus, our base is the corn oil price should secularly increase based on ongoing renewable diesel demand.

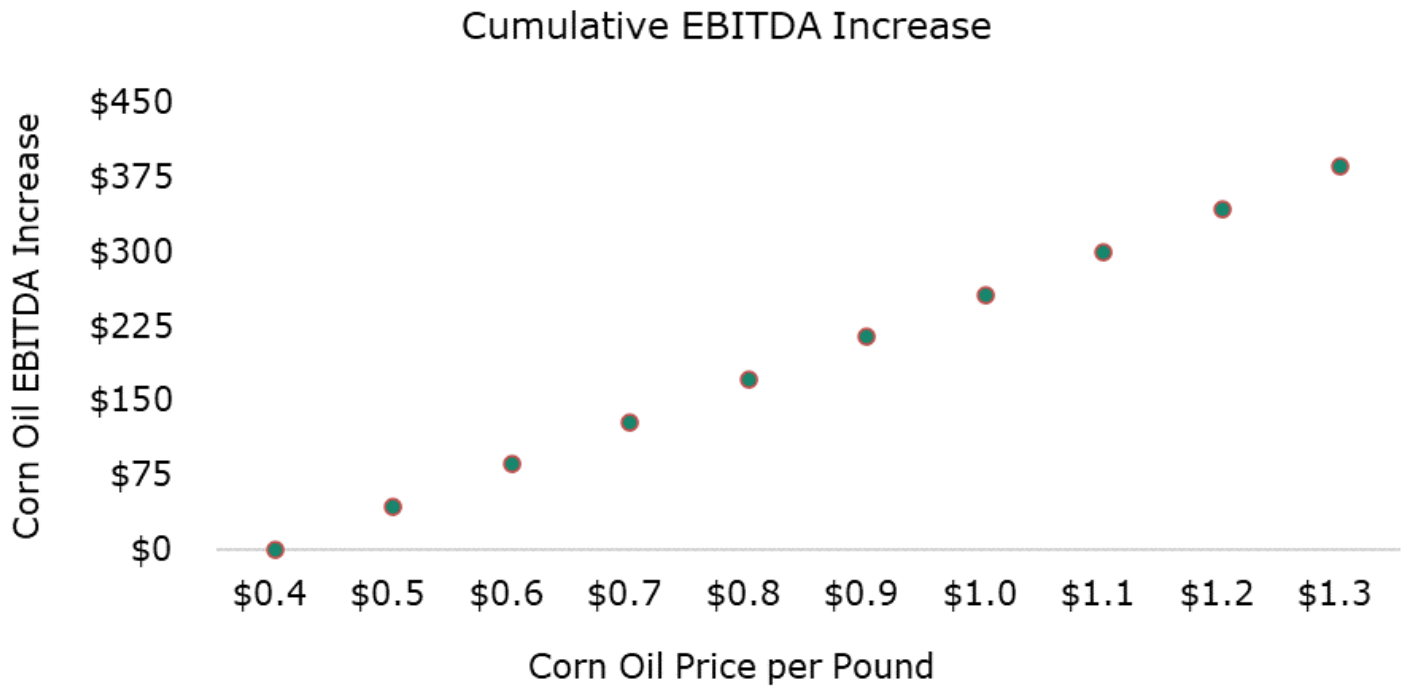
- While renewable diesel producers such as Neste continue to request long term offtake agreements, GPRE is only selling corn oil out 2 to 3 weeks as they see prices moving up materially over the near and intermediate term.

- Fluid Quip Brix Oil Separation corn oil systems being installed concurrent with the MSC high protein corn oil systems are widely perceived by the industry to "work". We have not uncovered industry questions around technology risk.

    - In fact, there is discussion regarding the technology being able extract more corn oil than we are modeling: https://us02web.zoom.us/rec/play/4noiIYKafPY0DkIWqknCkjqzmezHfpOZwcbjVR-FZ6WhSIiaDw3h9InLWW6RxC0vxwPk62G_P-XhKPCZ.oTuGWKEXhR0PSDk4?startTime=1614279764000

    - Current amount is 0.8 pounds of corn oil per bushel and our base case with Brix Oil Separation is 1.2 pounds. There are 1.8 pounds naturally occurring in a corn bushel. Incremental corn oil extraction would increase cash flow significantly.

Corn Oil Demand Driven by Sustainability Initiatives



Corn oil pricing is seeing increased demand and pricing as renewable diesel production has grown

Each $0.10 increase represents $40 million EBITDA with system-wide high protein and corn oil

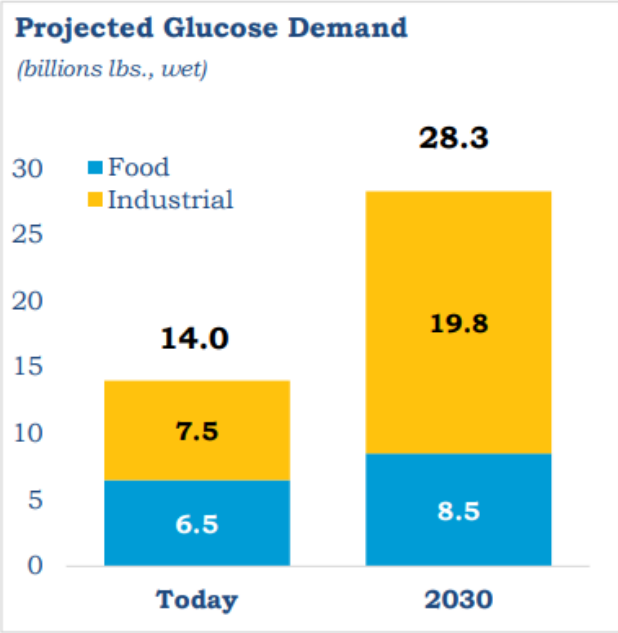
Clean Sugar / Renewable Dextrose

Green Plains Clean Sugar Slide

Clean Sugar Technology (CST) Opportunities

Clean Sugar

FLUID QUIP TECHNOLOGIES



Source: SynBioBeta, FQT analysis

Technology Acquired with Fluid Quip

- Fluid Quip is engineering and constructing a fully scalable commercial CST production facility at the Innovation Center at York
- CST produces an equivalent sugar quality to that of a wet corn mill process, with a production cost advantage and up to ~50% reduction in the carbon footprint

Opportunity Update

- 'Bio-revolution' use of fermentation to produce a variety of products without petroleum additives requires dextrose/glucose, driving potential growth of 7-14 billion pounds in demand
- Entering commercial discussions for potential co-location opportunities
- Focused on enhancing full and continuous operation of the Innovation Center at York pilot facility

Source: Green Plains Presentation December 2nd, 2021

Clean Sugar / Renewable Dextrose Innovation

Clean Sugar Technology (CST™) is a proprietary method to utilize GPRE's corn carbohydrate in a value enhancing way with low volume at low cost. Using patented, proprietary separation equipment and systems, Clean Sugar / Renewable Dextrose can effectively producing multiple specification, purity sugars for commercial use today.

- Produces an industrial sugar stream and a high-value corn oil stream
- Produces animal feed products, including high-purity protein
- Low cost at any volume

The bio-chemical industry is growing quickly, and Clean Sugar Technology can produce an industrial sugar stream at a fraction of the cost.

- Up to 50% less cost than traditional wet mill sources
- Tested, commercially proven technology
- Produces an industrial sugar stream, a high-value corn oil stream and animal feed products, including high-purity protein

The Clean Sugar Technology system is a game-changing technology for the quickly growing renewable bio-chemicals industry. CST can be bolted on to an ethanol plant to produce a sugar slip stream to be used by a co-located or co-licensed bio-chemical process.

- High purity clean sugar created in spec for the desired Carbohydrate/Bio-Chem process
- Increased oil recovery, additional co-products include protein and fiber
- Solid, proven, sustainable technology
- Tested and commercially ready from the start

"Clean Sugar Technology (CST) system that can be retrofitted to any dry grind, cereal-processing or bioethanol facility. By adopting it, an industrial sugar stream can be produced at up to 50% less than the cost of traditional carbohydrate sources, overcoming the barrier of cost. Fluid Quip Technologies are already working with food companies to create new revenue streams for them through lower cost alternative sugar production systems."

"We really see our Clean Sugar Technology as a game-changer, it can produce multi-specification sugar at up to 50% cheaper than current processes and everyday we are doing this ownership teams at ethanol across the world. We like to say that we are 'feeding the bioeconomy' by helping solve the global sugar shortage and by lowering costs, we can support biochemicals to present a more sustainable and cost-effective alternative to the current oil-based ones"

- Fluid Quip Founder Neil Jakel

Source: Bio Market Insight Quarterly #17, Spring 2020

Green Plains believes Clean Sugar could provide a 1 to 2 year payback period

Clean Sugar / Renewable Dextrose

- Green Plains Clean Sugar / Renewable Dextrose technology uses proprietary separation equipment and systems to produce multiple specification, purity sugars to meet any customer's needs
- Subsidiary Fluid Quip is engineering and constructing a fully scalable commercial Clean Sugar / Renewable Dextrose production facility at York Innovation center
- New sugar demand growth is being driven by biologic focused companies who use sugar as a feedstock for their bio-processes
- Create clean glucose and dextrose for a variety of biochem, synthetic biology, and food industries
- Increased penetration of bio-based processes drives additional sugar needs of 7 – 14 billion pounds
- Growing demand for fermentation to produce a variety of products without petroleum additives requires dextrose / glucose
- CST produces an equivalent sugar quality to that of a wet corn mill process, with a production cost advantage and up to 50% reduction in the carbon footprint
- Able to expand industrial glucose capabilities at a fraction of building a new wet mill and produce at a lower cost

Clean Sugar / Renewable Dextrose Economics

- Full Green Plains Clean Sugar / Renewable Dextrose yield is estimated to be 35 pounds per bushel
- Price and margin for sugar is estimated to be $0.15 and $0.055 per pound based on current pricing
- Green Plains expects to earn $0.67 per gallon of EBITDA when capacity is converted
- Managements base case assumes 55 million gallons converted and an upside case of 150 million gallons per year which would represent $37 to $100 million of EBITDA (base case has only one 55 million gallon plant converted representing $37 million EBITDA)
- Clean Sugar Technology requires a capital investment of $1.00 per gallon of capacity converted

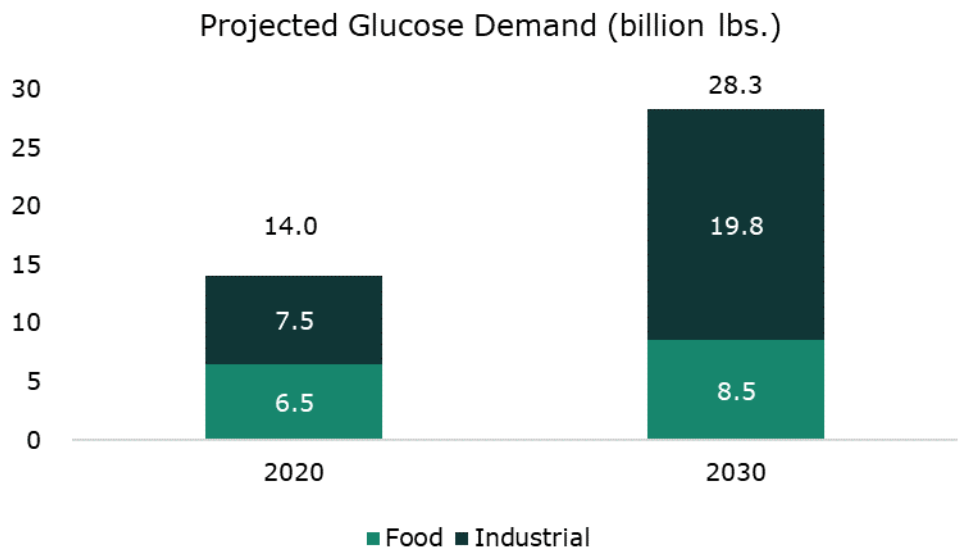
Clean Sugar / Renewable Dextrose	55 Million Gallons	150 Million Gallons
Pounds per Bushel	35	35
Annual Bushels Processed	19.2	52.3
Total Clean Sugar Pounds	671	1,829
Price per Pound	$0.15	$0.15
Revenue	$101	$274
Costs per Pound	$0.095	$0.095
Total Costs	$63.7	$173.8
EBITDA	$36.9	$100.6
EBITDA per Gallon	$0.67	$0.67
EBITDA per Pound	$0.055	$0.055
Capital Investment	$55	$150
Return on Invested Capital	67%	67%

Clean sugar economics represent higher returns on capital than even high protein

Specialty Chemical and Material Markets Requiring Glucose / Dextrose

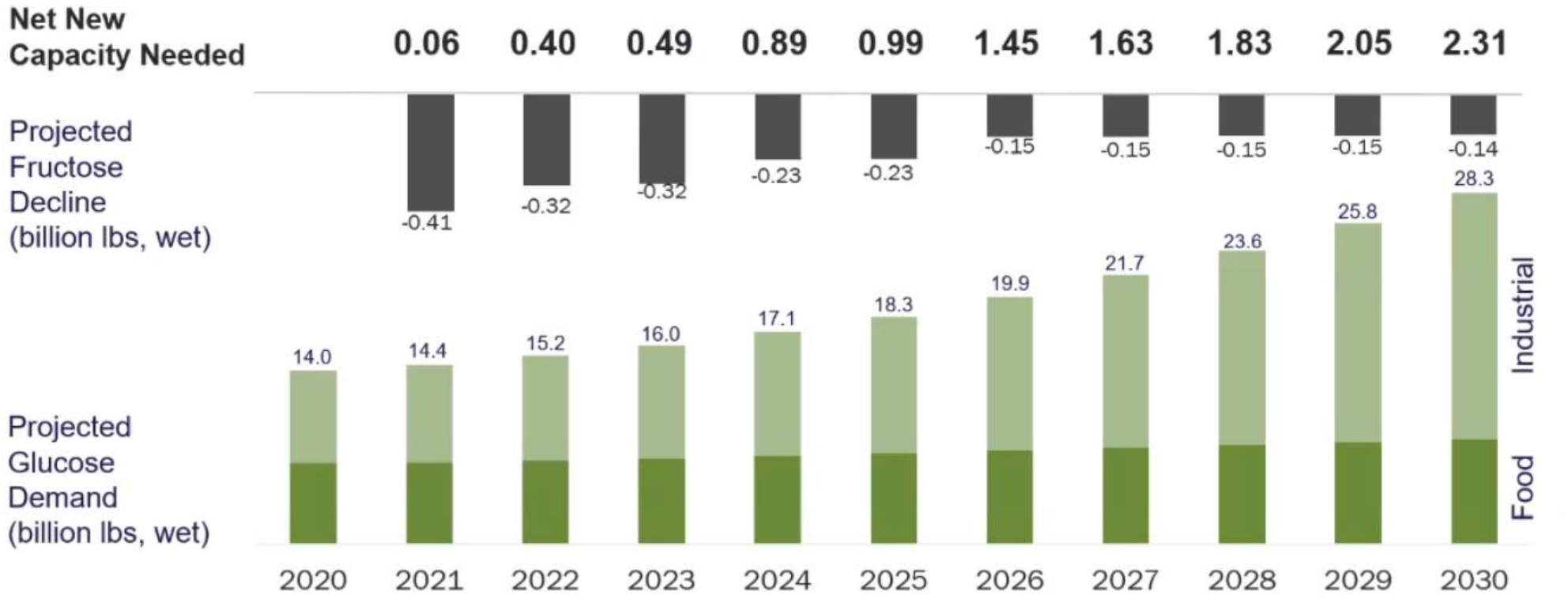
Segments	Percent of Market
Specialty Polymers	8%
Construction	8%
Industrial Cleaners	7%
Electronics	7%
Surfactants	6%
Flavors / Fragrances	5%
Specialty Coatings	5%
Water Soluble Polymers	5%
Catalysts	5%
Oilfield Chemicals	5%
Food Additives	4%
Plastic Additives	4%

Source: Company Estimates



Clean sugar markets are large and diverse representing an attractive growth opportunity

Industrial Glucose Market Growing Rapidly



Source: Fluid Quip Technologies

Base case value ascribes low / no value on starch biorefining. If Green Plains can produce valuable industrial glucose products, value would increase beyond current base case

Carbon Sequestration

Green Plains Carbon Sequestration Value

Scenario	Per Share Value	Probability	Annual EBITDA (2025 or later)
Direct Injection Only	$11.9	30%	$45 million
Base Case (8 pipeline plants & 3 direct injection plants)	$32.2	55%	$123 million
No Carbon Sequestration	$0.0	15%	$0 Unlikely yet possible if legislation changed

- Due to C02 capture chemical & economic advantages of CCS at ethanol plants, the Summit Carbon Solutions project is highly likely to be completed. Direct injection carbon capture is the highest and best use of carbon investment.
- With attractive economics and trend to reduce carbon emissions, each Green Plains plant should have carbon capture in the near future.
- Each carbon capture scenario is highly valuable to Green Plains given material profitability revenue and carbon reduction.

Direct Injection Only

	Ethanol Gallons (millions)	Tons of C02 per Gallon	C02 Tons (millions)	LCFS per Ton Credit Value	Product Amount Sold to LCFS states	Green Plains Credit %	COGS ($ millions)	Yearly EBITDA	EBITDA Multiple	Value per Share
Direct Injection	210	0.0015	0.315	$175	90%	100%	$10	$40	18.0x	$10.4
	Ethanol Gallons (millions)	**Tons of C02 per Gallon**	**C02 Tons (millions)**	**45Q Per Ton**	**% Applicable to 45Q**	**Green Plains Credit %**	**COGS ($ millions)**	**Yearly EBITDA**	**EBITDA Multiple**	**Value per Share**
Direct Injection	210	0.0015	0.315	$50	100%	100%	$10	$6	18.0x	$1.5
	Total							$45		$11.9

- Green Plains' Mount Vernon, Indiana, Obion, Tennessee and Madison, Illinois all sit on geological storage (much like ADM's Decatur Illinois plant which has been commercially storing CO_2 via direct geologic storage since 2017).
- The three plants total 300 million gallons annually and would allow GPRE to earn the 45Q tax credit as well as LCFS (if product used in California or another LCFS market).

Scenario includes all of the LCFS credit the 45Q credit for Green Plains for the direct injection sites

Scenario includes carbon sequestration at all of Green Plains 11 facilities

Base Case (Pipeline + Direct Injection)

	Ethanol Gallons (millions)	Tons of C02 per Gallon	C02 Tons (millions)	LCFS per Ton Credit Value	Product Amount Sold to LCFS markets	Green Plains Credit %	COGS ($ millions)	Yearly EBITDA	EBITDA Multiple	Value per Share	EBITDA Margin per Gallon [1]
			0.987	$225				$100		$26.2	$0.15
			0.987	$200				$89		$23.3	***$0.14***
Announced Pipeline	658	0.0015	0.987	$175	90%	50%		$78	18.0x	$20.4	$0.12
			0.987	$150				$67		$17.4	$0.10
			0.987	$125				$56		$14.5	$0.08
Direct Injection	210	0.0015	0.315	$175	90%	100%	$10	$40	18.0x	$10.4	

	Ethanol Gallons (millions)	Tons of C02 per Gallon	C02 Tons (millions)	45Q Per Ton	% Applicable to 45Q	Green Plains Credit %	COGS ($ millions)	Yearly EBITDA	EBITDA Multiple	Value per Share
Direct Injection	210	0.0015	0.315	$50	100%	100%	$10	$6	18.0x	$1.5
Total								$123		$32.2

- Green Plains' Mount Vernon, Indiana, Obion, Tennessee and Madison, Illinois all sit on geological storage (much like ADM's Decatur Illinois plant which has been commercially storing CO_2 via direct geologic storage since 2017).
- The three plants total 300 million gallons annually and would allow GPRE to earn the 45Q tax credit as well as LCFS (if product used in California or another LCFS market).

Scenario includes all of the LCFS credit the 45Q credit for Green Plains for the direct injection sites

Scenario includes carbon sequestration at all of Green Plains 11 facilities

Estimated Summit Pipeline Economics

Pipeline Owner Economics (Biorefinery Feedstock)				
	Millions of Tons of C02 Annually	45Q Tax Credit Per Ton	Pipeline % Share	Annual Pipeline Revenue
Biorefineries	10	$50	100%	$500
Carbon Source	Millions of Tons of C02 Annually	LCFS Credit Per Ton	Pipeline % Share	Annual Pipeline Revenue
Biorefineries	10	$175	50%	$875
Annual Pipeline Credit Revenue				$1,375
Pipeline Build Cost				$4,000
ROIC (assuming fuel sold in LCFS market)				34%

Pipeline Owner Economics (General Indu. Feedstock [1])				
	Millions of Tons of C02 Annually	45Q Tax Credit Per Ton	Pipeline % Share	Annual Value to Pipeline
General Industr	10	$50	100%	$500
	Millions of Tons of C02 Annually	LCFS Credit Value	Pipeline % Share	Annual Value to Pipeline
General Industr	10	$0	50%	$0
Annual Value to Pipeline				$500
Estimated Cost				$4,000
ROIC				13%

(1) General industrial CO_2 producers include: coal and fossil natural gas power, industrial gases, and hydrogen & ammonia.

- Due to LCFS credit benefit, biorefineries (i.e. ethanol plants) are the #1 target for pipeline operators in terms of partnering to fill the proposed volumes.
- For the announced Green Plains pipeline, Summit & co-owners (Green Plains owns a call option to purchase up to 25% of the pipeline) will include a mix of both ethanol producers and general industrial producers.

Pipeline economics highly favor ethanol producers as CO_2 shippers

Summit Carbon Pipeline & Green Plains Impact

- In February 2021, Summit Carbon Solutions announced plans to create one of the largest carbon capture and storage platforms in the world. The project will install equipment that will take C02 off fermentation and liquefy the gas on a small 6 inch pipeline that will carry the C02 to the main pipeline where it will be transported to central North Dakota and stored in porous canyons at least a mile underground.

- Summit will partner with biorefineries in Iowa, Minnesota, South Dakota, and North Dakota in the first phase of the project. When completed, the pipeline is expected to have infrastructure of capturing and sequestering over 10 million tons of carbon dioxide annually, the equivalent of removing over two million cars from the road each year. It will put them in position to be the largest carbon capture and storage project in the world.

- The pipeline is expected to cost $4 billion over the life of the pipeline and will be funded by partnering with plants and using tax credits. Carbon sequestration reduces Carbon Intensity (CI) score of biofuels and ingredients by 50%. The pipeline will begin operation in late 2024.

- The partnership will initially connect 658 million gallons from eight Green Plains biorefineries.

- Green Plains estimates the opportunity to increase margins by $0.15 per gallon with no capital required from ethanol facilities due to eligibility for LCFS credits in California market.

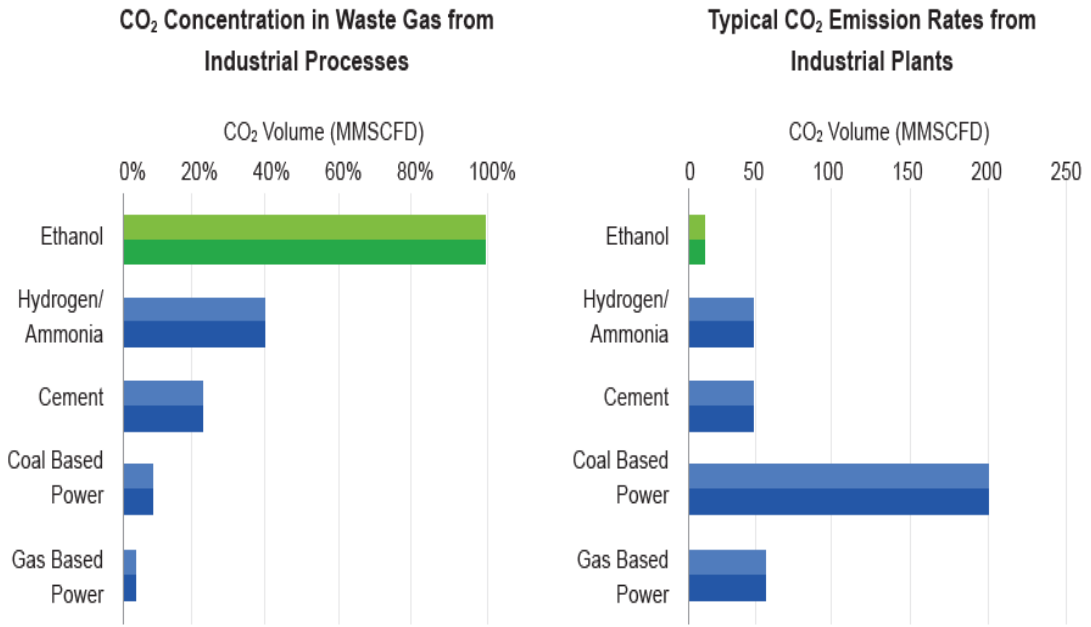
- Summit is responsible for pipeline construction, operation, carbon dioxide sequestration and all reporting requirements.

- Carbon capture and storage should result in attractive low CI ingredients, furthering the sustainability appeal of renewable corn oil, sustainable ultra-high protein and clean sugars produced at these locations.

- Green Plains has the option to acquire additional ownership in the development company, resulting in a pro-rata incremental return on all carbon dioxide contributed to the pipeline from other facilities but little details have been disclosed publicly.

Ethanol as a Carbon Source

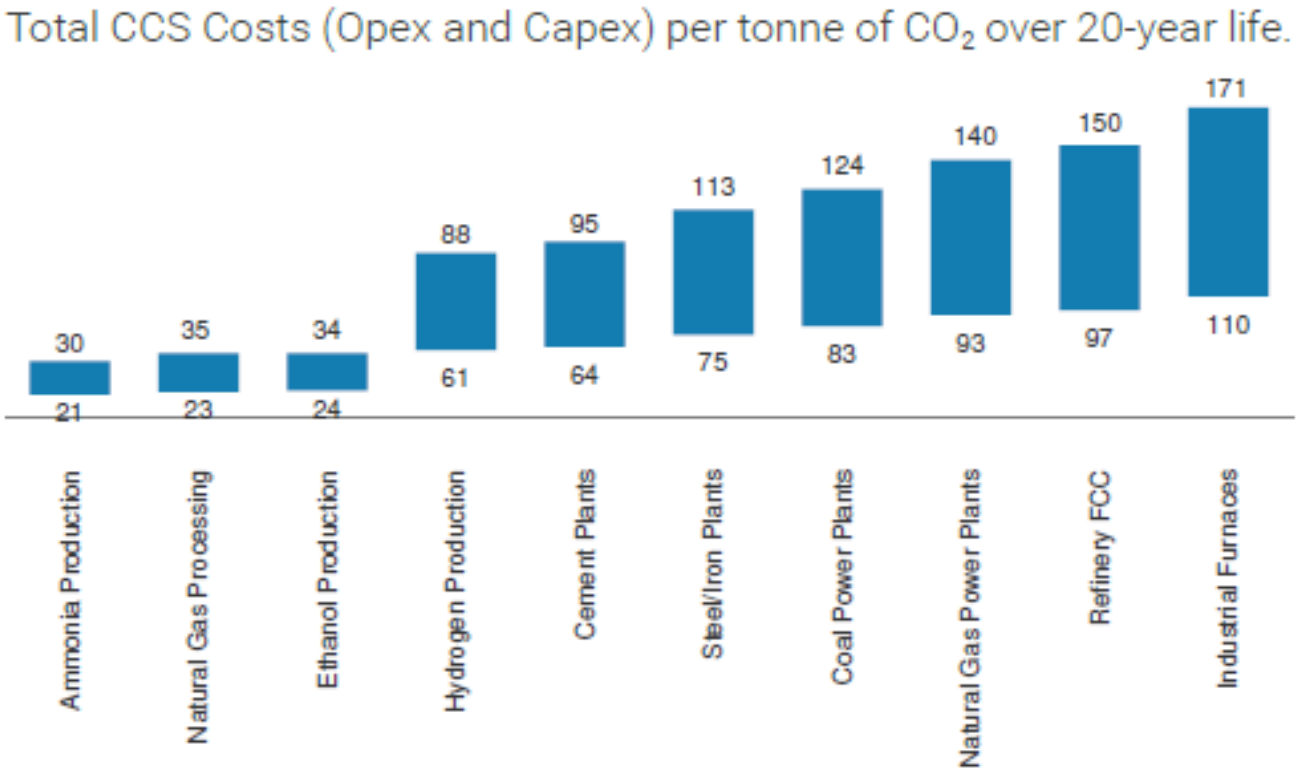
Figure 4: Biogenic and Anthropogenic CO_2 Sources



Source: Capturing and Utilizing C02 from Ethanol: Adding Economic Value and Jobs to Rural Economies and Communities While Reducing Emissions

Ethanol is the purest form of carbon emissions which makes sequestration projects exceptionally easy

Given Purity, Ethanol is a Cost Leader



Source: National Petroleum Council, Morgan Stanley Research; Note: Plant sizes vary and assumes 85% capacity utilization.

- Fermentation of C02 yields >99% pure C02 which makes it much less costly to sequester versus other sources.
- Industry estimates that the cost per ton of C02 is $20-$35 for high concentration sources such as ammonia, natural gas processing, and ethanol vs. $60-$170 for lower concentration sources such as cement, iron & steel, and power generation.
- Due to this, ethanol carbon sequestration projects make the most economic sense and plants are in a strong position to capture the benefits.

Ethanol represents the purest form of carbon emissions which makes sequestration projects more viable

Carbon Emissions from Various Fuels

Fuel Type	CI Score	Commentary
Gasoline	92.0 (2021 figure)	Baseline fuel carbon intensity Metric started at 100 in 2011 and is moving towards a carbon intensity goal of 80 by 2030 as more green fuels used
Ethanol (Pre Carbon Sequestration)	70.2	Current emissions on a plant with no carbon sequestration
Ethanol (Fermentation CO_2 Sequestration)	40.0	Capturing and sequestering the fermentation CO_2 stream (50% of total ethanol plant C02 emissions) is cost effective with industry estimates are $20-$25 per ton total for CapEx and OpEx over the project life
Renewable Diesel	32.1	Strong support from a policy standpoint and could be an example of opportunity for low CI ethanol
Biodiesel	25.8	Challenged fuel vis a vis renewable diesel given blending requirements
Ethanol (Further Sequestration)	Near Zero	Remaining 50% of $C0_2$ emissions are more costly to capture yet technologically possible over time (similar to power plants & industrial gas)

With potential to further reduce carbon emissions 50%, CCS and EOR make ethanol a competitive "green" fuel source

Carbon Sequestration Ethanol Carbon Intensity Reduction

- Based on a 40 CI score (ethanol after initial carbon sequestration of fermentation CO_2), a gallon of ethanol would be valued at a $0.43 premium to ethanol without sequestration that has a CI score of 70 in a $175 per ton LCFS market ($0.49 premium at $200 per ton LCFS)
- Valero quoted the margin at a gross level before accounting for the split between the biorefinery carbon sources and the pipeline owner and pre transportation costs.
- Green Plains took a more conservative approach when providing the $0.15 per gallon figure. Green Plains modeled a lower LCFS credit price of $0.30 per gallon for conservatism then assumed 50% credit for the biorefinery carbon source and 50% going to the pipeline owner.

70 Carbon Intensity Ethanol (i.e. Current)	Value	Comment
2021 Gasoline Carbon Intensity ("CI")	90.74	LCFS mandate reduction of 100 CI gas in 2011 down to 80 in 2030
Carbon Intensity Score (gCO2e / MJ)	70	Assigned to ethanol via CARB pathway
LCFS Credit Value	$175	GrizzlyRock estimates $200 long term LCFS credit price
MJ / gal ethanol equivalent	81.51	Energy value in ethanol gallon
Renewable Premium to Fossil Fuel	$0.30	

40 CI Ethanol post Carbon Sequestration	Value	Comment
2021 Diesel Carbon Intensity ("CI")	90.74	LCFS mandate reduction of 100 CI gas in 2011 down to 80 in 2030
Carbon Intensity Score (gCO2e / MJ)	40	30 point decrease based on fermentation ethan sequestration
LCFS Credit Value	$175	GrizzlyRock estimates $200 long term LCFS credit price
MJ / gal ethanol equivalent	81.51	Energy value in ethanol gallon
Renewable Premium to Fossil Fuel	$0.72	

LCFS Per Gallon (i.e. Valero quoted)	$0.43

Corn Oil vs. Soybean Oil Premium

- Spot prices of corn oil can trade in-line / at a discount to soybean oil due to not every pound of corn oil being sold into renewable diesel LCFS markets.
- Over time, as renewable diesel consumes more lower CI feedstock, corn oil should trade at a moderate premium to soybean oil given CI value.
- Diligence point: potentially apply a modest discount to the premium based on distillers corn oil's extra supply chain costs and verification?

Soybean based Renewable Diesel Premium per Pound	Value	Comment
2021 Diesel Carbon Intensity ("CI")	91.66	LCFS mandate reduction of 100 CI gas in 2011 down to 80 in 2030
Carbon Intensity Score (gCO2e / MJ)	55	Assigned to soybean oil via CARB pathway
LCFS Credit Value	$175	Traded price. GrizzlyRock estimates $200 long term LCFS credit price
MJ / gal diesel equivalent	129.65	Energy value in renewable diesel gallon
Renewable Diesel Premium	$0.83	
Feedstock Pounds per Gallon	7	
Feedstock Value Per Pound	$0.12	

Corn Oil based Renewable Diesel Premium per Pound	Value	Comment
2021 Diesel Carbon Intensity ("CI")	91.66	LCFS mandate reduction of 100 CI gas in 2011 down to 80 in 2030
Carbon Intensity Score (gCO2e / MJ)	33	Assigned to corn oil via CARB pathway
LCFS Credit Value	$175	Traded price. GrizzlyRock estimates $200 long term LCFS credit price
MJ / gal diesel equivalent	129.65	Energy value in renewable diesel gallon
Renewable Diesel Premium	$1.33	
Feedstock Pounds per Gallon	7	
Feedstock Value Per Pound	$0.19	

Per Pound Delta	$0.07

45Q Carbon Tax Credit

- The Bipartisan Budget Act of 2018 included in its entirety the FUTURE Act introduced in the U.S. Senate in 2017 to extend and reform the 45Q tax credit. Key provisions include:
- Increases the credit value incrementally over ten years from $10 to $35 per metric ton of CO_2 stored geologically through enhanced oil recovery and from $20 to $50 per ton for saline and other forms of geologic storage.
- Provides $35 per ton for CO_2 captured and put to beneficial uses beyond enhanced oil recovery that reduce lifecycle emissions.
- Authorizes the program for carbon capture projects that commence construction within 7 years from enactment, and projects meeting that timeframe can claim the credit for 12 years after being placed in service.
- Reduces the minimum eligibility threshold for qualified facilities from 500,000 metric tons of CO_2 captured annually to 100,000 tons for industrial facilities and 25,000 tons for CO_2 captured and put to beneficial uses other than EOR. Retains the 500,000-ton eligibility threshold for electric generating units.
- Awards the credit to the owner of the carbon capture equipment and allows transfer of the credit to other entities responsible for managing the CO_2 to provide greater flexibility for companies with different business models to utilize the tax credit effectively, including cooperatives and municipal utilities.
- Allows projects that involve carbon monoxide capture and direct air capture to qualify for the credit as well.

Source: https://carboncapturecoalition.org/45q-legislation/

Tax credits provide additional upside

Carbon Sequestration Political Support

- A recent proposal by Rep. David Schweikert (R-AZ) would expand provisions of the 45Q: includes increasing the tax credit for sequestration from $50 to $85 and the tax credit for enhanced oil recovery from $35 to $50.
- It would also increase the tax credit period from 12 years to 20 years
- These proposals would drastically improve the economics of carbon sequestration projects and increase the probability of upside scenarios for Green Plains

"H.R. 2633, introduced on April 14, 2021, by Rep. David Schweikert (R-AZ), focuses on expanding certain provisions of Section 45Q. In particular, the proposal would increase the Section 45Q tax credit to (a) $85 (from $50) per metric ton of carbon oxides captured and sequestered in secure geological storage and (b) $50 (from $35) per metric ton of carbon oxides captured and either used as a tertiary injectant in a qualified enhanced oil or natural gas recovery project (and then sequestered) or utilized in a qualified manner. The proposal would also drastically reduce the emission thresholds for a facility to be deemed a "qualified facility" for purposes of the tax credit. Finally, the proposal would extend the tax credit period from 12 years to 20 years. If enacted, the proposal would apply to taxable years beginning after December 31, 2020."

https://www.lexology.com/library/detail.aspx?g=2d08f7e7-1029-480c-b4a2-c694e7e1fbfa

Green Plains value per share could increase by $50 if carbon sequestration projects are realized

Carbon Sequestration Industry Quotes

"Almost all Green Plains plants will have some sort of carbon sequestration."

- Todd Becker, Green Plains CEO March 2021

"Carbon sequestration is the most misunderstood and undervalued project now for Green Plains shareholders."

- Todd Becker, Green Plains CEO March 2021

"Ethanol would be my bet to invest in carbon capture."

- Ronald Munson, Former Lead of Carbon Capture at Global CCS Institute

"So the 70 to a 40 CI reduction in ethanol, that's worth like right now $0.47 a gallon at $200 a ton. Even out into the future, it stays right in that range, about $0.50 a gallon at a $200 per ton carbon price. As Rich said, we've got California and Oregon with programs now. We expect New York, New Mexico, Washington, they all have legislation in place for low carbon. We expect those to happen over some time in the next few years. So as this project has got a time line to completion, we expect no slowing down in low-carbon mandates or clean fuel standard mandates."

– Martin Parrish, Valero SVP of Alternative Energy April 2021

Carbon Capture and Storage (CCS)

"Carbon capture and storage (CCS) is the process of capturing carbon from emission sources and sequestering the carbon permanently in underground storage such as depleted oil & gas reservoirs or saline formations. Captured carbon could alternatively be used commercially in enhanced oil recovery (EOR) or the production of materials, chemicals, or fuels. While CCS is not new, the technology is evolving — such as capturing carbon directly from the ambient air in the atmosphere, known as direct air capture (DAC), or utilizing captured carbon to produce low emissions products, including synthetic fuels and chemicals feedstocks."

– Morgan Stanley Research April 14, 2021

- The US is estimated to hold 2/3 of the world's storage for C02.
- Many believe that CCS is a required technology in a net-zero emission world.
- Carbon capture technology is proven at commercial scale with numerous projects dating back to the 1970's.
- Technologies continue to improve making the process more efficient to optimize carbon reductions.
- With recent pushes from politicians and environmentalists, projects are becoming more feasible as shared infrastructure and tax incentives are improving economics.

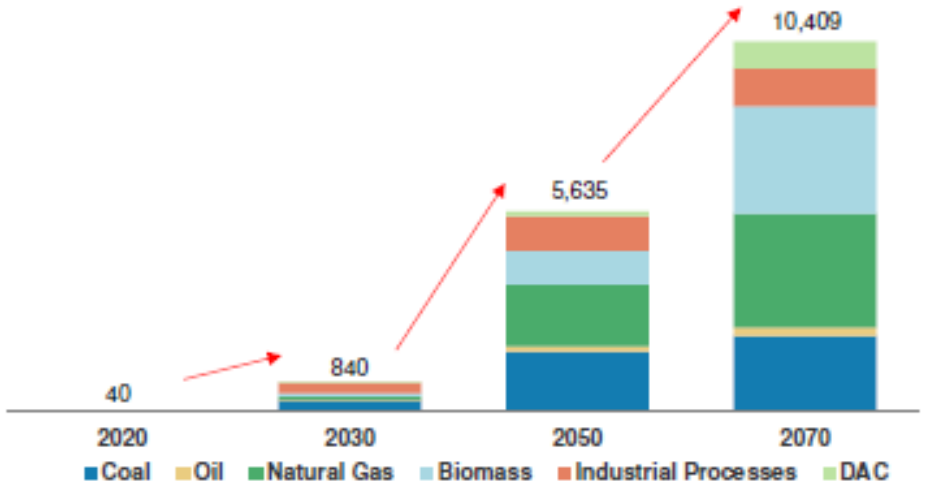
Carbon Capture and Storage will be an important piece to a "net-zero" emission world

Carbon Capture and Storage (CCS)

Exhibit 5:

According to the IEA's Sustainable Development Scenario SDS), captured CO2 volumes must grow to ~800 Mtpa in 2030 and ~5,600 Mtpa in 2050.

Total Carbon Capture (Mtpa)



Source: IEA, Morgan Stanley Research

Exhibit 11:

~2/3 of global storage for CO_2 in major oil & gas fields resides in the United States. Note, graphic depicts storage for CO_2 in oil & gas fields by country (millions of tonnes).

Source: Global CCS Institute; According to the Global CCS INstitute, storage in saline formations is hundreds of times larger than capacity shown in the depiction.

Carbon Capture and Storage will be an important piece to a "net-zero" emission world

The U.S. is in strong position to capture these trends

Valero, Blackrock, and Navigator

- March 16th Valero, BlackRock Global Energy & Power Infrastructure Fund II and Navigator Energy Services are developing an industrial scale carbon capture pipeline.
- Expected to span more than 1,200 miles across five Midwest states with capability of permanently storing up to 5 million metric tons of carbon dioxide per year.
- Could be expanded to transport and sequester up to 8 million metric tons.
- Valero is expected to be the anchor shipper while Navigator will lead the construction and operations of the system which expects to be online in late 2024.
- There are already approximately 50 C02 pipelines currently operating and transporting 68 million tons of C02 per year.
- https://www.navigatorco2.com/

https://www.navigatorco2.com/

Energy and infrastructure space leaders are making similar investments as Summit and Green Plains

"In March, we announced that we were partnering with BlackRock and Navigator to develop a carbon capture system in the Midwest, allowing for connectivity of 8 of our ethanol plants to the system. In addition to the tax credit benefit for CO_2 capture and storage, Valero will also capture higher value for the lower-carbon intensity ethanol product in low carbon fuel standard markets such as California."

– Joseph Gorder, Valero CEO April 2021

"We'll lower the carbon intensity of the ethanol that we produce from a kind of a 70 CI down to 40 CI. And I'll let Martin kind of talk about the value creation there. But today, he CI ethanol carries a premium into the California market, and the economics are supported by the California market and the 45Q tax credit. And we expect that further markets will develop for the low-carbon fuels, so increasing demand for this premium product."

– Richard Lashway, Head of Corporate Development

"So the 70 to a 40 CI reduction in ethanol, that's worth like right now $0.47 a gallon at $200 a ton And even out into the future, it stays right in that range, about $0.50 a gallon at a $200 per ton carbon price. As Rich said, we've got California and Oregon with programs now. We expect New York, New Mexico, Washington, they all have legislation in place for low carbon. We expect those to happen over some time in the next few years. So as this project has got a time line to completion, we expect no slowing down in low-carbon mandates or clean fuel standard mandates. So that's the additional demand for the product there."

– Martin Parrish, Valero SVP of Alternative Energy April 2021

"California is there with the program. We think if Oregon is there with the program. Canada has got a clean fuel standard that's going to be in place. And the Canadian demand on diesel is about twice as high as California demand. And then you've got all these other programs. You've got the EU now with Red 2 out to 2030, California out to 2030. So while there's a lot of projects announced, there's also a lot of incremental demand announced….I think CARB, if you have a carbon price go down, they're going to adjust that up. I mean I think they've pretty well signaled that this $200 a ton is kind of the sweet spot for them and 200, 200-plus."

– Martin Parrish, Valero SVP of Alternative Energy

Specialty Alcohol

Specialty Alcohol Industry

- Ethanol plants are limited to the amount of specialty alcohol they produce because increased production deteriorates fuel quality by pushing more impurities into the fuel.
- The specialty alcohol market has been historically hard to enter due to barriers to entry such as certifications / regulations and a balanced market.
- To produce specialty alcohol, manufacturers must replace someone currently producing the product.
- COVID-19 has driven demand far higher which many industry experts expect to become more permanent as increased cleaning and hand sanitizer use becomes increasingly normal.
- Increasing value withing the specialty alcohol supply chain requires significant capital and increased operating expenditures.
- Due to the massive premiums of specialty alcohol during the peak of COVID-19, many producers were able to generate the cash to switch capacity to specialty alcohol.
- More barriers to entry with regulation, certifications, and customer relationship.
- More complex products to manufacture, greater investments in quality assurance and certifications
- Quality and consistency very important. Customers are less price sensitive as specialty alcohol is a small portion of end product cost.
- Contracts are typically 6 to 12 months with fixed price and volumes.

Specialty Alcohol Wall Street Journal Article

"Before the pandemic, hand sanitizing was viewed as not necessary, or not necessarily value-added in terms of risk reduction when it comes to health," said Jim Arbogast, Gojo vice president of hygiene science and public-health advancements. "The pandemic is a real wake-up call for everyone globally on the importance of infection protection."

"I don't foresee any letup in any of the sanitizers, cleaners and wipes," said Reynolds Cramer, chief executive of Fareway Stores Inc., a grocery chain in six Midwest states.

"It will become a normal part of everyday lives to have three sanitizers: one in the car, one in your briefcase, one in your coat," he said.

"He said when the pandemic abates, the school would likely scale back some cleaning, such as spraying down meeting rooms with disinfectant after every use. But he intends to keep hand-sanitizing stations and separate health clinics." – per Ed Vittardi, Principal of St. Albert the Great School

https://www.wsj.com/articles/hand-sanitizer-sales-jumped-600-in-2020-purell-maker-bets-against-a-post-pandemic-collapse-11611311430?mod=business_lead_pos5

Industry participants believe specialty alcohol will receive a sustainable increase in demand

Green Plains Specialty Alcohol

- York and Wood River plants now produce United States Pharmacopeia (USP) grade alcohol with annual capacity of 75 million gallons.
- Alcohol production will be "very high quality" (VHQ) enabling use in both pharmacy grade alcohol and beverage alcohol.
- Feedback from customers is product quality is much higher than added after COVID-19 onset.
- Given supply/demand uncertainty, we model a decrease in long-term specialty alcohol margins for Green Plains at $0.50 per gallon.
- Long-term trend, customers will be selective in quality leading to a sustainable advantage for Green Plains.
- Historical premiums for USP/GNS alcohol have been $1.00 to $1.50 per gallon.
- Modeling on the low end of historical range will lead to $75 million of annual EBITDA from these two locations.
- Green Plains (and other producers) have locked in 2021 volumes and pricing, yet market dynamics remain uncertain beyond 2021.

Specialty alcohol is on trend with moving up the value chain of biorefining process

Specialty alcohol will provide stable free cash in 2021 and beyond due to positive underlying trends

Specialty Alcohol

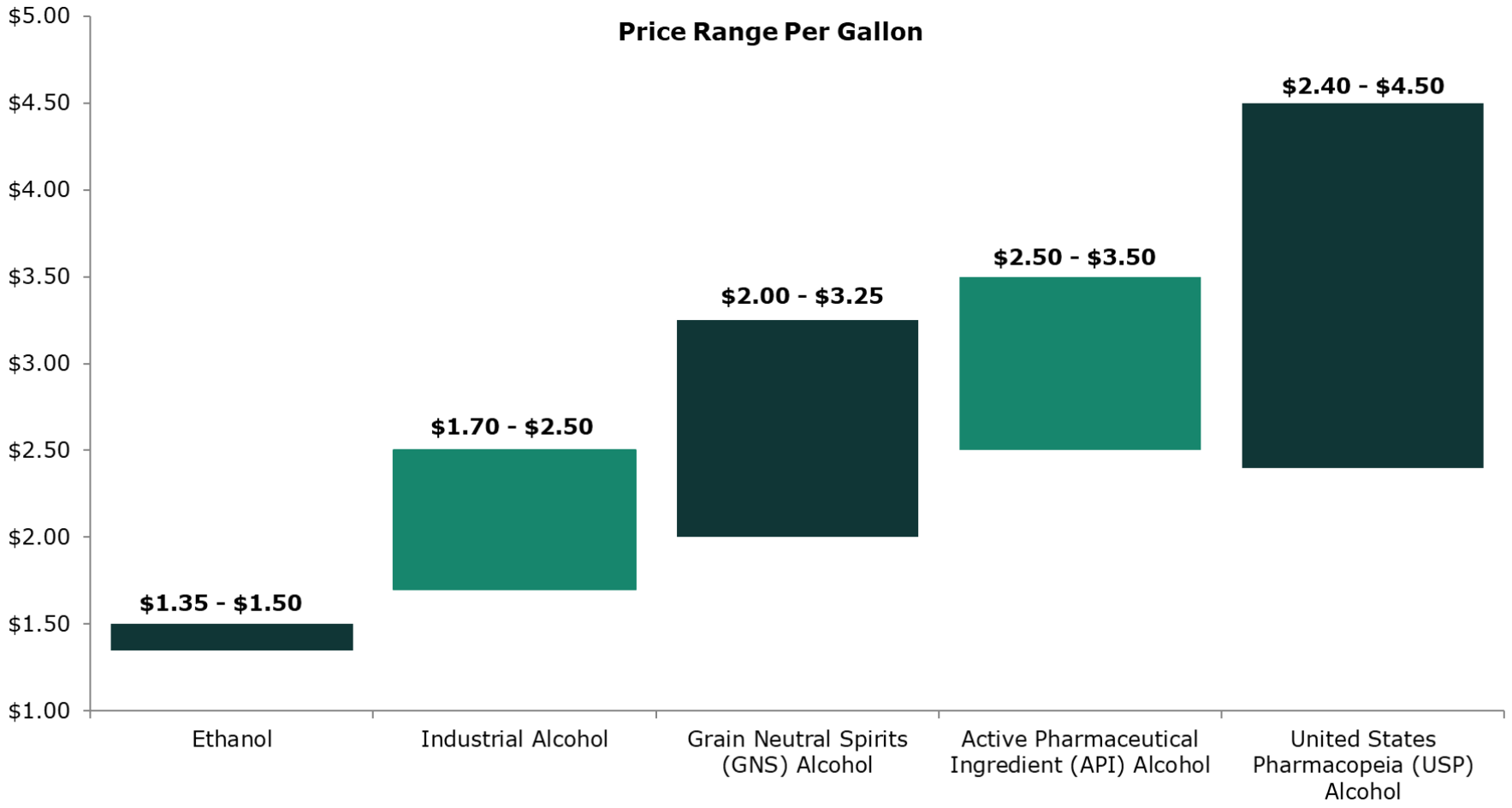
Segments	Products	Average Historical Premium[1]	Operating Expense Increase	Potential Margin Uplift per Gallon	Green Plains Incremental EBITDA[2]
Ethanol	Renewable Fuel	$0.00	$0.00	$0.00	$0
Industrial Alcohol	Various Commercial & Industrial Uses	$0.20	$0.03	$0.17	$13
Grain Neutral Spirits (GNS)	Alcoholic Beverages and Vinegar	$0.50	$0.05	$0.45	$34
Active Pharmaceutical Ingredient Alcohol (API)	Mouthwash, Cosmetics, Pharmaceuticals	$1.00	$0.05	$0.95	$70
United States Pharmacopeia (USP) Alcohol	Hand Sanitizer, Disinfectant, Cleaning Products	$0.90	$0.05	$0.85	$64

(1) Source: Alto Ingredients (formerly known as Pacific Ethanol) investor materials and CFO commentary, industry experts

(2) 75 million gallon annual capacity at York & Wood River

USP alcohol commands premium pricing with natural barriers to entry given regulatory restrictions

Specialty Alcohol Prices per Gallon



Source: Alto Ingredients (formerly known as Pacific Ethanol)

Other Business Segments

Ethanol

- One bushel (56 pounds) of corn produces 2.7 gallons of ethanol, 15 pounds of distillers grains, and 0.7 pounds of corn oil.
- Ethanol is an excellent oxygenate and source of octane.
- Top 5 producers operated 70 plants and accounted for 42% of domestic production capacity with capacities ranging from 800 to 1,700 million gallons per year.
- Approximately half of the 209 plants in the US are standalone facilities and accounted for 34% of domestic production capacity.
- 51% of production is located in Iowa, Nebraska and Illinois.
- Brazil is 2nd largest ethanol producer in the world after the US (primarily made from sugarcane).
- Project Hi Pro base case is the ethanol industry will operate at near zero profitability going forward.
- As Green Plains facilities are the top 15-20% low-cost producers (platform aggregate) this assumes that 80% of the industry operates at negative profitability going forward. While conservative modeling, this provides significant return potential in excess of base case return in the event Green Plains ethanol margins are positive.

US ethanol industry margins should be flat to positive based on the following drivers:

- **Policy:** Biden administration and Democratic Congressional control is likely to lead to a national Low Carbon Fuel Standard and/or other green fuel initiative. 3 million metric tons of carbon reduction in 2019 which is the equivalent to 3.8 million acres of forests, 634k passenger vehicles driven for one year, or 73 billion miles driven. EPA under Biden could be more friendly to ethanol producers vs oil.
- **E15 expansion:** Available year round and given USDA funding for higher blend infrastructure, 2,200 retail locations and more than 200 fuel terminal locations (5 locations in 2017) now available. Automakers approved use of E15 in more than 90% of 2020 models.
- **Exports:** Trade agreements could lead to higher exports.

Ethanol

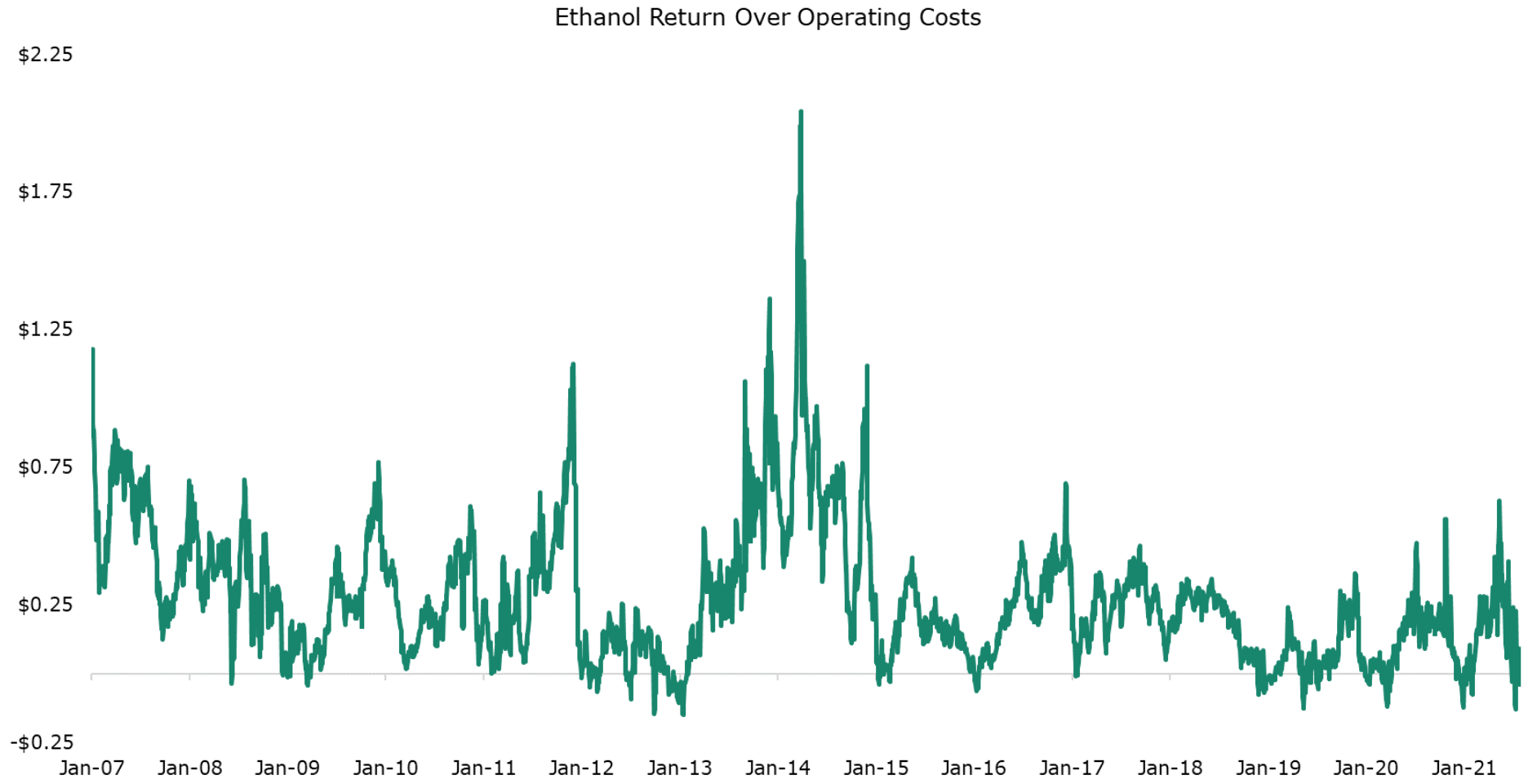
- In the early 2000's, many thought that ethanol would become the main source of fuel for vehicles similar to Brazil.
- This outlook, combined with strong industry margins led to a mass build of ethanol plants.
- Since then, demand growth has not kept up with the supply leading to an oversupply in the industry.
- Assuming the industry operates at zero profitability, being in the top 15-20% low-cost producers would allow Green Plains to generate $80 million of EBITDA annually in the ethanol segment.
- Due to the historical volatility and irrationality of ethanol producers, GrizzlyRock assumes that Green Plains will operate at modest profitability going forward. The plants will run at as high of utilization rates as possible to ensure maximum corn oil and high-protein feed production.
- This assumption implies that the bottom 80-85% cost producers will operate at a cash burn level for our investment horizon.

Volatile Economics

- Ethanol is an extremely volatile commodity product due to its relationships with other commodity products.
- The price of ethanol has historically been cheaper than gasoline, which incentivized fuel suppliers to mix in ethanol in order to reduce the cost of the overall product.
- Hence, the higher the gasoline price the higher the demand for ethanol which led to stronger pricing as well.
- Due to the current low gasoline environment, ethanol has declined materially in price making it unprofitable for producers.
- In addition, the price of the main cost input, corn, has increased which has put pressure on margins as well.
- Further, the largest co-product DDGs have declined in price due to increasing supply as ethanol producers have continued production and issues with demand such as tariffs from the Chinese government that has led to lower prices.

Base case valuation does not ascribe meaningful value to the ethanol segment

Volatile Profitability



Due to volatility in margins and industry issues, GrizzlyRock assigns little value to ethanol segment

Ethanol

- Industry capacity for ethanol is estimated to be between 16.5-17 billion gallons.
- Gasoline demand is around 140-150 billion gallons per year in the US and at 10% ethanol you get 14-15 billion gallons of demand.
- This number likely shrinks as you continue to get better fuel efficiency and electric vehicle penetration increases.
- Exports in a normal environment is around 1.2 - 1.5 billion gallons so that gets you to 15.2 to 16.5 billion gallons of demand so you are at an oversupply even in a good year.
- Due to the fragmented nature most of the producers are irrational and whenever crush is close to positive they run their plants.

Ethanol likely does not earn sustainable profit unless the following occurs:

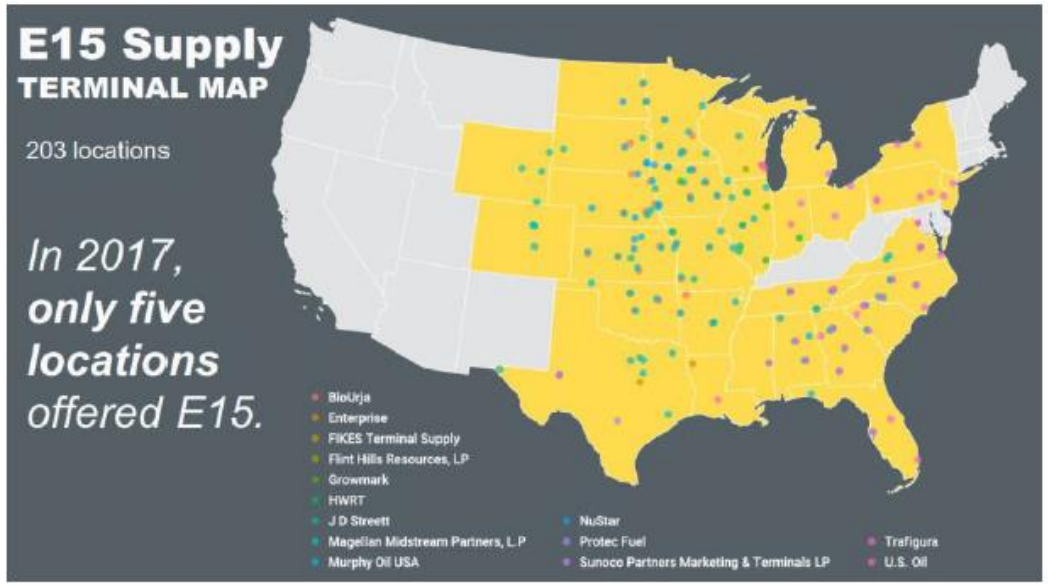
- **Considerable capacity comes offline:** Has not occurred yet despite horrible conditions and the hand sanitizer/alcohol boom from 2020 likely threw a lifeline to many plants (Alto Ingredients, formerly Pacific Ethanol, was on the verge of bankruptcy and now is performing well due to specialty alcohol sales).
- **China buying:** China could easily buy 800 million to 1 billion gallons if they wanted but difficult to underwrite
- **Massive E15 Increase:** Certainly, possible yet the rollout will be slow over the next few years so the oversupplied conditions likely persist for the near future.

High protein technology diversifies away from oversupplied ethanol industry

Ethanol

- E15 is sold in 30 states at 2,200 retail stations as of September 2020.
- E15 would increase the percentage of ethanol in fuel by 50% from its current E10 mandate which could fix the supply/demand imbalance and make the ethanol markets profitable.
- In October 2020, the EPA/OSHA announced grants for $22 million to increase ethanol infrastructure which could result in 150 million gallons of demand.
- Recent political events likely mean "green" trends will be more of a focus and ethanol could be a beneficiary of policy.
- Automakers approve use of E15 in more than 90% of 2020 models so continued growth in infrastructure should directly lead to more ethanol consumption.

1) Source: Prime the Pump as of September, 2020
2) Source: Based on analysis by RFA



Distillers Grains

- Dried distillers grains (DDGs) are the principal co-product of the ethanol process.
- Spent grain mash is pumped into a centrifuge for de-watering, the water (thin stillage), is pumped into an evaporator where it is concentrated into a thick syrup, the solids are then put into a dryer system to produce distillers grains.
- Once the high protein and corn oil technology systems are implemented, Green Plains will be able to produce 11.3 pounds per bushel of corn or ~1.9 million tons annually.
- The high protein and corn oil technology will also make DDGs that are cleaner, more consistent and finer.
- These are used as high-protein, high-energy animal feed and marketed to the dairy, beef, swine and poultry industries.
- High protein and corn oil system DDGs show less product variability which increases the value to cattle customers.

Dried distillers grains are an important co-product in the ethanol production process

Agribusiness

- Agribusiness segment is a commodity marketing business that sells and distributes ethanol, distillers grains, and corn oil produced at Green Plains ethanol plants.
- Provides grain procurement, distribution, and third-party purchases/sales in ethanol and other commodities.
- Operates three grain elevators with grain storage capacity of 7.6 million bushels, and grain storage at ethanol plants of 35.9 million bushels for a total of 43.5 million bushels
- Green Plains uses short-term working capital financing in this business which we subtract from Enterprise Value calculations as it is backed by inventory and accounts receivable.
- Going forward, this business should generate $20 million of run-rate EBITDA minus Interest from working capital financing.

Agribusiness supports Green Plains long term strategy and provides additional cash flow generation

Green Plains Partners, LP

- A master limited partnership to be primary downstream storage and logistics provider.
- Assets are the principal method of storing and delivering the ethanol they produce.
- Own a 49% limited partner interest and a 2.0% general partner interest of all the partnership's incentive distribution rights.
- Provides fuel storage and transportation services through fuel storage tanks, terminals, transportation assets, and other related assets and businesses.
- Controls 32 ethanol storage facilities, 7 fuel terminal facilities and approximately 2,630 leased railcars.
- Green Plains has take-or-pay contracts for minimum volume, storage, throughput, rail transportation, and terminal services with GPP and accounted for 92% of revenue in 2019.
- Current market capitalization of $182 million (as of 12/28/20) with distribution per unit of $0.48.
- GPP should be able to produce nearly $40 million of distributable cash flow going forward which at a 12% yield could be worth $14 per share or ~$200 million to Green Plains.

MLP provides storage and transportation services to Green Plains ethanol plants

Green Plains Partners, LP

- Master limited partnership formed on March 2nd, 2015 which owns ethanol storage and leased railcar assets and liabilities.
- Green Plains received $15 million per common unit for net proceeds of $158 million.
- Green Plains had planned to grow to 2 billion gallons of ethanol production and wanted to finance downstream ethanol storage and transportation more efficiently and revalue that portion of the business as a stable cash flow producer.
- Have done a few drop down transactions acquiring ethanol storage and leased railcar assets for certain ethanol production facilities but with the strategy change GPP no longer makes sense.
- The revolving credit facility is often double counted by investors as it shows up on both balance sheets.
- GPP is not highly valued in public markets (trades at ~18% distributable cash flow yield).
- Many sell-side analysts give value to Green Plains at a discount to market value due to illiquidity.
- As Green Plains transitions to a high protein feed and specialty alcohol producer, there will be little focus on ethanol.
- Due to this fact, we believe Green Plains would benefit from fully consolidating GPP to simplify the story for investors and help reach full valuation.

As Green Plains transforms its strategy, the MLP provides unnecessary complexity

Comparable Businesses

Protein Producers

Company	2021E EV/EBITDA	Description
Archer-Daniels-Midland (NYSE:ADM)	9.6x	ADM operates through three segments: Ag Services and Oilseeds, Carbohydrate Solutions, and Nutrition. It is one of the world's largest processors of agricultural commodities. It converts corn, oilseeds, and wheat into products for food, animal feed, industrial, and energy uses. It is also a leading manufacturer of protein meal, vegetable oil, corn sweeteners, flour, biodiesel, ethanol, and other value-added food and feed ingredients.
Darling Ingredients (NYSE:DAR)	10.9x (including expansion)	Darling collects and transforms various animal by-product streams into useable and specialty ingredients, such as collagen, edible fats, feed-grade fats, animal proteins and meals, plasma, pet food ingredients, organic fertilizers, yellow grease, fuel feedstock, green energy, natural casings, and hides. Darling is the 2nd largest global producer of renewable diesel
Bunge Limited (NYSE:BG)	8.0x	Bunge buys, sells, stores, transports, and processes oilseeds and grains to make protein meal for animal feed and edible oil products for commercial customers. They also produce sugar and ethanol from sugarcane, mills wheat, and corn, as well as sells fertilizers.
MGP Ingredients (NASDAQ:MGPI)	14.4x	The company provides food grade alcohol for beverage applications that include grain neutral spirits and food grade industrial alcohol, which is used as an ingredient in foods, personal care products, cleaning solutions, and pharmaceuticals. This segment also provides fuel grade alcohol for blending with gasoline; distillery co-products, such as distillers feed and corn oil. The Ingredient Solutions segment provides specialty wheat starches for food applications.

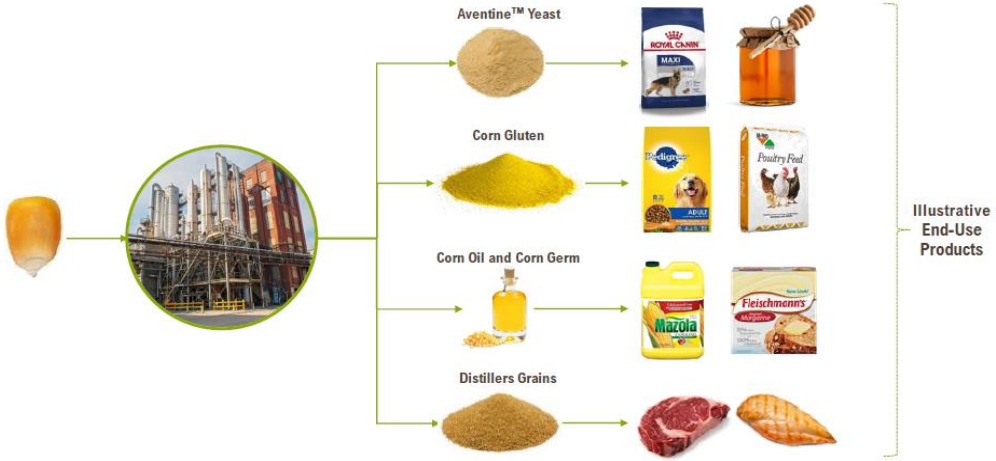
Comparable high-quality feed and ingredients companies trade at premium multiples

Largest Ethanol Producers

Company	Plants	Capacity (million gallons per year)	% Industry
Archer-Daniels-Midland Company (NYSE:ADM)	8	1,760	10.5%
POET LLC (privately owned)	27	1,600	9.5%
Valero Energy (NYSE:VLO)	14	1,600	9.5%
Green Plains Inc. (NASDAQ:GPRE)	11	958	6%
Flint Hills Resources (purchased by POET)	7	725	4%
Andersons (NASDAQ:ANDE)	4	405	2.5%
Small Operators	~54	~4,020	24%
Standalone Facilities	~75	~5,695	34%
Total	**200**	**16,750**	**100%**

Alto Ingredients, Inc. (NASDAQ:PEIX) (formerly Pacific Ethanol)

- Operate a 180 acre campus in Pekin, Illinois that includes one wet mill, two dry mills (one dry grind ethanol and one distiller), and a yeast plant.
- Total of 250 gallons roughly split between fuel ethanol and specialty alcohol.
- 125 million gallons of specialty alcohol capabilities in GNS, USP, API and Industrial grades.
- Pekin, Illinois wet mill is 100 million gallon plant and can transform corn into high value ingredients including yeast, corn gluten meal, corn oil and distillers grains.
- Selling west coast ethanol plants (160 million gallons) as they focus on specialty alcohols and ingredients.
- Feels confident that the long-term demand for specialty alcohol will increase as people focus on sanitization.



Valuation Summary & Projections

Model Convertible and Warrant Calculations

Instrument	Face Value	Conversion Price	Additional Shares at Base Case Value
2.25% 2027 Convertible Debt	$200 million	$31.62 per share	6.32 million
4.0% 2024 Convertible Debt	$115 million	$15.59 per share	7.38 million
Ospraie Warrants	$12.1 million	$22 per share	0.55 million
BlackRock Warrants	$44 million	$22 per share	2.00 million
Total Shares Added			16.25 million
Fully Diluted Shares Outstanding			58.49 million

- In the model, GrizzlyRock assumes all outstanding convertible debt and warrants are converted into Green Plains common stock.
- Debt excludes short-term working capital notes (backed by inventory and A/R) for Agribusiness segment and convertible debt but includes Met Life and BlackRock financing totaling $200 million (and included in cash)

Valuation Summary

Green Plains Current Metrics ($MMs except per share values)			
Share Price (Jan. 14th, 2022)	$32	Street Consensus 2024E EBITDA	$425
Fully Diluted Shares [1]	68.7	EV to Street 2024E EBITDA	3.9x
Market Cap	$2,200	GrizzlyRock 2024E EBITDA	$465
+ Debt	$174	GrizzlyRock EV to 2024E EBITDA	3.6x
- Cash	$721	GrizzlyRock 2024E Free Cash Flow	$276
Enterprise Value	$1,654	GrizzlyRock 2024E FCF Yield	13%

Intrinsic Value ($MMs except per share values)			
Intrinsic Value Share Price [2]	$76	EV to 2024E EBITDA [2]	10.0x
Fully Diluted Shares [1]	68.7		
Implied Market Cap	$5,211		
+ Debt	$174	Equity Upside	137%
- Cash	$721		
Intrinsic Enterprise Value	$4,664		

- As the high protein and corn oil transformation continues, Green Plains cash flow generation will materially improve.
- As this occurs, public investors should readily see stable cash flows. The stock should then re-rate.
- Base case value of $76 in 12 to 24 months (over 100% upside from 1/14/22 price).

Valuation Summary [1]

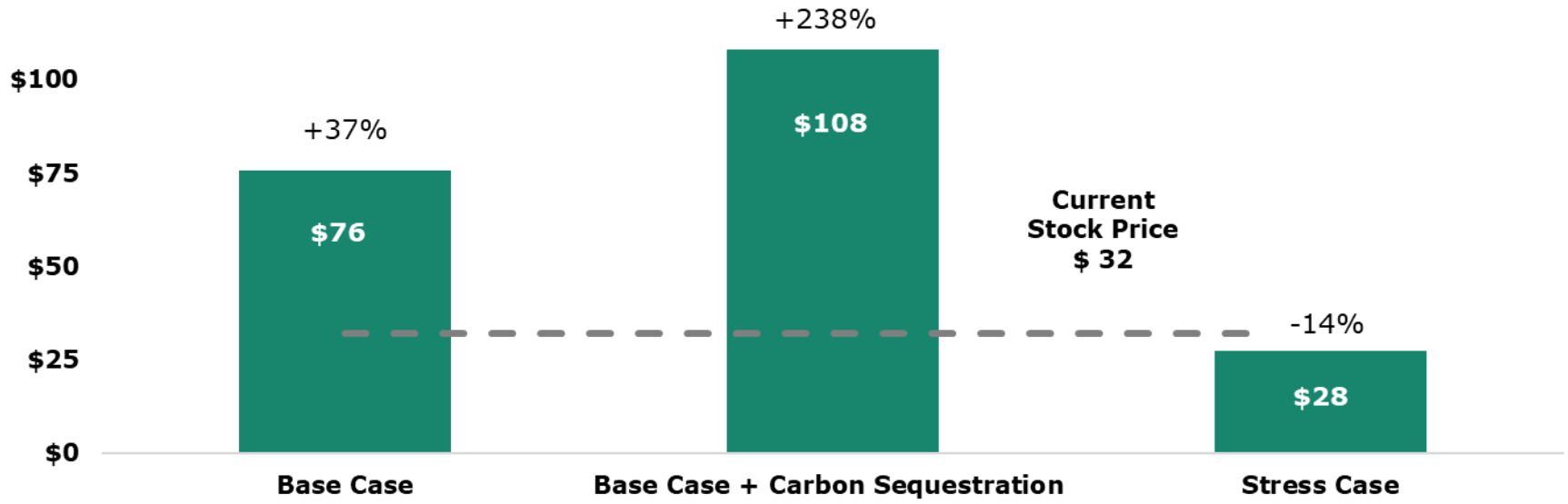
- **Base Case:** High protein corn meal sells at $500 per ton which earns $292 million EBITDA from high protein corn meal in 2024E. Incremental corn oil from the new technology systems generates $100 million of annual EBITDA at a price of $0.75 per pound. EBITDA multiples of 10.0x High Protein & Corn Oil EBITDA, 11.0x Clean Sugar EBITDA, 7.5x Specialty Alcohol EBITDA, 7.5x Agribusiness EBITDA, 8.0x Corporate, Ethanol & Clean Sugar and Green Plains Partners EBITDA. In the base case we assume only one Clean Sugar / Renewable Dextrose plant and no value to carbon sequestration.

- **Base Case + Carbon Sequestration:** High protein corn meal sells at $500 per ton which earns $292 million EBITDA from high protein corn meal in 2024E. Incremental corn oil from the new technology systems generates $100 million of annual EBITDA at a price of $0.75 per pound. EBITDA multiples of 10.0x High Protein & Corn Oil EBITDA, 11.0x Clean Sugar EBITDA, 7.5x Specialty Alcohol EBITDA, 7.5x Agribusiness EBITDA, 8.0x Corporate, Ethanol & Clean Sugar and Green Plains Partners EBITDA. In this case we assume only one Clean Sugar / Renewable Dextrose plant.

  This case includes a probabilistic Carbon Sequestration value of $32.4 per share.

- **Stress Case:** High protein EBITDA of $117 million and $40 million EBITDA uplift from corn oil. 8.0x High Protein & Corn Oil EBITDA, 7.0x Specialty Alcohol EBITDA, 7.0x Agribusiness EBITDA, 10.0x Corporate, Ethanol, Clean Sugar and Green Plains Partners EBITDA.

  No value ascribed to Clean Sugar / Renewable Dextrose or Carbon Sequestration.



(1) GrizzlyRock is the source of all estimates and assumptions

Sum of the Parts Model Valuation:

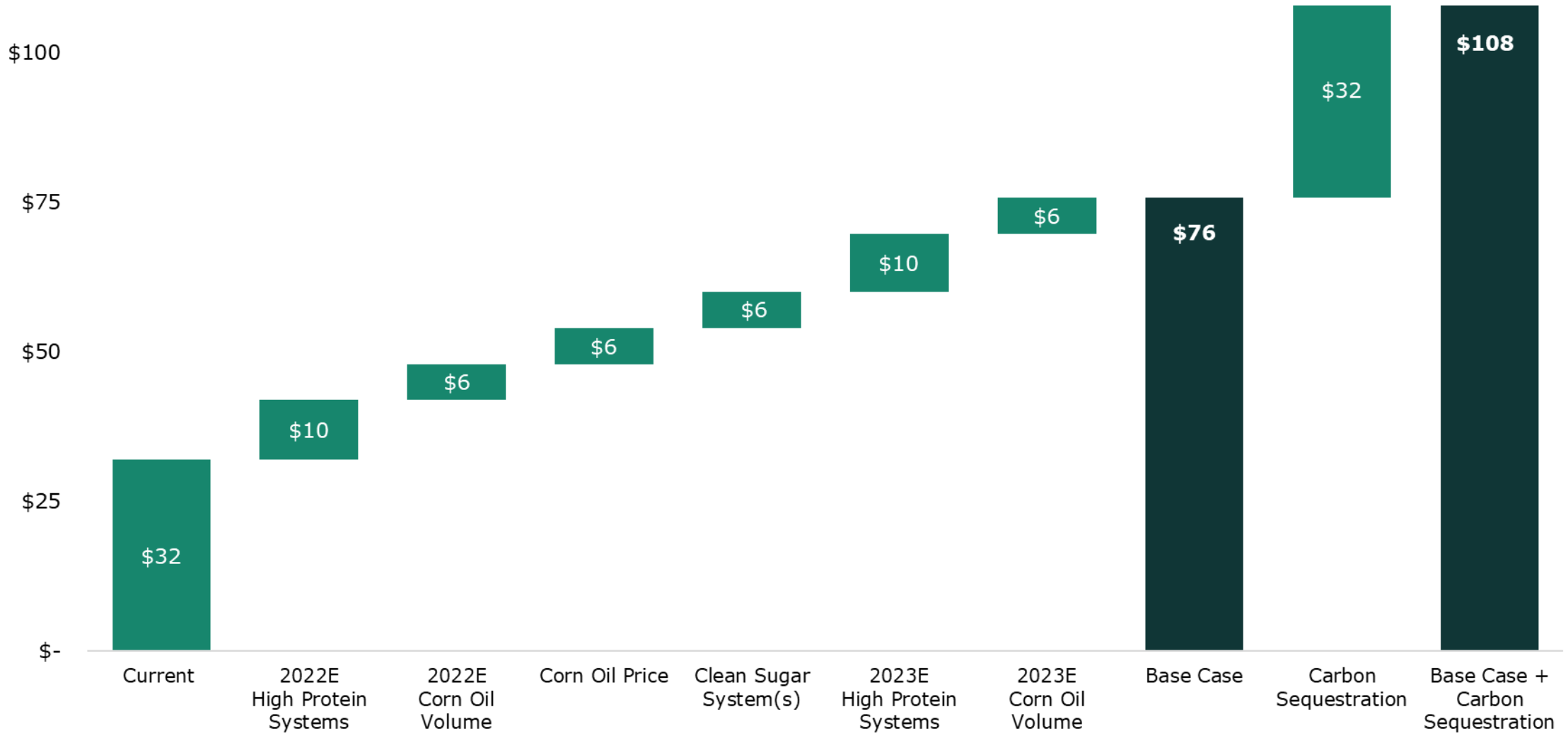
Segment	2024E EBITDA Estimate	Multiple	Value
High Protein Corn Meal	$292	10.0x	$2,921
Incremental Corn Oil	$100	10.0x	$1,001
Specialty Alcohol	$19	7.5x	$141
Clean Sugar	$37	11.0x	$405
Agribusiness	$20	7.5x	$150
Other [1]	($3)	8.0x	($24)
Implied Firm Value			$4,594
Net Cash 9/30/23E			$617
Implied Market Cap			$5,211
Implied Intrinsic Value Per Share (without Carbon)			$76
Implied Gain			137%

[1] Other includes Corporate, Ethanol, and Green Plains Partners

Base Case Model Valuation Assumptions:

- Protein producers typically trade at double digit EBITDA multiples. As corn meal is a newer market we apply a slightly discounted 10.0x multiple to run-rate EBITDA pro forma for all 11 plants having the Fluid Quip systems installed. (not currently including JVs such as Theraldson).
- Incremental corn oil from the new technology systems generates $100 million of annual EBITDA at a price of $0.75 per pound. Based on the current corn oil price of $0.43 per pound and tremendous renewable diesel supply coming online over next few years, our pricing estimate is conservative based on renewable diesel supply / demand.
- Clean Sugar EBITDA of $37 million based off one plant (Atkinson, Nebraska) producing 55 million gallons of Clean Sugar at an EBITDA margin of $0.67 per gallon.
- Industry experts believe that this protein can trade at a $100-$200 / ton premium to soybean meal which has historically traded around $300-$450 per ton and is currently ~$400 per ton. Model has high protein corn meal sells at $500 per ton and $292 million of annual EBITDA.
  - A $100 to $200 per ton increase represent $60 to $110 million of EBITDA.
  - Model is currently assuming 53% protein feed. Shenandoah is already running at 58% protein and that doesn't include the enhancements to yeast or enzymes to move up the J-Curve.
  - Green Plains could have the ability to monetize the Fluid Quip Technology platform further through additional partnerships or ventures.
- Renewable diesel is expected to grow exponentially over the coming years. With corn oil being a key feedstock source, there will be continued upward pressure on pricing. We believe there are scenarios that could have corn oil $1+ per pound which is nearly triple from current pricing.
- Each $0.10 increase in corn oil pricing represents ~$40 million of EBITDA with new high protein and corn oil technology.
- Over time, there is an additional 0.6 pounds per bushel of corn oil that could be extracted through new technologies which would lead to 1.8 pounds total production per bushel.
- The MSC technology decreases variability in dried distillers grains. Green Plains believes that it is possible these could get priced at a premium over time but currently doesn't include this in any assumptions.
- Clean Sugar could have better return on capital profiles than high protein and represents another way to diversify revenue streams while also eliminating ethanol capacity.

Sum of the Parts Value Per Share



Source: GrizzlyRock estimates

Stress Case Valuation Assumptions:

- Green Plains unable to reach targeted high protein corn meal premium yet the feed is still valued above distillers grains at $200 per ton. At scale, high protein feed would generate $117 million of annual EBITDA in the stress case.
- Incremental corn oil EBITDA of $40 million with corn oil decreasing in price to $0.30 per pound.
- Due to concerns around sustainability of margins and the ability to move up the value curve, the Company doesn't get a premium multiple and is valued at 7.0x 2024E EBITDA.
- We assume that due to additional capacity in the market, Specialty Alcohol margins will decline from the $1 to $1.50 per gallon estimated by Green Plains management to $0.50 per gallon on 75 million gallons of capacity representing $38 million of EBITDA.
- Management maintains that the Agribusiness can generate $25 million of EBITDA going forward. We value it on an EBITDA minus Working Capital interest basis as we don't include the short-term notes in debt count since they are backed by inventory and receivables.
- No Clean Sugar or Carbon Sequestration EBITDA or valuation uplift.
- We assume Ethanol remains oversupplied, Green Plains Partner will Generate $6 million of EBITDA, offset by $40 million of corporate costs for ($15) million of value. This negative stream of EBITDA is valued at a punitive 10.0x multiple.

Stress Case Valuation:

Segment	2024E EBITDA Estimate	Multiple	Value
High Protein Corn Meal	$117	8.0x	$935
Carbon Sequestration	$0	N/A	$0
Incremental Corn Oil	$40	8.0x	$320
Specialty Alcohol	$38	7.0x	$263
Clean Sugar	$0	7.0x	$0
Agribusiness	$20	7.0x	$140
Other [1]	($15)	10.0x	($150)
Implied Firm Value			$1,508
Net Cash 9/30/23E			$388
Implied Market Cap			$1,896
Implied Intrinsic Value Per Share			$27.6
Implied Gain			-14%

[1] Other includes Corporate, Ethanol, and Green Plains Partners

Risks, Mitigants, Conclusion

Risks & Mitigants

Risk	Impact	Mitigant
Crush Margin	Negative cash flow generation	Completion of Project 24 puts Green Plains in the top 15-20% low cost ethanol producers and transition to high value protein products materially increases the margins per gallon
Capital Constraints	Delayed buildout of high protein & corn oil technology	Green Plains has plenty of cash on the balance sheet and should be cash flow positive going forward leading to the ability to finance the buildout of the remaining plants
Failure to Expand Customer Base	Lower pricing on high protein feed	Green Plains is working directly with customers to develop products and GrizzlyRock has independently corroborated the demand for corn based high protein feed is real and growing
Industry Fails to Adopt Corn Protein	Large feed buyers may avoid corn based products	~584,000 tons high protein corn produced at scale meal allowing product and plant redundancy for quality control
Specialty Alcohol Margins	Lower margins and cash flow per gallon	Green Plains has high barriers to entry in the USP alcohol market and industry trends lead to the market continuing to grow and maintaining historical margins per gallon
Micro toxins	Pet food customers may avoid corn based protein	Green Plains has a multi-step process to test for mycotoxins throughout production, independent labs are sent samples to test for mycotoxins, and the customer tests the product for mycotoxins.

Contaminated Pet Food (Competitor Product)

Midwestern Pet Foods expands recall of aflatoxin-contaminated pet food - Tony McReynolds, 1/14/2021

Last week it was 28. This week, it's more than 70. That's how many pets have died after eating Sportmix pet food as of January 11, 2021, due to suspected aflatoxin poisoning. And more than 80 additional pets have been reported sick after ingesting the Sportmix products.

The US Food and Drug Administration (FDA) notes that not all cases have been officially confirmed as aflatoxin poisoning through laboratory testing or veterinary record review. The agency also notes the count is approximate and may not reflect the total number of affected pets.

Sportmix pet food is manufactured by Midwestern Pet Foods, which originally issued a voluntary recall on December 30, 2020, after the Missouri Department of Agriculture tested multiple samples and discovered elevated aflatoxin levels.

The company has voluntarily expanded its recall to include all dog and cat pet food products that contain corn and were made in their Chickasha, Oklahoma, manufacturing plant. The impacted products have the unique Chickasha identifier "05" in the date or lot code an expiration date on or before July 9, 2022.

The original recall included 9 lots of pet food. The expanded recall includes more than 1,000. The affected pet food was distributed nationwide via both online and brick-and-mortar vendors, and in the wake of the new deaths, the FDA has expanded its investigation. In addition to the Missouri Department of Agriculture, the agency is also working in cooperation with the state departments of agriculture for Oklahoma, Arkansas, Kansas, Kentucky, Louisiana, New Mexico, Oregon, Texas, and Washington.

Aflatoxins are poisonous substances produced by certain kinds of fungi that are found naturally the world over. The main fungi that produce aflatoxins are Aspergillus flavus and Aspergillus parasiticus, which can contaminate food crops such as corn used in the manufacture of pet food. As well as being dangerous to pets, aflatoxins pose a serious health threat to humans and livestock.

Symptoms of aflatoxin poisoning in pets include sluggishness, loss of appetite, vomiting, jaundice, and diarrhea. In severe cases, aflatoxin toxicity can be fatal. In some cases, pets may suffer liver damage but not show any symptoms.
The FDA is asking veterinarians who suspect aflatoxin poisoning in their patients to report the cases through the FDA's Safety Reporting Portal or by calling their local FDA Consumer Complaint Coordinators.

https://www.aaha.org/publications/newstat/articles/2021-012/midwestern-pet-foods-expands-recall-of-aflatoxin-contaminated-pet-food/

Green Plains Micro Toxin Plan: Testing, Testing, Testing

As micro toxins are a huge issue for the pet food market, this was a key part of investment diligence.

During our plant tour, we met extensively with the person in charge of quality assurance / quality control for Green Plains system wide. The following describes the quality control process:

- Step 1: Test multiple samples of corn from each truckload / rail car as it enters each biorefinery
- Step 2: Test corn again as it enters the biorefinery from on-site storage.
- Step 3: Test high protein feedstock as it exist the dry grind plant and enters the high protein system.
- Step 4: Test final product at the plant prior to shipping to customer.
- Step 5: Send samples to an independent lab for testing satisfactory to both pet food customer and Green Plains.
- Step 6: Customer tests product upon receiving high protein corn meal from Green Plains.

Green Plains has an extensive quality assurance / quality control process including independent lab testing

Green Plains has not had an issue with toxic product

Conclusion

Opportunity

- Highly cash generative & profitable investment in the production of high protein feed, corn oil, and specialty alcohol.
- Market leader in terms of technology and innovation giving multi-year head start vs. any potential competition.
- Rapidly growing markets with significant need of supply to meet growing protein consumption.
- The market is currently valuing Green Plains as an ethanol producer, as this transition takes place the business will materially improve cash flow generation and get a multiple re-rate.

Expected Return & Timeframe

- Green Plains has three plants fully online early in 2022 with the remaining 9 systems installed over the next few years.
- The buildout should be completed by 2023 at which time investors will have a view of run-rate EBITDA.
- As investors put a multiple on run-rate high protein and corn oil EBITDA generation, base case return is 100%+ over 12 to 24 months.

Appendix

Management Biographies

Name	Title	Background
Todd Becker	President, CEO & Director	Mr. Becker has been the Chief Executive Officer at Green Plains Inc. since January 1, 2009 and its President since October 15, 2008. He has been Chief Executive Officer and President of Green Plains Holdings LLC, a General Partner of Green Plains Partners LP since March 2015. Mr. Becker served as the Chief Operating Officer at Green Plains Inc. since October 15, 2008 until December 2008 and served as its Compliance Officer. He served as the Chief Executive Officer at VBV LLC since May 2007 until October 2008. He served as an Executive Vice President of Sales & Trading at Global Ethanol from May 2006 to May 2007. He spent ten years with ConAgra Foods in positions including Vice President of International Marketing for ConAgra Trade Group and President of ConAgra Grain Canada. He served as the Chairman at Green Plains Inc. and serves as its Director since March 10, 2009. He has been a Director at The Hillshire Brands Company since May 31, 2012 to 2014. He has been a Director of Green Plains Holdings LLC, a General Partner of Green Plains Partners LP since March 2015 and serves as its Chairman.
George Simpkins	CFO	Mr. George P. Simpkins Jr. has been the Chief Financial Officer at Green Plains Inc. since May 13, 2019. Mr. Simpkins had been the Chief Development Officer at Green Plains Inc. since October 2014 until 2019 and served as its Chief Risk Officer from October 2014 to August 2016. Mr. Simpkins has been Chief Financial Officer of Green Plains Holdings LLC, a General Partner of Green Plains Partners LP since May 2019 and has been its Director since June 2015. He served as Chief Development & Risk Officer of Green Plains Holdings LLC, a General Partner of Green Plains Partners LP since March 2015 until May 2019. He served as an Executive Vice President of Finance and Treasurer at Green Plains Inc. since joining in May 2012 until October 2014. Prior to Green Plains, he served as Managing Partner of GPS Capital Partners LLC. From February 2005 to June 2008, he served as the Chief Operating Officer and Chief Financial Officer of SensorLogic, Inc. and Executive Vice President and Global Chief Risk Officer of TXU Corporation from November 2001 to June 2004. Prior to that, he served in senior financial and commercial executive roles with Duke Energy Corporation, Louis Dreyfus Energy, MEAG Power Company and MCI Communications. He served as Chairman of Allegro Development Corporation.

Board Member Biographies

Name	Title	Role	Tenure	Background
Wayne Hoovestol	Chairman	External	2006 – Present	Mr. Wayne B. Hoovestol has been the Chief Executive Officer of Green Plains Grain Company LLC since February 2007. Mr. Hoovestol is employed at Lone Mountain Truck Leasing, LLC. He served as the Chief Strategy Officer of Green Plains Inc. from March 16, 2009 to November 3, 2009. He served as the Chief Executive Officer of Green Plains Inc. from February 2007 to December 2008. Mr. Hoovestol served as the Chief Operating Officer of Green Plains Renewable Energy, Inc. from January 2007 to February 2007. He began operating Hoovestol Inc. in 1978 and he later formed an additional trucking company known as Major Transport. He served as a Director of ACCESS Bank. Mr. Hoovestol became involved with ethanol as an investor in 1995 and has served on the boards of two other ethanol companies. He served as a Director of CapSource Financial Inc. from May 26, 2005 to July 20, 2007.
Todd Becker	Director	Internal	2009 – Present	Mr. Becker has been the Chief Executive Officer at Green Plains Inc. since January 1, 2009 and its President since October 15, 2008. He has been Chief Executive Officer and President of Green Plains Holdings LLC, a General Partner of Green Plains Partners LP since March 2015. Mr. Becker served as the Chief Operating Officer at Green Plains Inc. since October 15, 2008 until December 2008 and served as its Compliance Officer. He served as the Chief Executive Officer at VBV LLC since May 2007 until October 2008. He served as an Executive Vice President of Sales & Trading at Global Ethanol from May 2006 to May 2007. He spent ten years with ConAgra Foods in positions including Vice President of International Marketing for ConAgra Trade Group and President of ConAgra Grain Canada. He served as the Chairman at Green Plains Inc. and serves as its Director since March 10, 2009. He has been a Director at The Hillshire Brands Company since May 31, 2012 to 2014. He has been a Director of Green Plains Holdings LLC, a General Partner of Green Plains Partners LP since March 2015 and serves as its Chairman.
Alain Treuer	Vice Chairman	External	2008 – Present	Mr. Alain Treuer has been Chief Executive Officer of Tellac Reuert Partners SA since 2004. Mr. Truer serves as a Principal of Tellac Reuert Partners (TRP) S.A. Mr. Treuer founded TIGC in 1992. He served at Wilon Holdings S.A. since 2006. He has been the Chairman of Tellac Reuert Partners SA since 2005. Mr. Truer has been Vice Chairman at Green Plains Inc. since August 27, 2015. He is a Member of Board of Governors at Green Plains Obion LLC since March 2007. He has been a Director at Trivon AG since 2006. Mr. Treuer served as the Chairman of TIGC.
Martin Salinas	Director	Internal (Interim)	2021 - Present	Mr. Salinas served as chief financial officer of Energy Transfer Partners, LP, one of the largest publicly traded master limited partnerships, from 2008 to 2015. Prior to that, he was their controller and vice president of finance from 2004 to 2008. Mr. Salinas began his career at KPMG after earning a bachelor's degree in Business Administration in Accounting from the University of Texas in San Antonio. He is also a member of the Texas Society of Certified Public Accountants and advisory council member of the University of Texas, San Antonio School of Business. Mr. Salinas' term will expire at the 2022 annual meeting. There are no arrangements or understandings between Mr. Salinas and any other person pursuant to which Mr. Salinas was appointed to the Board, or transactions in which Mr. Salinas has an interest requiring disclosure under Item 404(a) of Regulation S-K.
Brian Peterson	Independent Director	External	2005 – Present	Mr. Peterson served as an Executive Vice President of Site Development at Green Plains Inc. since 2005 until October 2008. He worked as a bank inspector and internal bank auditor. He is involved in various other renewable energy investments. For more than the past five years he has been principally employed by his farming enterprises. He owns and operates a cattle feedlot. He owns a local grain elevator, a trucking business and a construction business. Mr. Peterson has been an Independent Director of Green Plains Inc. and Green Plains Grain Company LLC since May 2005. He has been a Director of Natural Innovative Renewable Energy, L.L.C. since March 2006.

Board Member Biographies

Name	Title	Role	Tenure	Background
James Anderson	Independent Director	External	2008 – Present	Mr. Anderson had been Managing Director and Operating Partner at CHAMP Private Equity since 2016. Previously, Mr. Anderson served as Chief Executive Officer and President of The Gavilon Group, LLC since October 2014 until March 1, 2016. He served as the Chief Operating Officer of Agriculture at The Gavilon Group, LLC. Mr. Anderson served as the Chief Executive Officer of GrainCorp Malt until February 2010. He served as Chief Operating Officer and Executive Vice President of CT Malt since April 2003. He served as Chief Executive Officer of United Malt Holdings since September 2006, where he drove innovation and change across its seven companies to increase shareholder value for private equity and employee owners. During the last few months, he led a dual track IPO and private sale process, ultimately delivering an excellent return to investors upon the sale of UMH to a strategic buyer. In 1995, Mr. Anderson joined ConAgra Foods as Senior Vice President of the ConAgra Grain Companies in charge of asset operations and world trading and served as its President since 2000. Prior to UMH, he spent 11 years in senior management roles at ConAgra, including ConAgra Food Ingredients, ConAgra Agriculture Products, ConAgra Trade Group and ConAgra Grain Companies. He served as a Director of United Malt Holdings since September 2006 and Green Plains Renewable Energy, Inc. He served as a Board Member of North American Export Grain Association and National Grain and Feed Association.
Eugene Edwards	Director	External	2014 – Present	Mr. Edwards served as the Chief Development Officer & Optimization and Executive Vice President of Valero Energy Corporation from November 2012 to February 12, 2014. Mr. Edwards has over 35 years of experience in the energy and refining sectors. He consulted on refinery economics for Pace Consultants. He served as Executive Vice President of Corporate Development & Strategic Planning at Valero Energy Corporation from December 2005 to February 12, 2014 and its Chief Development Officer from January 2011 to November 2012. He was with Valero Energy Corporation for 19 years in various managerial positions. He started his career as a Process Engineer for CITGO. He served as a Director of CrossAmerica GP LLC (Formerly Lehigh Gas GP LLC), a general partner of CrossAmerica Partners LP since October 1, 2014 until July 13, 2017. Mr. Edwards has been an Independent Director at PBF Energy Inc. since July 9, 2014. He serves as a Director of PBF Energy Company LLC. He served as a Director of CST Brands, Inc., from May 2013 to December 2013.
Ejnar Knudsen	Independent Director	External	2016 - Present	Mr. Knudsenis a Founder and Chief Executive Officer at AGR Partners, LLC. He serves as the Chief Investment Officer of Kruse Investment Company. Mr. Knudsen is a Co-Founder of Materra LLC and serves as its Director on its Board. He is the Chair of Dairy Club. Mr. Knudsen serves on the Boards of California Ag Leadership Foundation, Kruse Investment Company, Western Milling and California Grain and Feed Association. He is a Member of the Dean's Advisory Council of the Cornell University's College of Agriculture and Life Sciences. He has been a Non-Executive Director of Ridley Corporation Limited since June 24, 2013. He serves as a Director of Opal Foods LLC. He serves as a Director at Icicle Seafoods. He served as Member of Advisory Board at Key & Company LLC. Mr. Knudsen serves as an Advisor of Equity Investments at Visalia, CA. He serves as a Director of Gowan Company and Vintage Wine Estates. From 2009 to 2012, he was portfolio Manager of Passport Capital's Agriculture Fund. Prior to 2007, Mr. Knudsen served in various financial roles.
Kimberly Wagner	Independent Director	External	2020 - Present	Ms. Wagner was a venture partner at Flagship Pioneering and president and chief operating officer of CIBO Technologies. Previously, she was a senior partner and managing director at The Boston Consulting Group (BCG). In addition, she founded and led BCG's Global Agribusiness practice, bringing the firm's expertise and capabilities together in a focused way to serve the unique needs of agricultural businesses. More recently, she was a partner at McKinsey & Company, where she served as a senior member of the Global Agriculture and Food practice. Her accomplishments in client service have been acknowledged through multiple awards, including Consulting magazine's 2012 Women Leader in consulting honor. Ms. Wagner serves on the boards of several not-for-profits with agricultural, sustainability, and/or educational missions, and she is an active member of several national and international scientific societies.

Corn Processing: Dry Mill versus Wet Mill

	Dry Mill	Wet Mill
Input	Corn	Corn
Primary Products	Ethanol, Corn Oil, Dried Distiller's Grains	200+ Corn Products Human Food Focus
Largest US Firms	Flint Hills Resources (Koch Industries), Valero Energy, Green Plains Inc.	Archers-Daniel Midland, Cargill, Tate & Lyle, Ingredion
Relative Start Up Costs	Less Expensive	More Expensive
% of US Ethanol	90%	10%
Production Process	Dry-grind corn then add water and enzymes Cook corn mash to liquify starch and ferment to create ethanol. Remove corn oil. Remaining components packed and sold as distillers dried grains	Steep corn for 48 hours to assist component separation Fiber and corn gluten become animal feed Starch fermented to become human food products, and ethanol

All Green Plains biorefineries are dry mills

Fluid Quip Talks with Ospraie Management and Green Plains

"If you think about what we do as an industry, we make 5 or 6 or 7 different products. And quite frankly, it's not enough. And when you look at what a wet mill does, they make 200 different SKUs or 200 different products. And so, which of those products can we go and use your technology to exploit our ability to process lots and lots of corn really cheaply. And one of those was your CST or your clean sugar technology, where we can now have a dry mill, produce glucose or dextrose or sugar and not -- and potentially not even make ethanol anymore… And sugar was one of them. And if you look at what's going on, whether it's in green chemicals, bioplastics, synthetic biology. All those things are going to take more and more glucose and dextrose to make that happen. A lot of food innovation is going to take a lot more of these sugars to make those things happen, and chemicals as well. And these are insatiable markets on their own. But they've been limited by growth because they're limited by inputs.… And that's a huge opportunity for us. I mean, in the next 10 years, our view is that demand for dextrose and sugars are going to double from plants like ours. And supply will not double unless we do it here in our industry.

– Todd Becker, FQT Talks January 28th, 2021

"But beyond that, sitting on that site (York) was an -- $70 million or $80 million spend on an innovation center that was there when we got there. And it's a full-scale pilot facility that really was the backbone of cellulosic work in the last 10 years. And so we weren't focused on that. But then when we got in there, we saw the fermentation capabilities, the separation capabilities, all the capabilities that can do, inclusive of can Fluid Quip use this innovation center to retrofit it and make kind of what we would say is a large-scale clean sugar facility that can be easily replicated now at the larger plants. And that's where we're going with this right now."

– Todd Becker, FQT Talks January 28th, 2021

Partnership focus diversifies revenue base

Fluid Quip Talks with Ospraie Management and Green Plains: Clean Sugar

"Well, the answer is, is the opening conversation with Todd going back a year was actually more protein focused, okay? But for that to be the stream alone and that probably wouldn't have been enough for us to commit to join in with this investment. It's the breadth of markets which your products can help upgrade the streams to. And so you take a look at the size and scale of the industrial or clean sugar market and how that has had -- we talked about the structural growth for fish, okay? When you've had no growth in the wild crop that you've had, that's the highest growth rate in total for the world per capita for protein is going to be fish, holy cow. The structural, sustainable, non-economically sensitive growth for industrial and clean sugar and how you need a diversification of supply sources for that in incremental supply to make it affordable and actually make incremental growth possible. When we actually understood that not only for the existing operating plants is your technology working and able to upgrade for that higher level of protein to work and be suitable for other markets. You also have the incremental technology that'll upgrade the flow to actually create clean sugar and what that can do for the fermentation. We understand the scale of that market, the margins for that market and the potential growth and structural growth, noneconomically sensitive or energy cyclical nature to the growth for that market. That aspect of what it could do for your customers and for the plant in an incremental aspect was something that that's really what got us over the hurdle to say, hey, this has got a good base rate return for you and your customers. But the incremental ways that your business can grow by going and tapping into that market for the plants was the thing that really was a convincing aspect that made this something from a logical and good investment to something that could be really exciting."

- Dwight Anderson, Ospraie Capital Management on FQT Talks 1-28-20

"We did a range of outcomes. We said, we're not sure whether the growth is going to be 7 billion, 10 billion, 12 billion, 14 billion pounds, okay? But it's going to grow. But actually the constraint is as much price and availability rather than the end markets. And so one of the things we always take a look for is that addressable market, the size of what it's going to be. Is there a pull for it? And so that aspect for your customers, where there is some question over the terminal value for some of their existing products to be able to transform it to an area where there is such a gap, great availability, just short of supply, we think, would actually increase that level of demand. And so we spent a lot of time talking about high protein. But that aspect of what the clean sugar could do in terms of for your customers and the scale and sustainability of what that end market could be is something that gave us really great comfort that the investments themselves in your equipment wouldn't destroy the profitability end market. It would actually potentially create incremental demand here."

– Dwight Anderson, Ospraie Capital Management on FQT Talks 1-28-20

Ospraie has a successful track record in agriculture technology and sees the incredible market opportunities for Green Plains

Shenandoah Plant Tour: MSC Technology

High protein production

Corn oil capture
"Brix Oil Separation" System

Shenandoah Plant Tour

Ring dryer

Dried distillers grains

Shenandoah Aquaculture Lab

Green Plains aquaculture feed formulation

Beginning stages of Rainbow Trout trials

2022 Renewable Volume Obligations Blending Mandate Update

Today (Tuesday, December 2022), the EPA announced that blending obligations ("RVO")for ethanol will be revised to 12.5 billion gallons for 2020, 13.32 billion for 2021, and 15.0 billion for 2022 (rumor was 14.1 billion gallons as recently as last week). In addition, the USDA is announcing $700 million in grants for biofuel producers. Furthermore, the EPA announced a significant number of denials on small refinery waiver requests and will set out new rules for how they will be awarded in the future.

This is bullish for Green Plains for a few reasons. The first is removing the overhang in the stock. Multiple times GPRE has traded off in the past months over rumors on what the volume obligations would be. Now that this number is known, it should remove volatility from headlines.

Additionally, the ruling shows the administration's support for biofuels. 15 billion gallons is the normal number that is expected and returning to that in 2022 is a positive. Furthermore, the reduction in prior exemptions will make it so that the quotas are met given COVID related reduction in miles driven.

Ethanol margins for 4Q 2021 and 1Q 2021 continue to remain strong. We continue to ascribe $0 value to ethanol so any positive cash generation is upside to our base case and will allow them to deploy additional capital to high return projects.

The Company has presented at numerous conferences over the past few weeks. Green Plains continues to remain optimistic about the probability of having 60%+ protein production platform wide and signing a value accretive corn oil offtake in the near future. With ~50% of production on track to be up by mid-2022, the inflection point in the stock continues to get closer.

While ethanol profitability is not a main value driver for our thesis, today's positive news removes a material overhang for Green Plains shares

We reiterate our base case of $75+ per share over the next year or two

December 2021 Conference Notes

- **Ethanol**
  - Some structural changes in Chicago market on how producershedge
  - think exports are pretty strong
  - feels like they're blending more in some markets
  - industry is getting older – assets can't run at utilization levels they used to
  - Coming in hedged aren't participating in all of margin upside but seeing benefits
  - Typically you start to build inventories when you run into winter but its really not happening so 1Q margins are positive and positive throughout 2022
  - By February 2022 all plants will have Project 24 complete and modernized

- **Corn**
  - Doesn't think soybean plants have the equipment to build a lot of the announced plants
  - Thinks normal corn acreage will be planted but more of a question on fertilizer
  - $5.75 corn seems high but if you look at ethanol / processing margin you need to compete with soybean
  - Probably will stay at elevated levels because margins are dictating that you will stay elevated on corn
  - Seeing good farmer participation – GPRE normally 20% physical locked in for 1Q and are as close to 40%

- **Corn oil running at 0.9 on legacy platform today – some plants even above 1.0 without protein system**
  - **Shenandoah / Wood River are at 1.2 – 1.4 lbs.**
  - Exit rate in 2022 – 330-350 million pounds of corn oil
  - Should be above 400 million pounds as systems fully come up
  - Corn oil should trade up to 10% above soybean oil due to CI
  - **Have had multiple offers on corn oil offtakes to date and turned them all down and continue to get approached**
  - Think there is still a path to a monetization strategy but a bit of it is a waiting game
  - Think upward trend on price is going to continue
  - If someone wants 400+ million pounds what is the best way to give GPRE shareholders value?

- **Build Schedule and Supply Chain**
  - Very good job on ordering long lead time equipment – equipment on site and labor is there
  - Wood River got delayed from needing a burner for the drier but that's it
  - Trying to prevent that from happening at Central City, Obion, and Mount Vernon
  - In a better place for next 3 sites than Wood River

Recent Conference Notes

- **Carbon Capture**
  - "whether they invest or not invest in the pipeline they are on it"
  - Question is do they want to get further into development risk and infrastructure risk vs. other high return projects
  - Direct inject – this is first priority – looking at sites and doing geographic work

- **Sustainable Aviation Fuel**
  - Alcohol to jet is absolutely coming – matter of when not if
  - In this decade will convert a significant amount of ethanol to jet
  - Have to de-carbonize to get this done
  - Doing a lot of work on technology reviews on what's the best path forward or if it makes sense at all vs. clean sugar
  - As an industry, alcohol to jet is baselining assets because you can't get it out of renewable diesel – in his opinion ethanol is only way to do it at scale
  - If this happens you get a huge change in supply/demand for ethanol as well
  - Assets aren't on the market – so many good things between protein, oil, carbon, sugar, SAF, etc. – optionality has never been greater

- **Turnkey / JV Future**
  - Turnkey will accelerate as they accelerate up the price curve for their products
  - Talking with several partners for JVs – if you want 60% protein it has to be with GPRE because of their partnerships
  - If they get up to 60% protein they want to get better than 50/50 share with partnership

- **Talent / Team Buildout**
  - Getting a lot of interesting new hires that want to be a part of the new end markets

- **Spending bill**
  - Everything favorable from GPRE perspective –> 45Q, SAF, Renewable Diesel, etc.
  - **"Think the $85 45Q credit is an if not when question – if its not this bill it's the next bill"**
  - Build back better 30-40% chance but 45Q is 80-90% chance

Recent Conference Notes: 2022 Expectations

- **2022 expectations**
  - By end of 2022 should produce around 430,000 to 450,000 tons of high protein corn meal
  - CEO thinks market is missing how unique product is especially given scale
  - Can innovate on 11 different products at 11 different GPRE plants whereas soybean meal is all the same
  - Expanded to multiple pet food customers
  - Goal is to get 60%+ protein across platform
  - **Doing a major commercial trial in early 2022 which could be a "game changer" (CEO commentary)**
  - At 60%+ think they will really start selling into aquaculture markets – South America, Canada, and non-GMO Nordic countries
    - Did a small trial at 58% protein and made too much, second trial did blocks in the 60% protein so know they can do it
    - **Replace things like fishmeal, soybean protein concentrate - $600 to $1,600 range somewhere in the middle is room for this product and know it from discussions with customers**
    - 44 million tons of feed in aqua – at scale entire GPRE protein product would only be 1.5% inclusion rate and they think they could be up to 30% inclusion in fish meal
  - Gating item was redundancy – finally have redundancy and now they can get some of the material customers

Note: from a catalyst perspective, we would not be surprised if Green Plains raises their 2024 run-rate numbers on the Q1 2021 earnings call if successful (both from protein and corn oil baseline)

Green Plains Inaugural Sustainability Report (link here)

SUSTAINABLE DEVELOPMENT GOALS

Integrating Sustainability Throughout Our Entire Value Chain

Our Green Plains 2.0 transformation includes combining the knowledge, resources and world-class technologies of exclusive strategic partners with our years of expertise in fermentation and agricultural technology. As we further integrate sustainability principles and practices throughout our value chain, we are doing more than just lowering our own operational footprint – as important as that is - we are providing the products needed by our customers - from pet food manufacturers to sustainable aquaculture producers to disinfectant and sanitizer manufacturers - to help them make *their* products and services more sustainable. The ripple effect of these downstream sustainability benefits then help communities around the globe live more inclusive and sustainable lives – in line with the United Nations Sustainable Development Goals*. Our goal is to transform our entire platform by 2024.

* https://sdgs.un.org/goals

1 NO POVERTY

Directly supports over 700 jobs across the U.S.

2 ZERO HUNGER

Meets growing global demand for plant-based protein in a sustainable way

3 GOOD HEALTH AND WELL-BEING

Contributes to global health and safety through production of high-purity alcohol for hand sanitizer and disinfectants

6 CLEAN WATER AND SANITATION

Engages in robust efforts to clean water and efficiently manage water resources across 11 biorefineries

7 AFFORDABLE AND CLEAN ENERGY

Provides consumers with less expensive, renewable biofuel alternatives to regular gasoline

8 DECENT WORK AND ECONOMIC GROWTH

Plays a significant role in agricultural economic activity in the U.S. Midwest, including purchasing corn locally and directly from American farmers

9 INDUSTRY, INNOVATION AND INFRASTRUCTURE

Drives innovative biorefinery process and product development

12 RESPONSIBLE CONSUMPTION AND PRODUCTION

Meets the world's growing food and dietary protein demands with high-protein and plant-based feeds

13 CLIMATE ACTION

Reduces particulate matter emissions and carbon footprint of liquid fuel vehicles

14 LIFE BELOW WATER

Develops innovative aquaculture diets to reduce overfishing of our oceans

15 LIFE ON LAND

Reduces need to further deforest land for agricultural purposes by using locally sourced corn

17 PARTNERSHIPS FOR THE GOALS

Engages with strategic partners to deploy advanced agricultural technology and achieve sustainability goals

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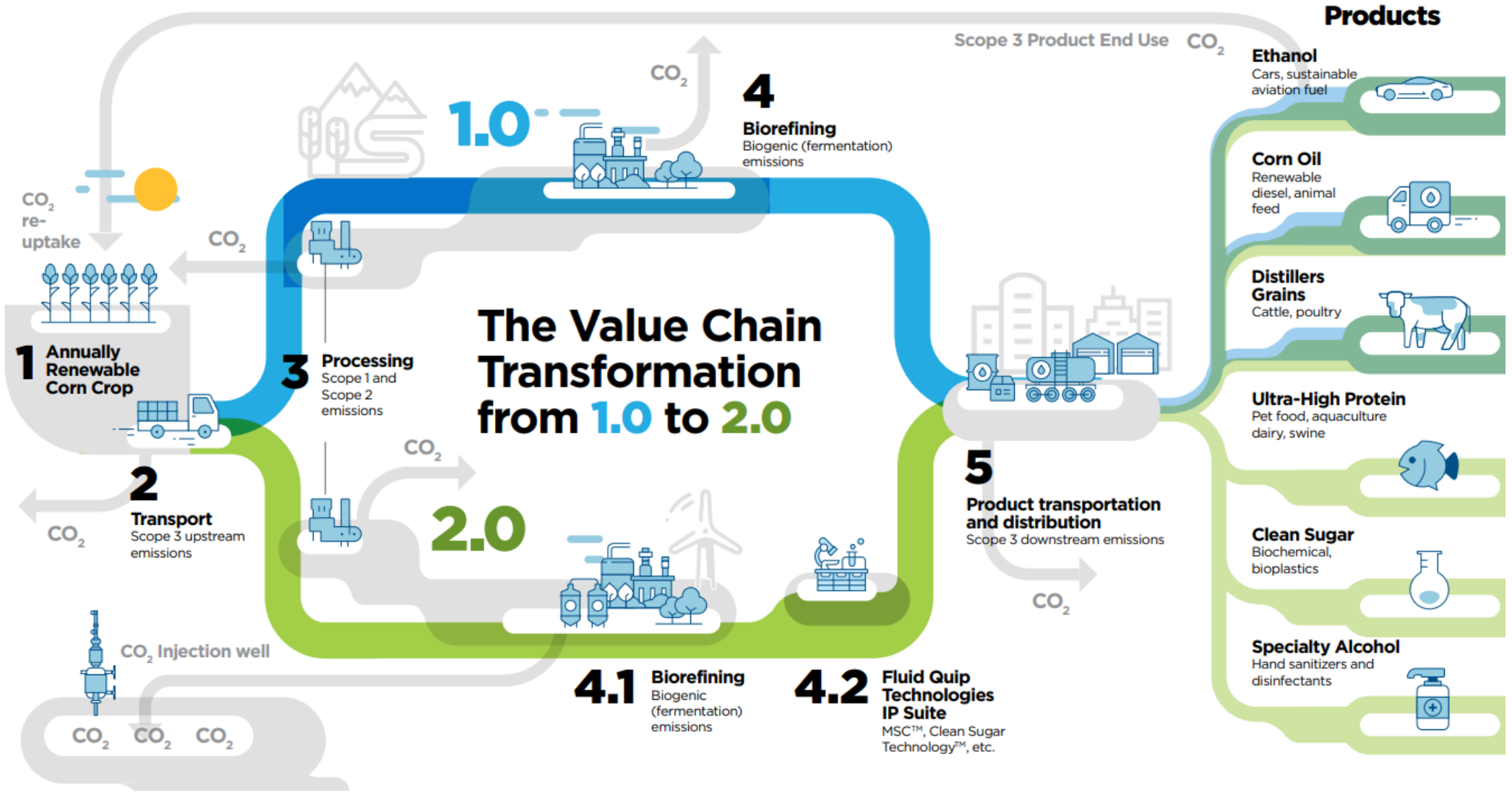

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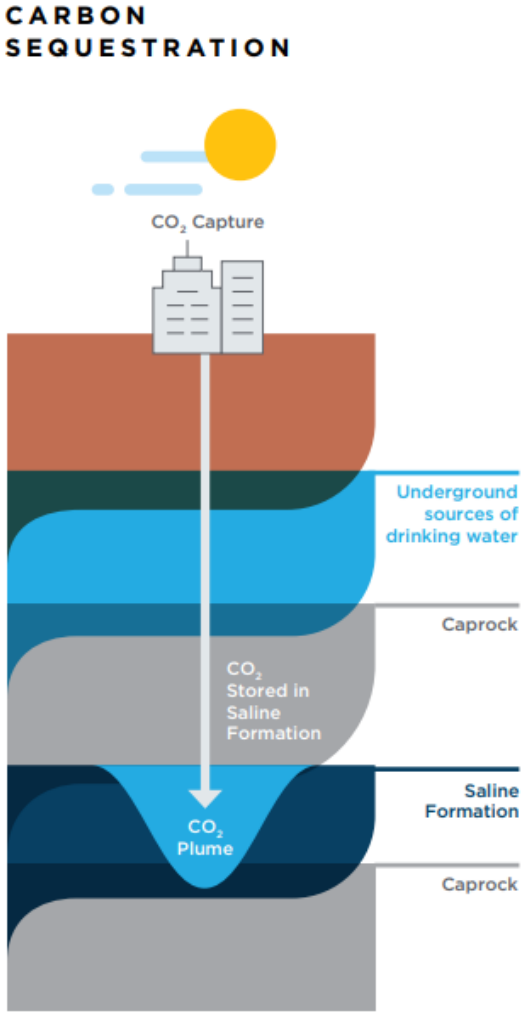


Renewable Biofuel and Carbon Sequestration

Corn naturally sequesters carbon dioxide (CO_2) throughout the growing season and stores it in the soil and the corn kernel. We grind corn kernels into their main components – starch/alcohol, fibrous protein-rich solids, and CO_2 – via fermentation. Currently this CO_2 is released back into the atmosphere and subsequently captured again during the growing season by corn and other plants. While this life cycle loop makes our biofuel less carbon intensive than gasoline, we knew there was room for further improvement.

Under our Green Plains 2.0 model, we are aiming to keep that carbon dioxide from being released back into the atmosphere via a Carbon Capture and Sequestration (CCS) project in collaboration with Summit Carbon Solutions (SCS), a subsidiary of Summit Agricultural Group. This innovative venture puts our ethanol on a path toward achieving carbon neutrality and helps to address the urgent global need for decarbonization.

All eight of our Nebraska, Iowa, and Minnesota biorefineries are expected to be connected to the SCS project by 2024. The remaining three locations (Madison, Mount Vernon, and Obion) may be suitable for capture and direct onsite injection of CO_2.

Once completed, SCS's project will be able to transport up to 10 million metric tons of liquified CO_2 annually from midwestern biorefineries and other industrial sources to North Dakota for deposit into geologic storage, dramatically reducing the carbon footprint of the biofuels produced at connected biorefineries. Geologic sites for sequestration include depleted oil and gas fields, deep coal seams, and saline formations.[7] **Importantly, none of this CO_2 will be used for enhanced oil recovery (EOR).**

The amount of Green Plains CO_2 sequestered per year is expected to be approximately 1.9 million metric tons, the same amount that would be sequestered by 2.3 million acres of U.S. forests in a year.[8]

Further, by capturing and sequestering the CO_2 from our biorefineries, we believe we will be able to reduce the carbon intensity score of our ethanol by as much as 50%, making it comparable to or lower than other low-carbon fuels available in the market today and positioning our renewable fuels for low-carbon markets globally.

We plan on monetizing our carbon capture and sequestration initiatives through several channels, including:

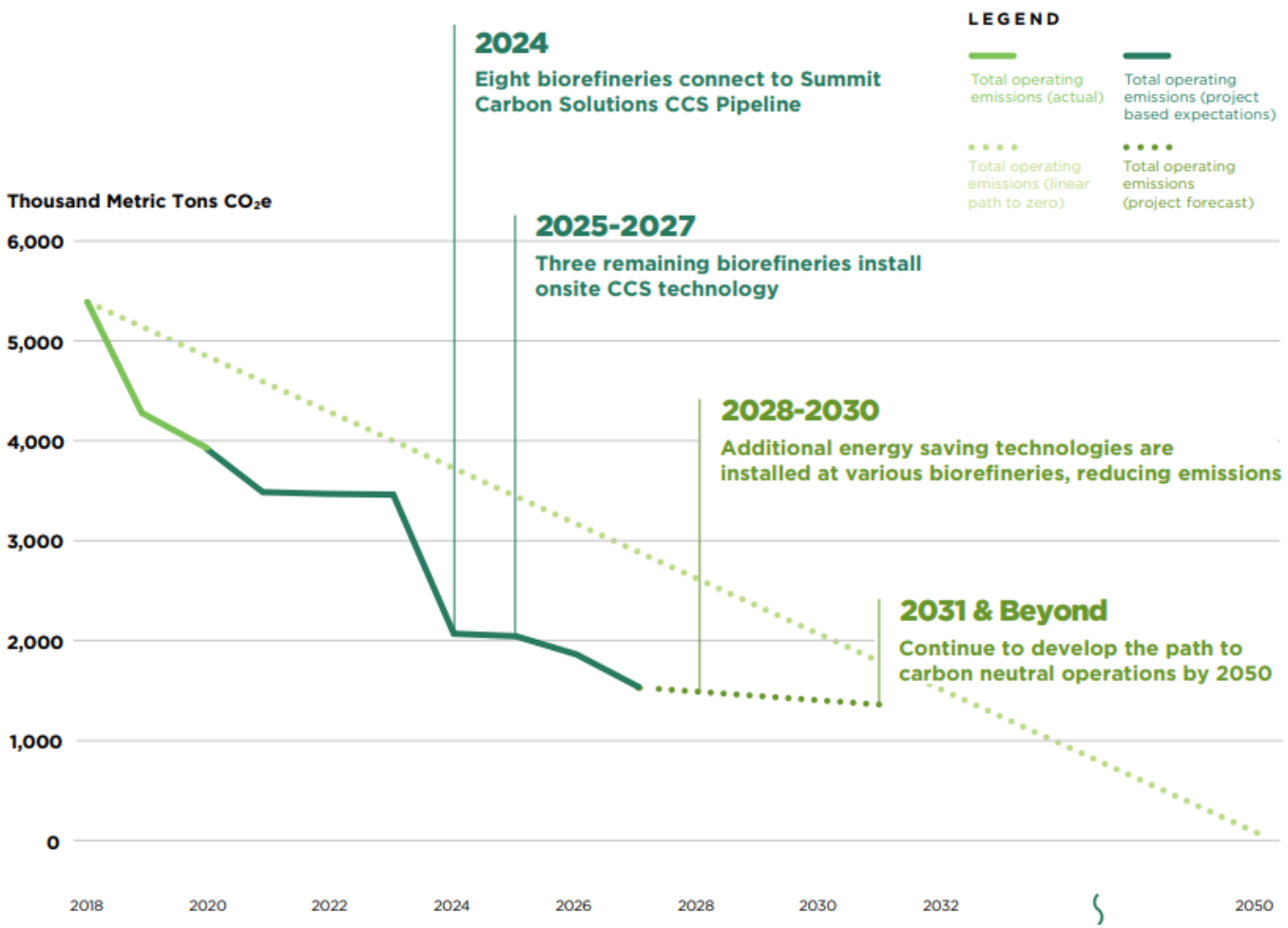
- California Air Resources Board (CARB) compliance offset credits
- U.S. Treasury Department and Internal Revenue Service 45Q tax credits for carbon dioxide capture and sequestration. Tax credit amounts vary by project type and are currently $50 a ton for saline sequestration.
- Voluntary carbon credit marketplaces. The market value of voluntary credits varies with the value of LCFS credits and other private market opportunities.
- Other state, regional and national low-carbon initiatives.

7 https://19january2017snapshot.epa.gov/climatechange/carbon-dioxide-capture-and-sequestration-overview_.html
8 https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator

Green Plains Inaugural Sustainability Report (link here)

Carbon-Free Future

Path to Carbon-Neutral Operations by 2050



GREEN PLAINS PERFORMANCE DATA*	UNIT OF MEASUREMENT	2018	2019	2020
Direct GHG Emissions (Scope 1)	Thousand Metric Tons (MT) CO_2e	1,688	1,316	1,179
CO_2 from Combustion	Thousand MT	1,686	1,315	1,178
Methane (CH_4)	Thousand MT CO_2e	0.795	0.620	0.557
Nitrous Oxide (N_2O)	Thousand MT CO_2e	0.947	0.739	0.677
Indirect GHG Emissions (Scope 2)	Thousand MT CO_2e	655	527	348
CO_2	Thousand MT	652	524	345
CH_4	Thousand MT CO_2e	0.267	0.215	0.910
N_2O	Thousand MT CO_2e	3.230	2.599	1.567
Biogenic GHG Emissions (CO_2 from Fermentation)	Thousand MT	3,100	2,444	2,225
Total GHG Emissions	Thousand MT CO_2e	5,443	4,287	3,752
Emissions Intensity	MT of CO_2e/ Raw Material MT	0.569	0.566	0.538

* Scope 1 emissions reflect publicly reported data submitted to regulatory agencies as part of the annual air emission inventory reporting. Emission factors are derived through stack testing or through the use of commonly accepted emissions factors. The Scope 2 emissions we are currently reporting is purchased electricity. They are calculated using utility billing statements and the EPA GHG Emissions Calculator.[11] We use a grid/location-based method of converting purchased electricity into GHG emissions.

We have built and acquired biorefineries that are strategically located close to grain supplies, so we face fewer obstacles acquiring the resources we need while also reducing the Scope 3 GHG emissions from trucking corn across long distances. We are currently evaluating Scope 3 calculation methods and will consider reporting and tracking Scope 3 emissions in the future.

11 https://www.epa.gov/climateleadership/simplified-ghg-emissions-calculator

Green Plains Inaugural Sustainability Report (link here)

ESG Highlights

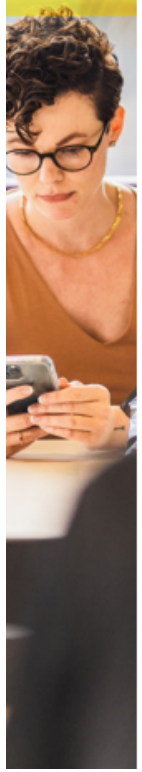
	WHERE WE ARE (2020/2021) PROGRESS SINCE 2018	WHERE WE ARE GOING (2021 AND BEYOND)
Emissions and Air Quality*	**22%** reduction in total GHG emissions (kg CO_2) per gallon of ethanol produced As of April 2021, 70% of platform committed to carbon offtake agreement with Summit Carbon Solutions	— Science-based target of 50% reduction in operational emissions from 2018 baseline by 2030 and 100% reduction by 2050 — Considering methods of calculating Scope 3 emissions — Reduce other air permit deviations 60% by 2025 compared to 2020 baseline
Energy Use*	**40%** reduction in off-site electricity GHG emissions (kg CO_2) per gallon of ethanol produced **12%** reduction in on-site natural gas GHG emissions (kg CO_2) per gallon of ethanol produced	— Developing goals to further increase energy efficiency — Clean energy: Contribute to the production of low carbon-intensity renewable diesel via a 50% increase in renewable corn oil yield by 2025 over 2020 baseline — Incorporating additional energy efficiency projects into our Capital Plan, such as Variable Frequency Drives (VFD)
Water and Effluents*	**19%** reduction in gallons of water used per gallon of ethanol produced	— Developing goals to increase total water recycled — Reduce water permit deviations 50% by 2025 compared to 2020 baseline
Land Stewardship and Environmental Compliance	**100%** US domestic feedstock sourced within trucking distance **55%** of feedstock originated directly from the farmer	— Achieve 60% origination from the farmer in 2022, an increase of 5% from 2020 — Exploring ways to gain a line of sight from the fields to our facilities[9]

9 At two of our ethanol plants, we contract with a third-party grain originator to supply the corn necessary for ethanol production. These contracts terminate in November 2023, which, if not renewed, would allow us to further increase direct origination of corn.

* Emissions and Air Quality, Energy Use, and Water and Effluents metrics are reductions realized (between 2015-2019 for Emissions and Air Quality and Energy use and between 2017-2019 for Water and Effluents) on a per gallon basis at the first three facilities that had Project 24 upgrades completed by June 2020 and assume a full production run-rate. They may not reflect total enterprise environmental data due to reduced run-rates or plant idling (i.e., when a plant is only running at 60% production). See page 24 for more details on Project 24.

Green Plains Inaugural Sustainability Report (link here)

Social



	WHERE WE ARE (2020/2021) PROGRESS SINCE 2018	WHERE WE ARE GOING (2021 AND BEYOND)
Workforce Equality, Diversity and Inclusion	— Hired **new Chief People Officer** with extensive experience in diversity and workplace culture	— Increase the number of female employees 25% from 2020 numbers by 2030 — Increase the number of employees who add diversity to our workforce by 15% from 2020 numbers by 2030 — Enhancing goals and plans on talent management, leadership training, and diversity, equity and inclusion
Employee Health and Safety	— Safety metric included in executive compensation plan — Occupational Health & Safety Policy adopted in September 2021	— Reduce OSHA TRIR by 35% by 2025 compared to 2020 baseline — Implement cardinal rules of environment, health, safety and security (EHSS)
Customer Health and Safety	— **100%** of products are subject to either a Certificate of Analysis process, feed tag with guarantee, and/or other type of Quality Assurance document — Audited by the U.S. Food and Drug Administration (FDA) regarding compliance with the Food Safety Modernization Act (FSMA). None of our facilities received negative findings.	— Implementation of Quality Management System (QMS) and corresponding Quality Procedures at all facilities equipped with Fluid Quip's MSC™ — No findings on FDA Audit for FSMA program. — Quality Deviation Report (QDR) and Corrective Action and Preventative Action (CAPA) program/tools and training for all employees working at facilities equipped with Fluid Quip's MSC™ — Establishment of KPI to track % of shipped products that meets feed tags, Certificate of Analysis (COA) and/or other product specifications
Supplier Relationships	— **100%** of non-corn suppliers screened using social criteria — Code of Vendor Conduct adopted in May 2021 — Resumed customer appreciation days in 2021 — Shipped 68% of biorefinery volume by bulk transport (rail or barge) in 2020, exceeding goal of 50%	— Maintain 50% bulk shipping goal (rail and barge) instead of truck to lower our CI scores and reduce Scope 3 emissions — Find carriers that will use backhauls instead of deadheading (hauling from terminals to our biorefineries) to reduce Scope 3 emissions between 3-20%[10]
Communities	— **100%** of our operations have implemented environmental impact assessments and ongoing monitoring via EPA's Risk Management Program and our Process Safety Management policy and procedure — Infused over **$1 billion** into local communities near our biorefineries via grain purchases in 2020, including over $450 million in direct purchases from area farmers. — Donated $1.6 million in 2020*	— Increase donations and sponsorships by 10-20% from 2021 to 2022 — Invest in 10 employee-led new priorities for donations in 2022 (in addition to existing priorities) — Dedicate 2,000 hours of volunteering company-wide in 2022

10 Lin, Dung Ying and Nig, Kuok Hou. (December 2021). "The impact of collaborative backhaul routing on carbon reduction in the freight industry." Transportation Research Part D: Transport and Environment, Volume 17, Issue 8, pp. 626-628.

* Includes $1.3 million in alcohol donations as noted later in the report.

Green Plains Inaugural Sustainability Report (link here)

	WHERE WE ARE (2020/2021) PROGRESS SINCE 2018	WHERE WE ARE GOING (2021 AND BEYOND)
Board Composition And Structure	— Ongoing Board refreshment and diversity initiative — Appointed first female director — Appointed a Lead Independent Director in September 2021 — Adopted new Board Governance Guidelines — Company Bylaw improvements concerning shareholder rights — Adopted a new Diversity & Qualifications Policy	— 2 female board members and one board member who adds diversity by 2022 — 33% of Board members gender/ethnically diverse by 2022 annual meeting
Ethics and Compliance	— Updated and improved Anti-Corruption Policy formalized in May 2021 — Human and Labor Rights Policy adopted in May 2021 — Initiated a new Vendor Screening program in 2021, screening 7,558 foreign and domestic vendors and suppliers against 63 different watches, sanctions and most-wanted lists, including key human rights list	— By 2022, 100% of Green Plains employees will be trained on Code of Ethics, Anti-Corruption and Human and Labor Rights policies