Green Plains

Ingredients that matter

Jefferies
Virtual Industrials Conference

August 3-4, 2021

Forward-Looking Statements

This presentation includes forward-looking statements that reflect management's current views of company performance, industry conditions and future economic environment. These statements are based on assumptions and various factors that are subject to risks and uncertainties. Green Plains has provided additional information about such risks and uncertainties that could cause actual results to differ materially from those expressed or implied in its reports filed with the Securities and Exchange Commission.

Forward-looking statements are made in accordance with safe harbor provisions of the Private Securities Litigation Reform Act of 1995. These statements are based on current expectations which involve a number of risks and uncertainties and do not relate strictly to historical or current facts, but rather to plans and objectives for future operations. These statements include words such as "anticipate," "believe," "continue," "estimate," "expect," "intend," "outlook," "plan," "predict," "may," "could," "should," "will" and similar words and phrases as well as statements regarding future operating or financial performance or guidance, business strategy, environment, key trends and benefits of actual or planned acquisitions.

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Our Transformation is Underway . . .

- **Green Plains (GPRE)** is transforming from traditional ethanol into a **sustainable biorefinery platform**, innovating through ag technology to produce higher-value products with stable cash flows, for tomorrow's sustainable economy
- Investments in critical technology, infrastructure and strategic partnerships are driving progress to accelerate the transformation into the **Biorefinery Platform of the Future**
- Our transition into highly specialized production aims to meet the world's demand for sustainably sourced products, low carbon ingredients and cleaner technologies
- **GPRE** is a $1.7 billion[1] market capitalization company transforming agriculture and energy supply chains



[1] Source: Bloomberg as of 8/2/2021

… to a Sustainable Future

Tracking our Transformation Through Milestones

Milestones Completed

- ☑ Partner with Novozymes in protein production
- ☑ Ultra-High Protein production begins at Shenandoah biorefinery
- ☑ Complete $75 million loan facility
- ☑ Breaks ground at second high protein project at Wood River biorefinery
- ☑ Sell Cattle for $80 million
- ☑ Form exclusive partnership with Hayashikane
- ☑ Complete sale of Hereford and Ord plants
- ☑ Acquire majority stake in Fluid Quip Technologies with Ospraie and BlackRock
- ☑ Completes York USP Upgrade
- ☑ Announce Clean Sugar project at York Innovation Center
- ☑ Partner with funds and accounts managed by BlackRock to provide financing to fund transformation plan
- ☑ Announce carbon sequestration partnership with Summit Carbon Solutions
- ☑ Complete concurrent offerings of common stock and convertible senior notes due 2027 (Fully funded)

Key Milestones

- ☑ Announce Fagen, Inc. as general contractor to accelerate protein construction
- ☑ Announce construction sequence and begin MSC rollout across platform
- ☑ **Begin Clean Sugar production at York Innovation Center**
- ☐ Begin Ultra-High Protein production at Wood River, further developing recurring earnings and cash flow
- ☐ Complete Project 24, reducing costs and carbon footprint
- ☐ Commercial agreements for 58%+ Protein, moving up “J-curve” for margins
- ☐ Achieve 60%+ Ultra-High Protein production
- ☐ Commercialize MSC protein technology to third-party plants
- ☐ Select and begin conversion to Clean Sugar Technology, first “Biorefinery Platform of the Future”
- ☐ Develop new innovations in proteins, yeasts, oils, aquafeed, and clean sugar
- ☐ Develop strategic partnerships aligning with Green Plains 2.0
- ☐ Begin carbon sequestration pipeline construction
- ☐ Begin sequestering carbon, reducing CI of biorefinery platform

We Have Created a Powerful Ag Tech Platform

Acquisition and partnerships accelerate technology deployment

FLUID QUIP TECHNOLOGIES

- The company owns significant intellectual property and is one of the only commercially proven sustainable ultra-high protein technologies for dry mill production facilities
- Successful operational track record: proven deployment of technologies with notable existing engagements has led to consistent growth
- Enables Green Plains to accelerate their transformation and allows the Company to focus on higher value proteins and clean sugars
- Supported by a wide patent portfolio with more patents pending

MSC™



Maximized Stillage Co-Products™

CST™



Clean Sugar Technology™

Flex Plant™



Flex Plant Technology™

BOS™



Brix Oil Separation System™

Green Plains

BlackRock / Ospraie MANAGEMENT, LLC

- The partnership forms a powerful ag tech alliance to focus on innovation, value-added opportunities and sustainability
- Drives acceleration of transformation through access to new strategic partnerships and customers on a global scale
- Leverages Green Plains' scope and scale to create value-added opportunities in key ingredients, redefining investment in biorefining industry world-wide
- Provides further validation of Green Plains' strategy and helps to accelerate sustainable ultra-high protein and clean sugar technology deployment

Fluid Quip's technology portfolio facilitates Green Plains' transformation with many future possibilities

Introducing the Biorefinery Platform of the Future

Our acquisition of Fluid Quip Technologies, combining exclusive partnerships with BlackRock & Ospraie

Our biorefineries' role in whole kernel solutions

- Fluid Quip provides the cornerstone technology for our sustainable transformation, creating a powerful ag tech platform
- Transforms the commodity into its most valuable components – proteins, oils, sugars
- Integrated with key technology players through exclusive partnerships to drive a collaborative transformation of our business
- Production of higher protein with better renewable corn oil yields, optimizing valued components

Strategic Partnerships

Aligned with experts to maximize value across various product lines

MSC™ Protein Technology



Upgrade to sustainable protein technology across the platform providing value-added ingredients and expanded corn oil production

Clean Sugar Technology™



Deploy technology, to provide industrial sugars for use in ag tech, biotech and synthetic biology markets

Carbon Capture and Sequestration



Initiative to reduce carbon intensity for biofuel and ingredients with option to co-invest in the pipeline, further benefiting from project economics

Five Main Verticals in Addition to 1.0 Platform

- **Sustainable Ultra-High Protein** - sustainable ingredients for high-value global markets in pet, aquaculture, dairy and poultry industries
- **Renewable Corn Oil** – responsible low carbon feedstock for high-growth renewable diesel industry
- **Specialty Alcohol** – high purity alcohol for use in cleaners, sanitizers, disinfectants and beverage industries
- **Clean Sugar Technology** – clean dextrose for a variety of biochem, bioplastics, synthetic biology, and food industries
- **Carbon Capture & Sequestration** – building one of the largest carbon capture and storage (CCS) platforms in the world with Summit Carbon Solutions (SCS)

SUSTAINABLE ULTRA-HIGH PROTEIN



RENEWABLE CORN OIL



SPECIALTY ALCOHOL



CLEAN SUGAR

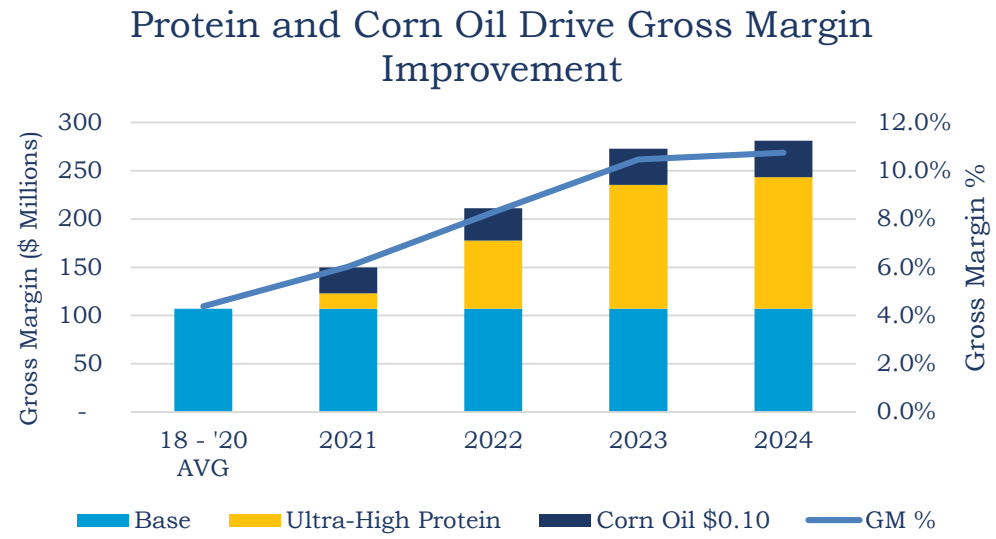


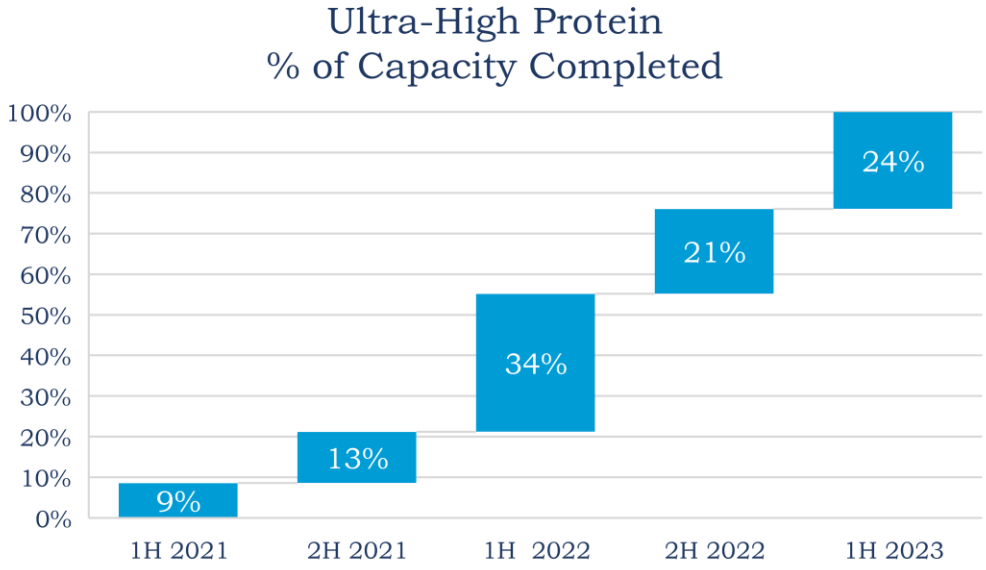
CARBON CAPTURE & SEQUESTRATION



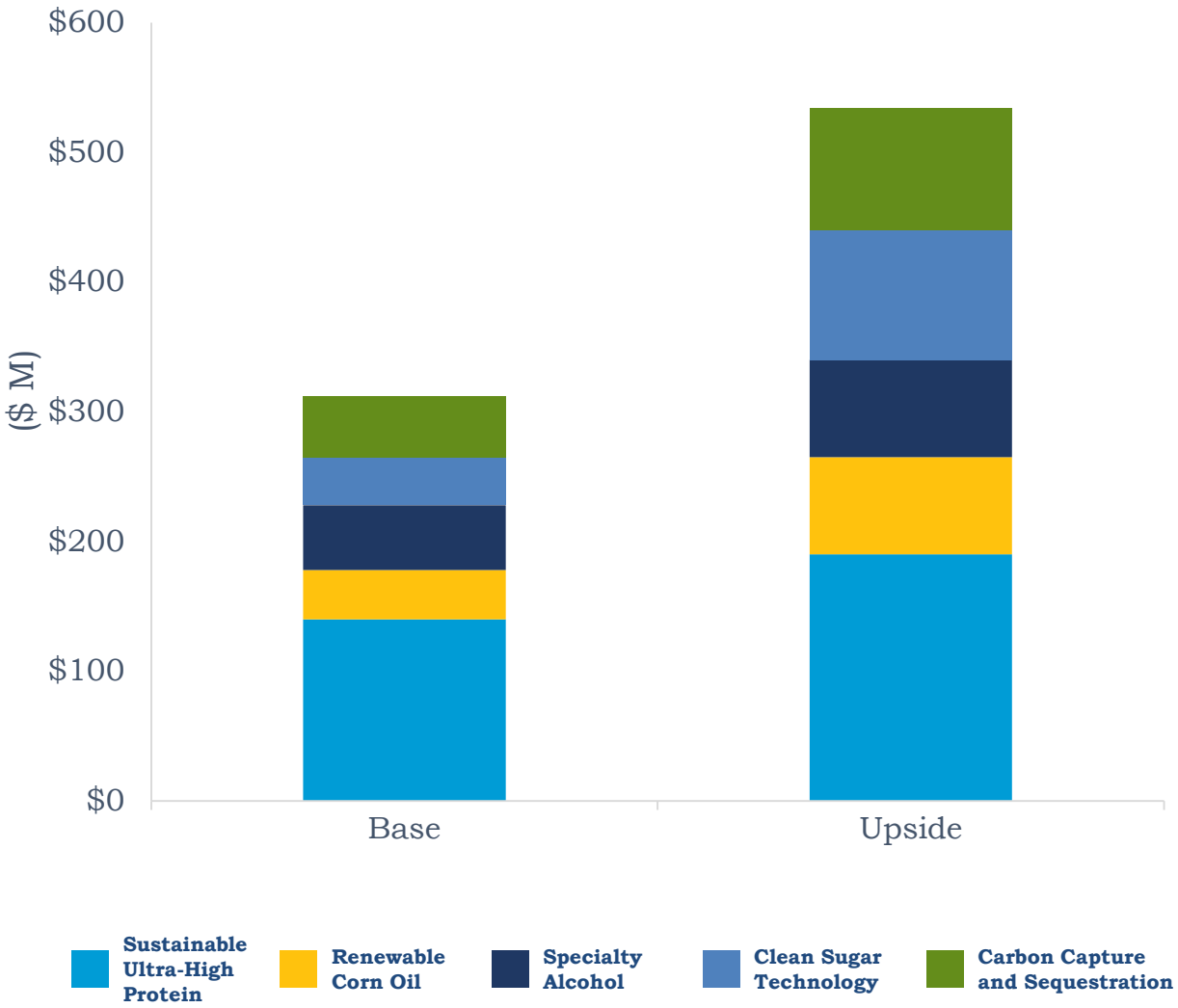
Protein Drives a Transformation Inflection Point …

- As Ultra-High Protein is deployed, our platform transitions to potentially higher gross margins, even prior to potential uplift from the J-curve
- Over 50% of platform is anticipated to be converted by mid 2022
- Platform anticipated to transition to double digit gross margin %
- At capacity, Ultra-High Protein could add ~$140 million of additional gross margin by 2024 at $0.15/gallon
- At capacity, each $0.10 / lb uplift in renewable corn oil pricing adds ~ $40 million
- Specialty Alcohol, Clean Sugar Technology and Carbon Capture and Sequestration can further enhance Gross Margins
- With moderate uplift from specialty alcohol, CST and CCS, gross margins could well exceed 14%





… Toward Our 2024E* Run-Rate EBITDA



Assumptions

- Assets produce at 95% of capacity on 958 MGY of capacity
- Potential contributions from fuel ethanol business excluded

Sustainable Ultra-High Protein

- Protein capital investment of ~$400M based on 11 ethanol plants, with ~$340M remaining to be spent
- Protein crush margin uplift for base of $0.15 per gallon for 50% pro and upside of $0.21 per gallon for 53% pro, with potential to go higher
- Higher renewable corn oil yields at historical pricing is part of structural advantage of MSC technology and included in protein uplift

Renewable Corn Oil

- Increased pricing of $0.10 per pound to $0.45 with upside of $0.20 per pound to $0.55, with potential to go higher
- Renewable corn oil capacity increased by 50% to ~396 million pounds through deployment of sustainable Ultra-High Protein technology

Specialty Alcohol

- Premiums to fuel ethanol of ~ $0.66 per gallon for base with upside of $1.00 per gallon 75 MGY of specialty alcohol capacity

Clean Sugar Technology

- Clean Sugar Technology capital investment of ~ $1.00 per gallon of capacity converted
- Base assumes 55 MGY of capacity converted to CST with $0.67 per gallon uplift
- Upside assumes 150 MGY converted to CST with $0.67 per gallon uplift

Carbon Capture and Sequestration

- ***Beginning in 2025**, CO_2 offtake of 658 MGY of capacity with Summit Carbon Solutions pipeline at $0.15 per gallon before carbon credits with base assuming 50% online, and Upside assuming 100% online by end of 2024
- Opportunity to add carbon sequestration at remaining 300 MGY of capacity and the right to invest directly in the development company allow for potential additional upside

Sustainable Ultra-High Protein – Our New Product

Product Advantages

- Flexible protein concentration starting at 50%
- Animal free source: vegetable (75%) and fungal (25%)
- Cornerstone ingredient for developing new feed rations, freedom of formulation
- High digestibility and additional species-specific benefits improving animal health and performance

Continuous Product Development and Partnership Advantages

- Improved product characteristics through yeast enhancement
- Ongoing targeted removal of anti-nutritional factors
- Direct application into specialty feeds and premixes through innovative aquafeed solutions
- Value multiplier through combinations with other proprietary technologies developed through Optimal Aquafeed and strategic partnerships like Hayashikane



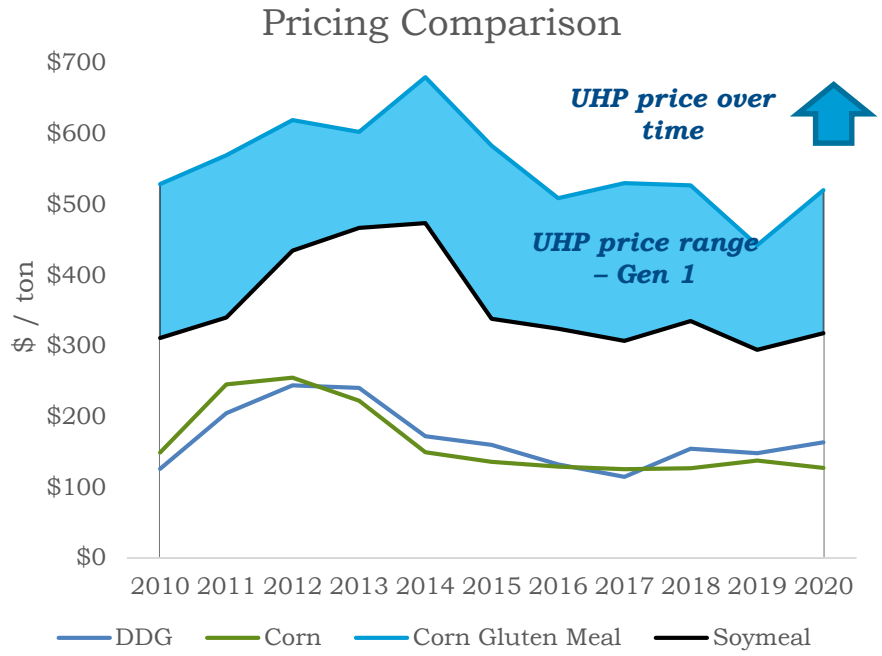


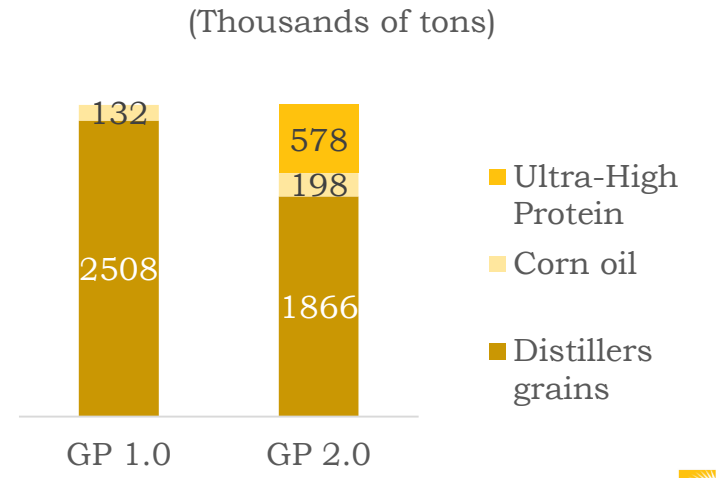
Protein Technology Generates Structural Uplift

Sustainable Ultra-High Protein

- **Biorefinery economics see significant improvement**
- Base Ultra-High Protein at 50% is valued at **~ 2.5x distillers grains values,** driven by traditional relationship between corn and soybeans.
- Ultra-High Protein is a high-value product for pet, dairy, poultry and aquafeed rations.
- Distillers Dried Grains (DDGS) historically price at corn-parity values, whereas MSC Protein prices at a premium, undergirded by 48% protein soybean meal prices
- **Fluid Quip's MSC™ is a market leading technology for protein enhancement, providing end product and capital efficiencies**
- Upon completion, Green Plains would produce ~ 0.6 million tons of Ultra-High Protein, assuming 3.5 pounds / bushel production
- The entire 17 billion gallon industry would only convert ~ 10 million tons annually of DDGS to Ultra-High Protein – less than 3% of the 350 mmt global protein meal market
- Fluid Quip's MSC also results in up to 50% increase in renewable corn oil yields, further demonstrating the value of this technology

Sources: Annual averages for corn, DDGS, SBM and CGM based on Chicago Board of Trade and USDA data.



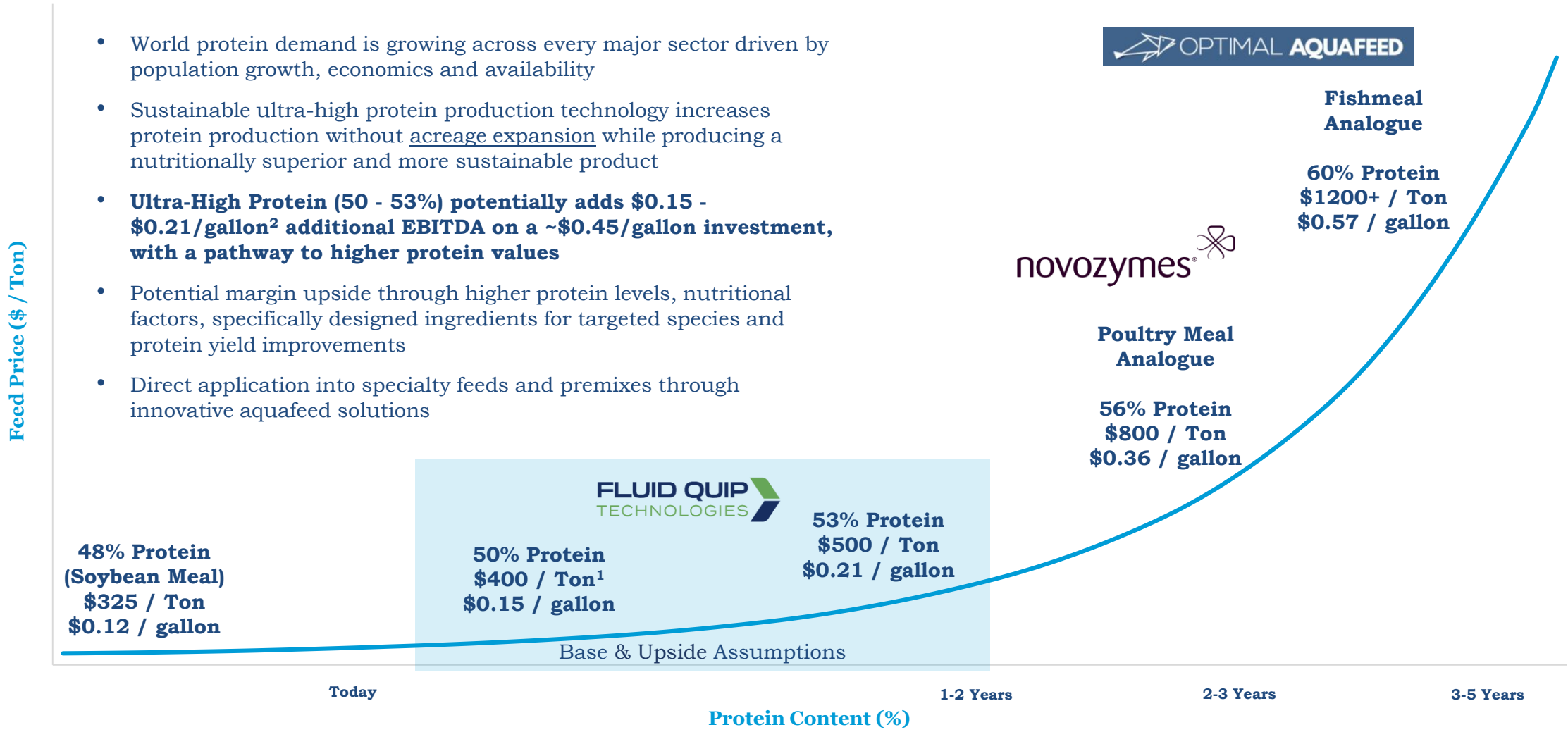


Creating Value Through Protein Innovation

Sustainable Ultra-High Protein

J-Curve of Protein Opportunity

- World protein demand is growing across every major sector driven by population growth, economics and availability
- Sustainable ultra-high protein production technology increases protein production without acreage expansion while producing a nutritionally superior and more sustainable product
- **Ultra-High Protein (50 - 53%) potentially adds $0.15 - $0.21/gallon[2] additional EBITDA on a ~$0.45/gallon investment, with a pathway to higher protein values**
- Potential margin upside through higher protein levels, nutritional factors, specifically designed ingredients for targeted species and protein yield improvements
- Direct application into specialty feeds and premixes through innovative aquafeed solutions



[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

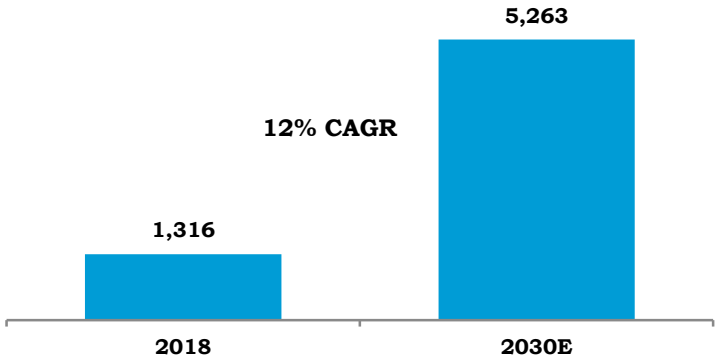
Corn Oil, A Responsible Renewable Diesel Feedstock

Renewable Corn Oil

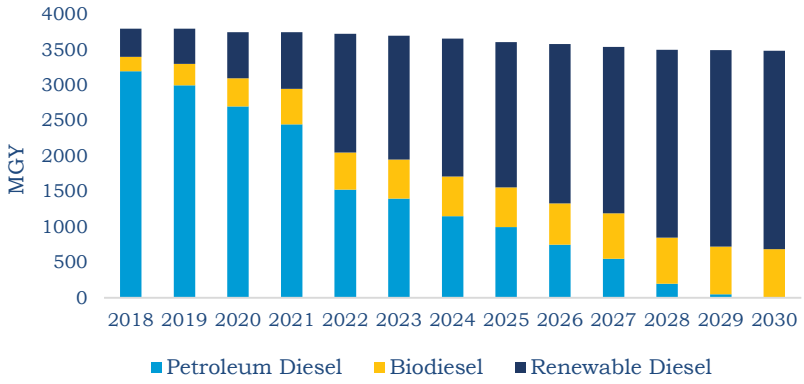
Renewable Corn Oil Demand Growth

Driven by sustainability initiatives, renewable corn oil volumes are growing exponentially with renewable diesel

Global Renewable Diesel Demand (MGY)



California Annual Diesel Demand Forecast



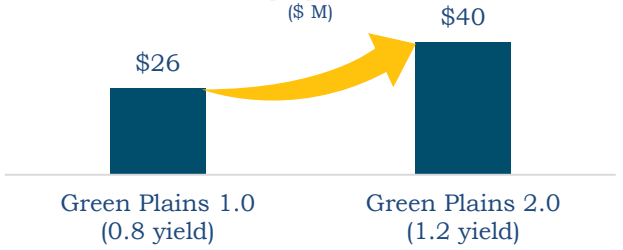
Source: California Advanced Biofuels Alliance, Wood Mackenzie

Taking Advantage of the Unique Drivers in Renewable Corn Oil

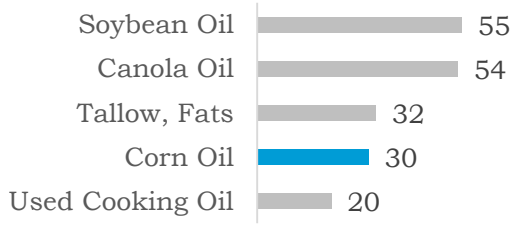
Renewable Corn Oil Price
(Cents per Pound)



Potential Renewable Corn Oil Margin Increase
Per $0.10 per pound increase
($ M)



Average CI Pathways for Biodiesel and Renewable Diesel Feedstock



Source: California Air Resources Board, Company Analysis of CARB pathways

- Fluid Quip's MSC™ protein technology enhances renewable corn oil yields, delivering a sustainable structural advantage over Green Plains 1.0
- Increase in renewable corn oil pricing driven by growth in renewable diesel production
- Assuming Renewable Diesel continues to expand in LCFS markets, we believe the low CI value of corn oil will translate into a premium to competing veg oils
- Each $0.10 per lb. increase in renewable corn oil price represents a lockstep ~$40M renewable corn oil EBITDA increase with planned production capacity expansion to 1.2 lbs. / bu.
- Upside to renewable corn oil pricing is 100% incremental margin as it is part of the core product process in ethanol production
- As an inedible waste oil, increased production of corn oil can be achieved without expansion of cropland acreage

Premium High-Purity, Specialty Alcohol

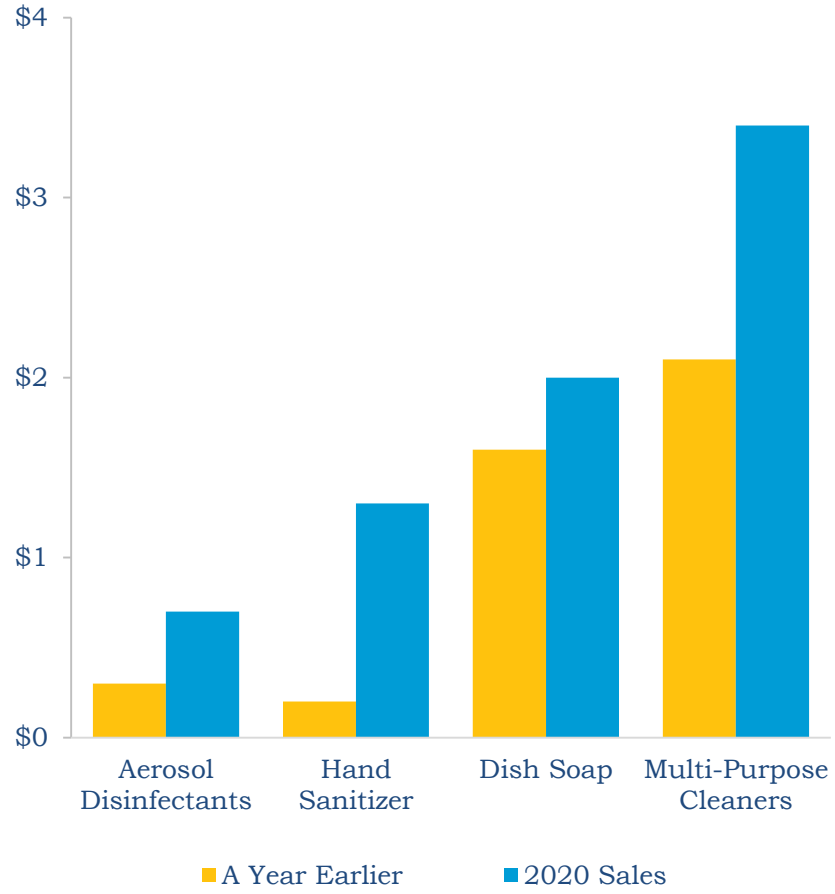
Industry Update

- Consumer demand for sanitizers and disinfectants has vastly accelerated with the ongoing COVID-19 pandemic and heightened consumer awareness of infection prevention
- Specialty alcohol demands are more sustainable and expected to be more permanent as increased cleaning and hand sanitizer use becomes increasingly normal

Green Plains Initiatives

- Green Plains expects specialty alcohol to provide stable free cash flow due to positive underlying trends
- York now produces United States Pharmacopeia (USP) grade alcohol with an annual capacity of 50 MGY, and is reviewing the timing to upgrade to Grain Neutral Spirits (GNS)
- Upgrading to GNS alcohol production at York would enable use in both pharmacy grade alcohol and beverage alcohol
- Long-term trend, customers will be selective in quality leading to a sustainable advantage for Green Plains

US Annual Sales of Cleaning Products ($bn)



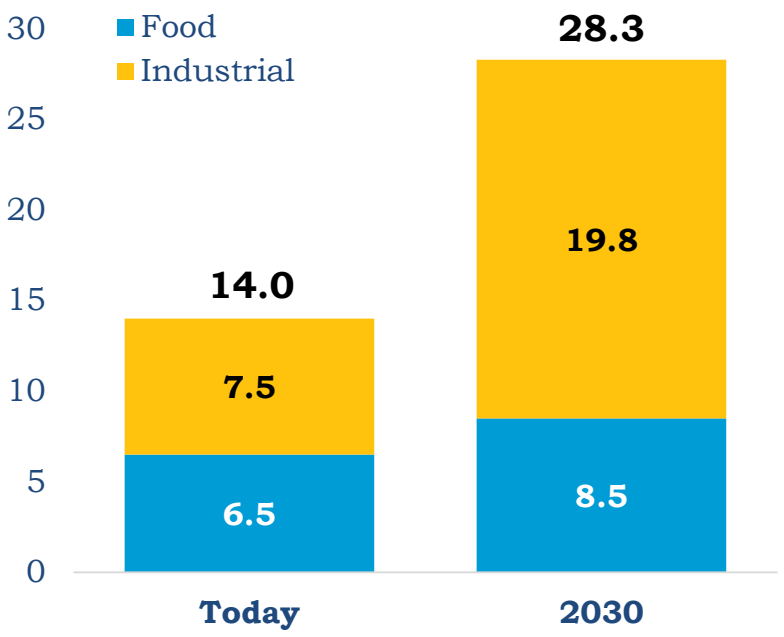
Source: Nielsen

Clean Sugar Market

- New sugar demand growth is being driven by biology focused companies who use sugar as a feedstock for their bio-processes
  - 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
- FQT is engineering and constructing a fully scalable commercial CST production facility at the York Innovation center
- CST uses proprietary separation equipment and systems to produce multiple specification, purity sugars to meet any customer's needs
  - 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 lower operating costs

Projected Glucose Demand

(billions lbs., wet)



Specialty Chemical and Material Markets Requiring Glucose / Dextrose

Total Addressable Market of $450 billion



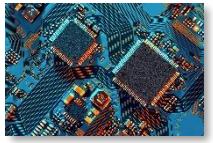
Specialty Polymers
~8% of market



Construction
~8% of market



Ind. Cleaners
~7% of market



Electronics
~7% of market



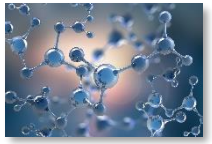
Surfactants
~6% of market



Flavors / Fragrances
~5% of market



Specialty Coating
~5% of market



Water Soluble Polymers
~5% of market



Catalysts
~5% of market



Oilfield Chemicals
~5% of market



Food Additives
~4% of market



Plastic Additives
~4% of market

Source: SynBioBeta, FQT analysis

Carbon Capture and Sequestration Initiatives

Carbon Capture and Sequestration

*Opportunity to **increase margins by $0.15 / gallon** with **no capital required** from the ethanol facilities, **in addition to potential for carbon credits, 45Q tax incentives and direct returns** on investments in the pipeline and Summit Carbon Solutions (SCS)*

Partnership	• Green Plains provides SCS with plant carbon dioxide for 12 years for an estimated ~658 MGY of capacity • Green Plains annual commitment is estimated to be ~1.9 million metric tons of carbon dioxide, the same amount of carbon sequestered by 2.3 million acres of U.S. forests in a year, according to the EPA. • SCS is responsible for pipeline construction, operation, carbon dioxide sequestration and all reporting requirements
Partnership Details	• Pipeline expected to begin operation in late 2024 • CCS 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
Direct Inject	• Additional margin opportunity exists through standalone projects at the three remaining Green Plains biorefineries

A Real ESG Story

Carbon Capture and Sequestration (CCS)

- ***Zero Carbon Footprint*** – With an opportunity to meter and sequester carbon, Green Plains can lead a zero-carbon footprint for the renewable fuels industry, creating one of the largest projects globally
- ***Lower CI Scores*** – Biofuels from plants with CCS comparable to other low CI fuels such as renewable diesel and Brazilian sugar cane
- ***LCFS Programs*** – Expanded market opportunity as LCFS programs spread to other states and countries, demand for low CI fuels can be supplied by Green Plains

MSC (Protein & Corn Oil) Technology

- ***Lower Carbon*** – +50% Increased Distillers Corn Oil (DCO) recovery –feedstock for production of renewable diesel and biodiesel end markets
- ***Lower Transportation Costs*** - Shipping a concentrated corn protein end- product vs whole kernel or traditional DDGS reduces shipping costs and carbon footprint
- ***Lower Land Use*** - Corn-based protein solutions reduces deforestation – no need to plant additional acres
- ***Reduce Stress of Oceans*** - Reduce reliance on fishmeal in aquaculture diets, lowering stress on ocean ecosystems
- ***Lower Emissions*** - Reduced BTUs per gallon of ethanol produced
- ***Further Sustainability*** - Zero Carbon Intensity (CI) high protein production possible by reclaiming ring dryer vapors

Clean Sugar Technology

- ***Lower Carbon*** - Reduced CI to produce sugar from dry mill relative to a wet mill
- ***Lower GHG*** - Sugars can be used in protein production such as plant-based burgers
- ***Sustainable and Renewable*** - Carbon used in green chemical production is derived from sustainable corn sugars vs carbon from petroleum

Project 24

- ***Lower Energy*** - Installation of Project 24 technology reduces gas use by 20% and power use by 20%
- ***Higher Efficiency*** - Lowers overall operating cost in terms of chemical use by 15%, water requirements by 10%, and increases renewable corn oil recovery by 10%

Measuring Our Global Impact

Provide less expensive, renewable biofuel alternatives to regular gasoline for consumers

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

Reduce the need to feed animals to animals and overfish our oceans

Improve the food system to be more secure with healthier livestock and aquacultures

Reduce need to further deforest land for agricultural purposes by using corn sustainably farmed and sourced locally





Investment Highlights

MSC™ Protein Fully Funded	• Strong balance sheet with **ample liquidity to execute our MSC™ protein strategy** • Fully funded implementation of MSC™ Ultra-High Protein technology across the platform
Sustainable Ag Tech	• Fluid Quip owns a significant disruptive IP portfolio that adds value to several ag processing disciplines • Technology in higher value **proteins and clean sugar are "game changers" for Green Plains' portfolio** • Diversify products into more stable and valuable margin streams, reducing reliance on biofuels • Technology helps build a **structural advantage in renewable corn oil** to provide feedstock to the growing renewable diesel industry
ESG Focused	• Transforming to be a world-class provider of sustainable Ultra-High Protein, renewable corn oil and novel feed ingredients, and closed loop and sustainable biofuels with a focus on lowering the carbon footprint • **Carbon capture and sequestration project supports lower carbon intensity** for our biorefinery platform
Innovation & Higher Margin Opportunity	• Control of technology enables development and monetization of high value, on trend technologies • Cultivating **strategic partnerships to help drive innovation** across our platform – Ultra-High Protein with a "J-curve" opportunity for higher margins • York Innovation Center and Shenandoah Aquaculture Center allow for development and validation of new solutions with key customers and continued creation of game changing IP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Glossary

- **BOS** – Brix Oil Separation System
- **CCS –** Carbon Capture and Storage
- **CI –** Carbon Intensity
- **CST** – Clean Sugar Technology
- **DDG** – Dried Distillers Grains
- **FQT** – Fluid Quip Technologies
- **GPRE** – Green Plains Inc.
- **GPP** – Green Plains Partners
- **LCFS** – Low Carbon Fuel Standard
- **MGY** – Million Gallons per Year
- **MSC** – Maximized Stillage Co-Products
- **SCS** – Summit Carbon Solutions
- **USP** – United States Pharmacopeia