

Green Plains

Ingredients that matter

# Stephens Annual Investment Conference

November 16-17, 2022

# 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.

Factors that could cause actual results to differ from those expressed or implied are discussed in this report under "Risk Factors" or incorporated by reference. Specifically, we may experience fluctuations in future operating results due to a number of economic conditions, including: disruption caused by health epidemics, such as the COVID-19 outbreak; competition in the ethanol industry and other industries in which we operate; commodity market risks, including those that may result from weather conditions; financial market risks; counterparty risks; risks associated with changes to government policy or regulation, including changes to tax laws; risks related to acquisitions and disposition activities and achieving anticipated results; risks associated with merchant trading; risks related to our equity method investees and other factors detailed in reports filed with the SEC.

We believe our expectations regarding future events are based on reasonable assumptions; however, these assumptions may not be accurate or account for all risks and uncertainties. Consequently, forward-looking statements are not guaranteed. Actual results may vary materially from those expressed or implied in our forward-looking statements. In addition, we are not obligated and do not intend to update our forward-looking statements as a result of new information unless it is required by applicable securities laws. We caution investors not to place undue reliance on forward-looking statements, which represent management's views as of the date of this report or documents incorporated by reference.

This presentation also includes estimated projections of future operating results. This information is not fact and should not be relied upon as being necessarily indicative of future results; the projections were prepared in good faith by management and are based on numerous assumptions that may prove to be wrong. Important factors that may affect actual results and cause the projections to not be achieved include, but are not limited to, risks and uncertainties relating to the company and other factors described under "Risk Factors" sections of the Company's Annual Report on Form 10-K . Actual results may differ materially from those contained in the estimates. Accordingly, there can be no assurance that the estimates will be realized.

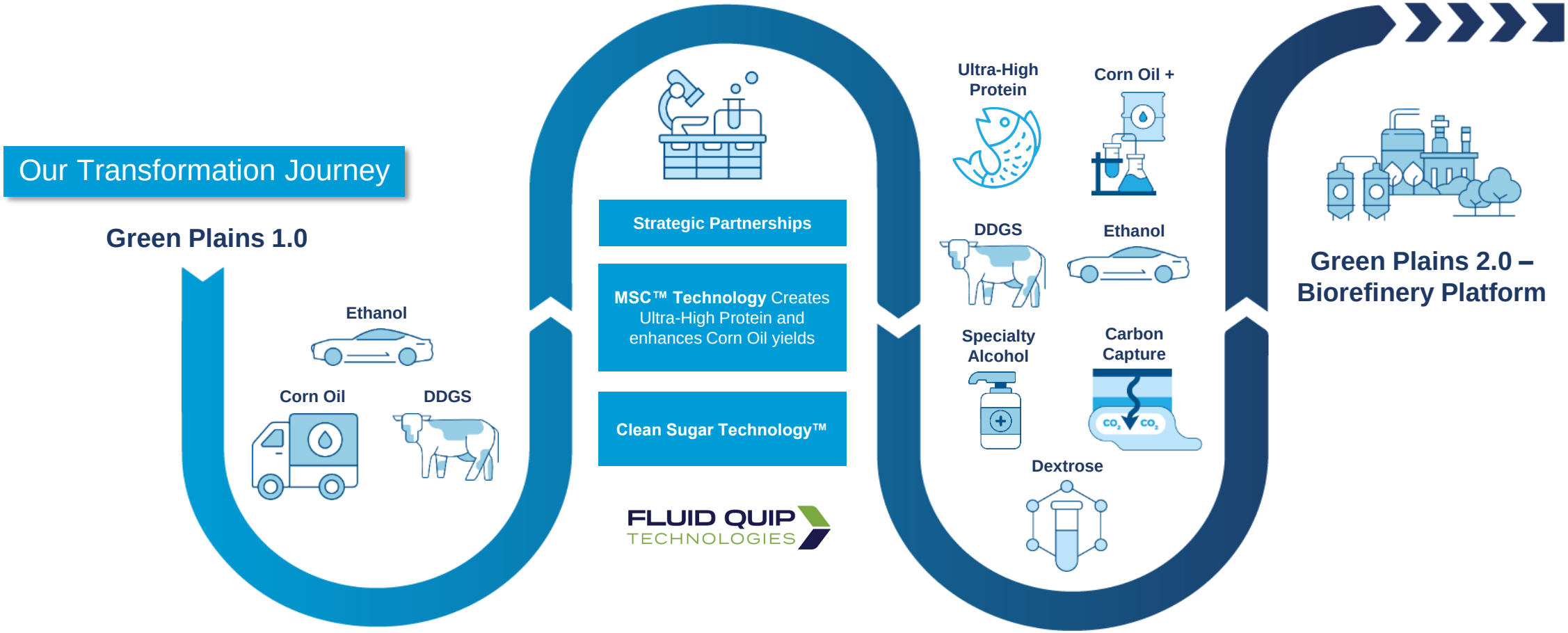
Neither the SEC nor any other regulatory body has passed upon the accuracy or adequacy of this presentation. Any representation to the contrary is a criminal offense. Except as otherwise indicated, this presentation speaks as of the date hereof. The delivery of this presentation shall not, under any circumstances, create any implication that there has been no change in the affairs of the company after the date hereof.

Certain of the information contained herein may be derived from information provided by industry sources. While the company believes that such information is accurate and that the sources from which it has been obtained are reliable, it has not independently verified data from these third-party sources.

# Transforming to the Biorefinery Platform of the Future

**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

## Our Transformation Journey




Investments in essential technology, infrastructure and strategic partnerships are creating our ***AgTech platform for sustainable ingredients***

# Transforming Our Business in Four Strategic Areas

Positioned to capitalize on rapidly growing demand

- **Sustainable Ultra-High Protein** – sustainable ingredients for high-value global markets in pet, aquaculture, dairy, swine and poultry industries
- **Renewable Corn Oil** – responsible low carbon feedstock for the high-growth renewable diesel industry
- **Clean Sugar Technology** – clean dextrose for a variety of biochem, bioplastics, synthetic biology, and food industries – with 'bio-revolution' driving growth
- **Carbon Capture & Sequestration** – participating in one of the largest carbon capture and storage (CCS) platforms in the world with Summit Carbon Solutions (SCS) – potential for direct injection systems at Obion, Mount Vernon and Madison locations



MSC ULTRA HIGH PROTEIN



RENEWABLE CORN OIL



CLEAN SUGAR TECHNOLOGY



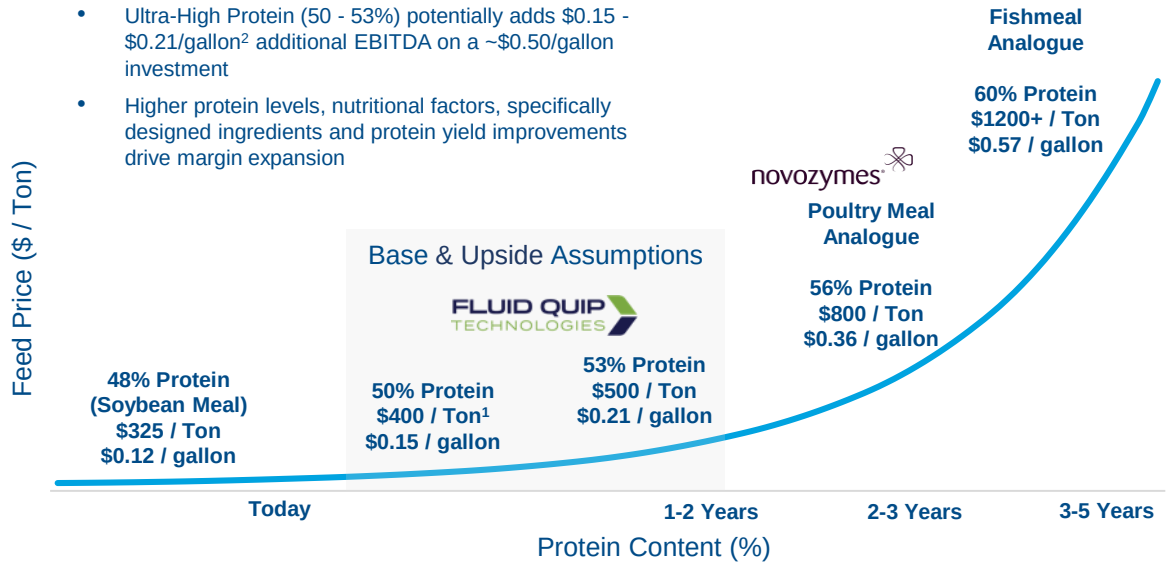

CARBON CAPTURE & SEQUESTRATION

# MSC™ Technology Drives an Inflection

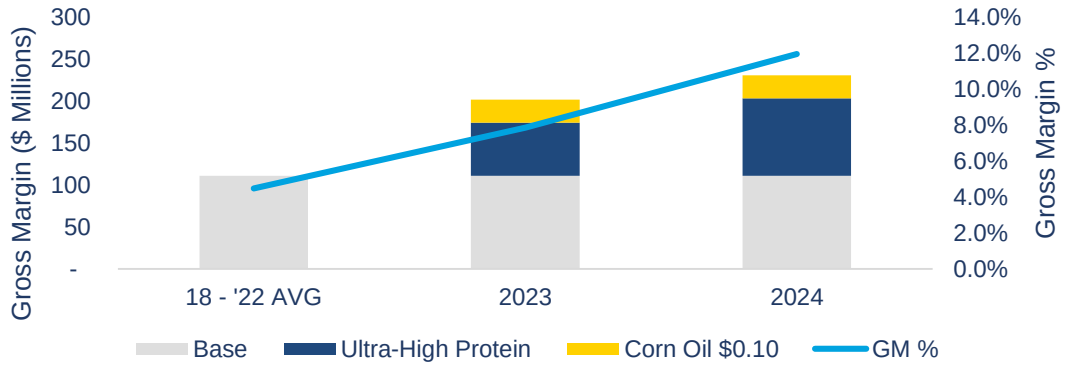
- Biorefinery economics see significant improvement through deployment of MSC™ technology
- **50% uplift in renewable corn oil yields** – the most valuable component of corn today
- **~20% of DDGS mechanically separated into high-value Ultra-High Protein**
- Over 50% of our platform is anticipated to be converted by the end of 2022
- At capacity, Ultra-High Protein technology **could add over $150 million of additional earnings power by the end of 2024**
- Potential uplift from higher protein values and additional growth initiatives could further enhance gross margins

## Increased Protein Upside

- Ultra-High Protein (50 - 53%) potentially adds $0.15 - $0.21/gallon[2] additional EBITDA on a ~$0.50/gallon investment
- Higher protein levels, nutritional factors, specifically designed ingredients and protein yield improvements drive margin expansion




## Protein and Corn Oil Drive Gross Margin Improvement

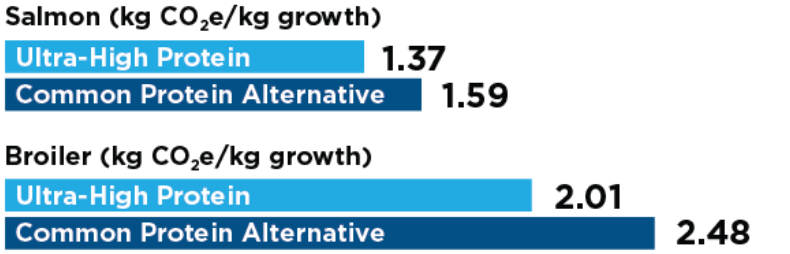


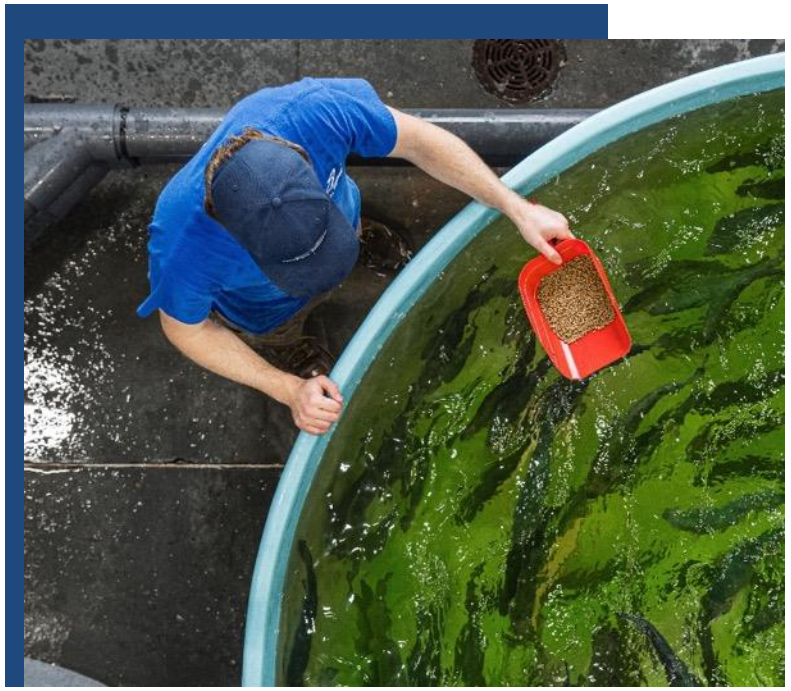

[1]Value per ton of protein is based on underlying Dried Distiller's Grain (DDG) of $150 per ton and should be adjusted based on current DDG values.
[2]Upon reaching redundant scale and moving through commercial contracting year and inclusive of 50% improvement in corn oil yields at historical pricing.

# Ultra-High Protein Contributes to the Circular Economy

- Ultra-High Protein significantly improves the value of the coproduct stream at our biorefineries
- Combination of plant based protein and yeast delivers **renewable protein source** with favorable amino acid profile, good taste and positive health benefits
- **Lower carbon intensity** than comparable protein source
- Unique opportunity to become key supplier of high-quality, plant-based aquafeed for land-based recirculating aquaculture systems
- Potentially reduces demand for fish meal in fish feed formulations while positively impacting fish in / fish out ratio of aquafeeds
- **Aquafeed partnership with Riverence** – largest trout producer in the Americas - anticipated to be operational in 2023

**Carbon Footprint of Ultra-High Protein vs Common Protein Alternative**

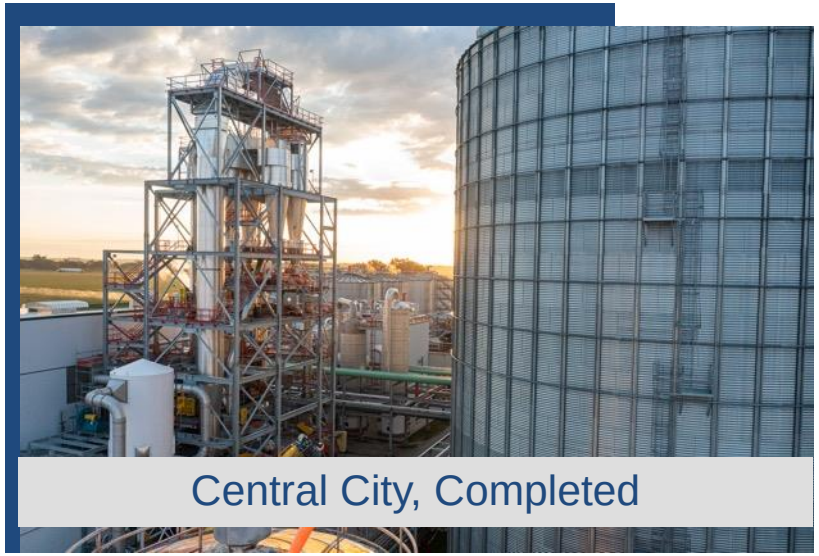


Source: Green Plains 2021 Sustainability Report

# Transformation on Track for Over 50% Completed in 2022

- Five plants representing ~ 560 MGY of ethanol capacity to have MSC technology completed by year end
- MSC at Central City is completed; Mount Vernon and Obion commissioning in Q4
- Annual Ultra-High Protein capacity of ~ 330,000 tons in 2023
- Renewable corn oil uplift from MSC technology begins during commissioning, prior to full protein production coming online
- Construction at our joint venture partner, Tharaldson Ethanol, is underway
- MSC deployment at addition Green Plains' locations planned for 2023 and 2024



Central City, Completed

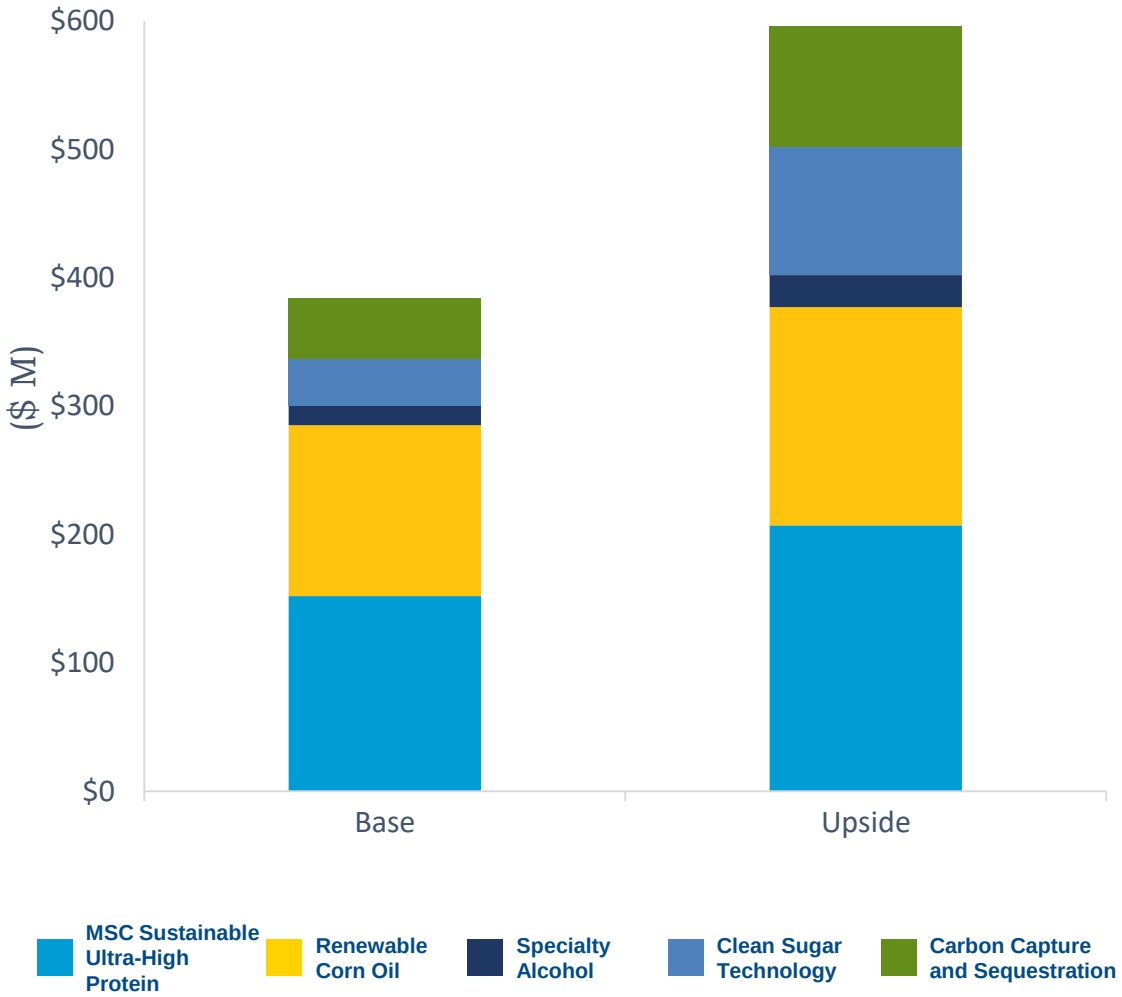


Mount Vernon, October 2022



Obion, October 2022

# Assumptions for 2024 Ending* 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

**MSC Sustainable Ultra-High Protein and Turnkey Initiatives**

- Protein crush margin uplift of $0.15 to $0.21 per gallon
- DCO Tech at Superior and Ottertail included here as a precursor to full MSC technology deployments
- Higher renewable corn oil yields are part of structural advantage of MSC technology and included in protein uplift

**Renewable Corn Oil**

- Assumes gross price of $0.70 to $0.80 per pound, ($0.55 to $0.65, net)
- 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**

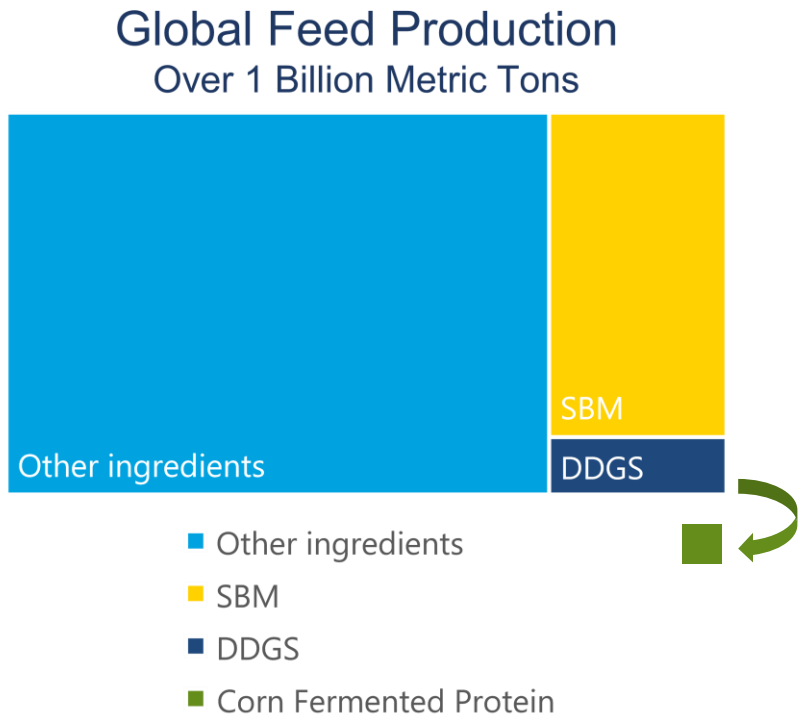
- Capital investment of ~ $1.00 per gallon of capacity converted
- 55 MGY to 150 MGY converted to CST with $0.67 per gallon margin uplift

**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 opportunities at 3 Eastern plants and potential upsides from IRA bill

# Significant Opportunity to Commercialize Value-Added Ingredients

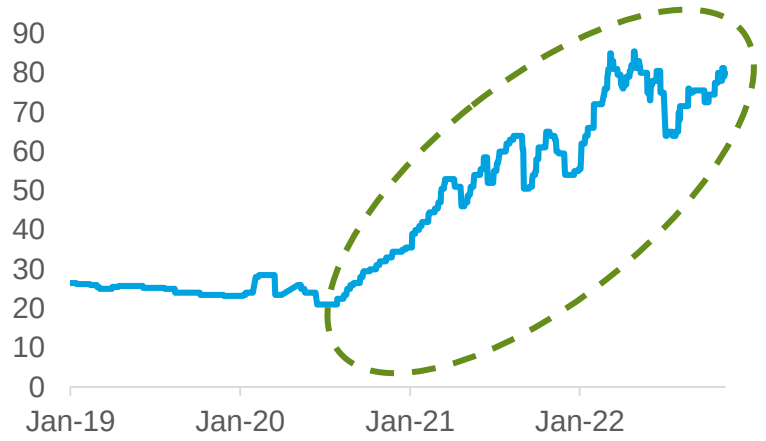
- Strong commercial sales team with deep industry experience building a robust customer pipeline
- Numerous ongoing customer dialogues including recent **25% increase in volumes to pet space in 2023**
- Innovation Centers drive further product development
- Targeting aqua, swine, poultry, dairy and pet segments
- **~14 MMT total opportunity driven by conservative inclusion rates** – our total capacity represents less than 5% of the opportunity
- Total dry mill industry has only ~ **8 MMT** of corn fermented protein capacity which would reduce DDGS capacity by an equivalent amount
- Green Plains platform capacity of ~ **0.6 MMT**



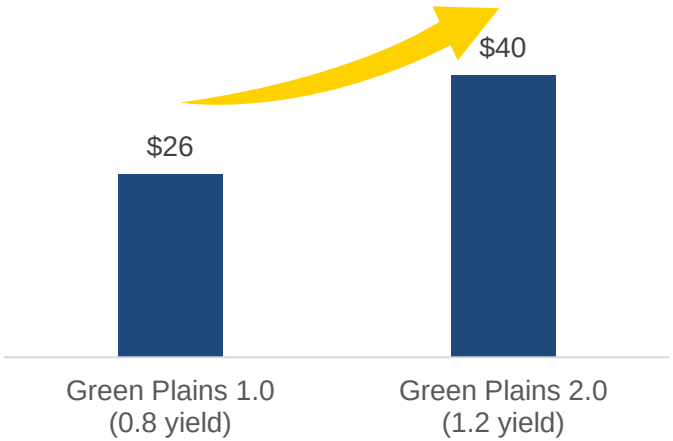

Source: 2021 Alltech Global Feed Survey, USDA, Company analysis

# Taking Advantage of the Unique Drivers in Renewable Corn Oil

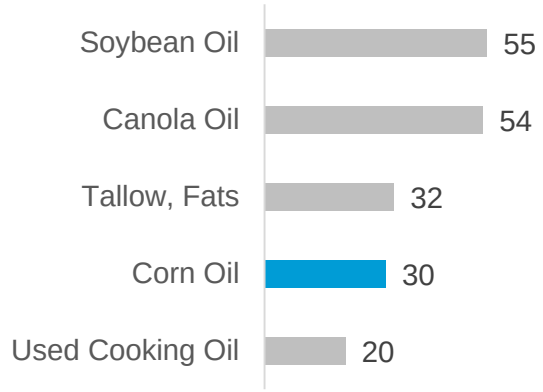
**Renewable Corn Oil Price [1]**
(Cents per Pound)




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




**Average CI Pathways for Biodiesel and Renewable Diesel Feedstock [2]**




- MSC™ technology delivers a **sustainable structural advantage** in corn oil yields over Green Plains 1.0
- 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 pound increase in renewable corn oil price represents a lockstep ~$40M increase in EBITDA from renewable corn oil with planned improvements in efficiency to 1.2 pounds per bushel**
- Fluid Quip now offering DCO Technology™ to broader industry to produce higher corn oil yields

[1] Source: Jacobsen through Nov 10, 2022
[2] Source: California Air Resources Board and company analysis of CARB pathways

# Fluid Quip Technologies | Sustainable Industry Solutions

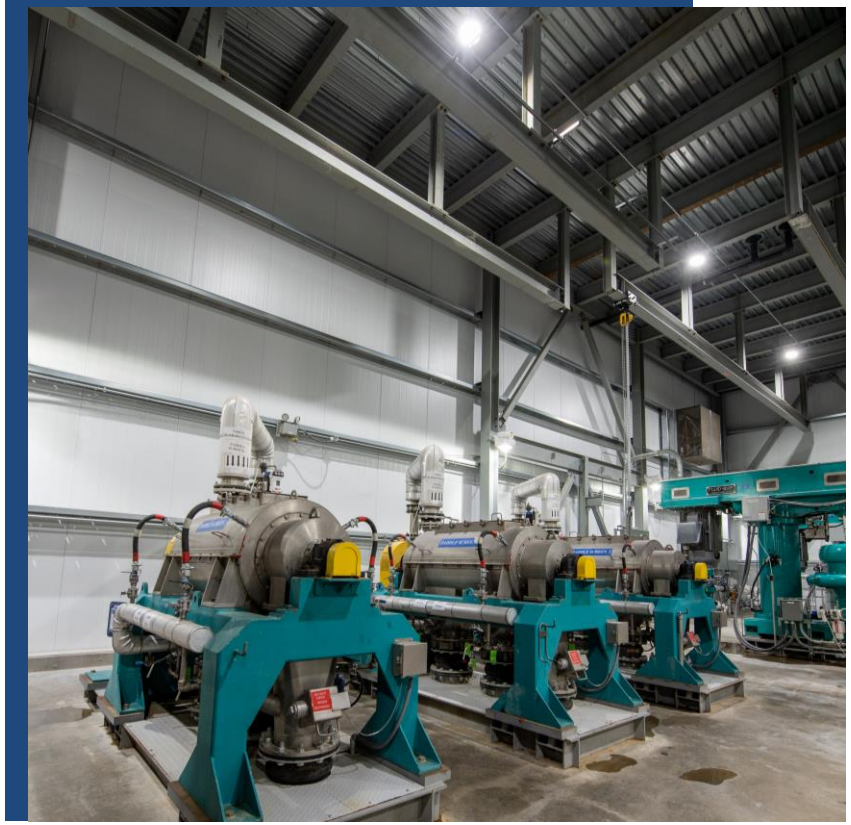
Offers design, engineering and technology to the industry

**DCO Technology™**

- FQT's latest offering, DCO Technology, provides the industry with a bolt-on investment in increasing renewable corn oil recovery
- Works as precursor to a full MSC system and provides similar oil yield benefits
- Supported by rapidly-growing demand from the renewable diesel industry for low-CI feedstocks such as DCO
- At current corn oil pricing, the projects have a < 2 year payback

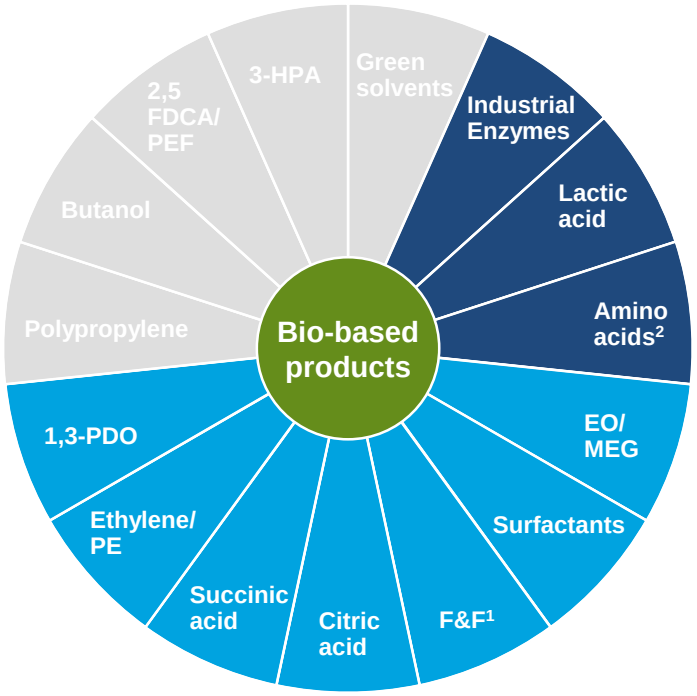
**FQT can customize sustainable solutions using core technologies and engineering solutions including the application of various patented technology systems**

- Selective Grind Technology™
- Brix Oil Separation™
- MSC Technology™
- Clean Sugar Technology™
- Low-CI Ethanol process engineering



FLUID QUIP TECHNOLOGIES

# Clean Sugar Technology (CST) Opportunities




- Currently commercially produced in bio-based method – largest growth opportunity
- Existing commercial markets, but at small scale – emerging growth opportunity
- Not yet commercial – future growth opportunity

1 Flavors and fragrances - E.g., vanillin, nootkatone, patchoulol, valencene 2 E.g., glutamate and lysine
SOURCE: Expert interviews; press search, company websites, annual reports

**Technology Acquired with Fluid Quip**

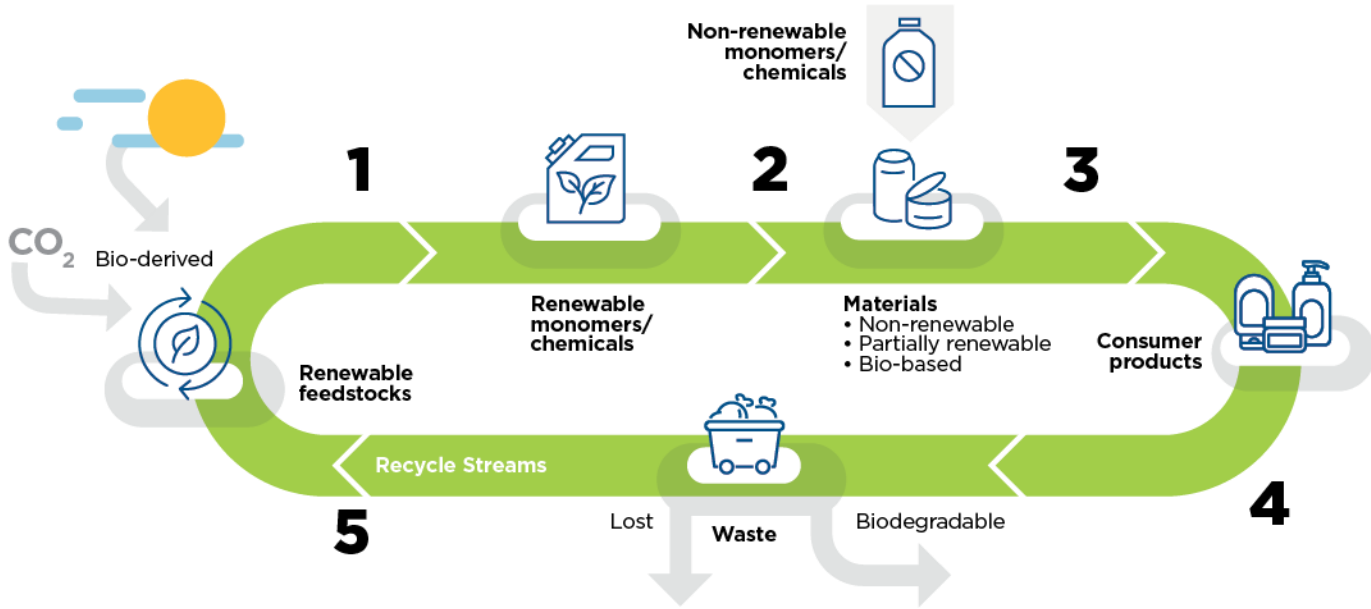
- Fully scalable commercial CST production facility operating at the Innovation Center at York
- CST produces an equivalent sugar quality to that of a wet corn mill process, with a production cost advantage and up to ~50% reduction in the carbon footprint

**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 with high growth, commercially viable segments of the synthetic biology market
- Focused on enhancing full and continuous operation of the Innovation Center at York pilot facility
- **Construction underway for 30,000 bushel per day capacity CST system at Shenandoah, Iowa**

# CST – Part of Moving to a More Circular Economy

- Bio-based glucose and dextrose derived from corn – the most abundant renewable carbon source available – is in high demand and anticipated to grow as the demand for bioproducts expands
- CST produces fermentable sugars to support growth in bioplastics, biochemicals, renewable chemicals and synthetic biology – contributing to the circular economy
  - Produced clean, without harsh chemicals
  - Lower carbon intensity than alternatives
  - Renewable source of carbon




Source: Genomatica

# Carbon Capture and Sequestration Initiatives

*Opportunity to **increase margins** from ethanol facilities with **no capital required***

**Current Status**

- CCS lowers green gas emissions, resulting in attractive low CI ingredients
- Green Plains has committed to provide biogenic $CO_2$ to SCS from 8 facilities for 12 years, representing 658 MGY of capacity
- Annual commitment is estimated to be ~1.9 million metric tons of carbon dioxide, equivalent to the amount of carbon sequestered by 2.3 million acres of U.S. forests in a year (Source: EPA)
- SCS is responsible for pipeline construction and operation, with operations expected to begin in late 2024
- SCS is partnering with Minnkota for $CO_2$ sequestration[1]
- SCS announced over $1 billion in total equity commitments [2]
- SCS has secured easements for more than 50% of the proposed route [3]

**Direct Injection Opportunity**

- Green Plains has engaged with an experienced CCS developer to perform a feasibility study and assess the opportunity at 3 Eastern plants for standalone direct injection projects

[1] Source: SCS press release April 28, 2022
[2] Source: SCS press release May 11, 2022
[3] Source: SCS press release Nov 8, 2022

# Opportunities Under Inflation Reduction Act

- **Biodiesel tax credit** – ensures continued growth of biodiesel and renewable diesel industries
- **Advanced biofuels credit** – benefits cellulosic ethanol
- **45Q** – provides an $85 per ton tax credit for carbon capture and storage
- **Blending infrastructure** – allocates $500 million over 10 years to increase offerings to consumers at the pump
- **Sustainable aviation fuel** – helps reduce the carbon footprint of the aviation industry using alcohol-to-jet technologies
- **CI-reducing opportunities for farmers** – Green Plains is working with farmer customers to help them determine requirements for measuring and reducing on-farm emissions
- **Clean fuel production credit** – most promising development since the start of the renewable fuels sector – any renewable fuel under the 50 CI threshold can qualify for $0.02/gal for each point of CI reduction



# ESG Embedded in our DNA

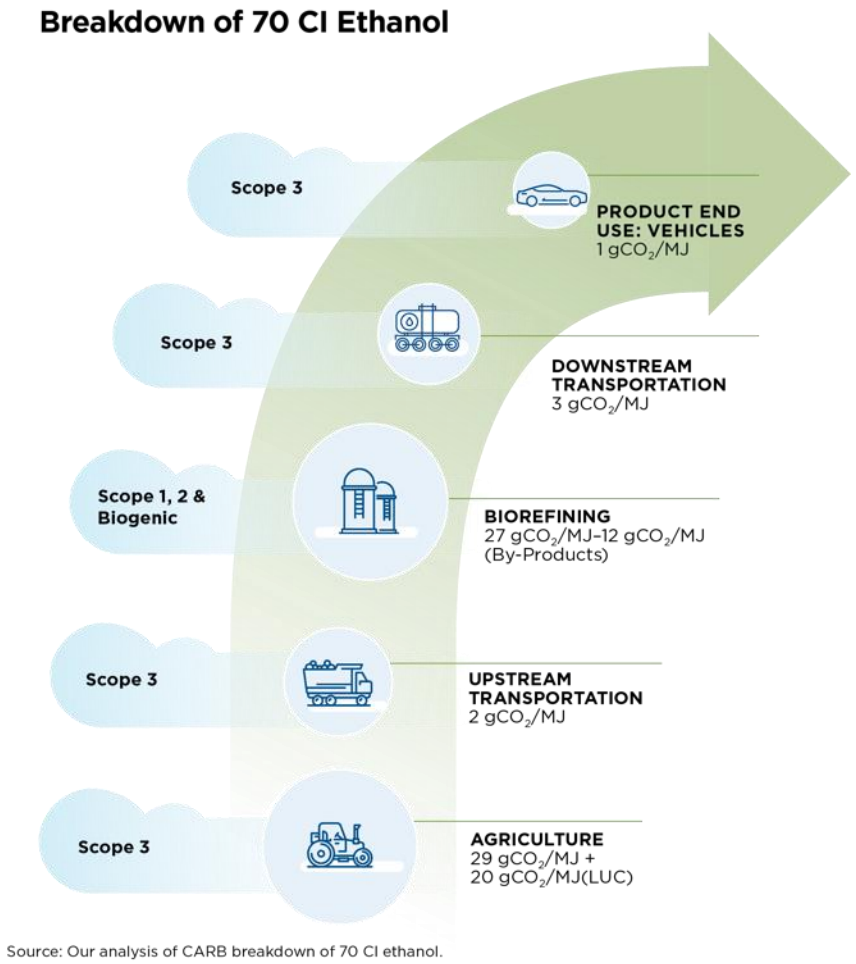



- **35% reduction** in operational emissions from 2018 baseline
- Alignment with the **Task Force on Climate-related Financial Disclosures** (TCFD)
- Increased focus on **natural capital, biodiversity and land stewardship**
- **24% decrease** in OSHA Total Recordable Incident Rate from 2020
- Completed **Sustainability-linked credit facility**, replacing other debt
- **Materiality assessment** completed to align ESG goals with stakeholders' priorities
- Completed **board refreshment initiative**
- **Adopted** Board of Governance Guidelines, Board Qualifications and Diversity Policy, and updated Company Bylaws to enhance shareholder rights



# Our Path to a Low-Carbon Future

- Targeting 50% reduction in operational GHG emissions from 2018 baseline by 2030 and 100% reduction by 2050
- Plan to submit our GHG emissions reduction targets to the Science-Based Targets Initiative for validation by the end of 2022
- Evaluating initiatives to reduce our Scope 3 emissions
- Reducing energy use and increasing efficiency across our platform
- MSC™ increases our low-carbon renewable corn oil capacity by ~50%
- Our biofuel has a 46% lower GHG profile on average than petroleum-based gasoline
- Biofuel produced from locally sourced, renewable feedstock



Source: Our analysis of CARB breakdown of 70 CI ethanol.

Source: Green Plains 2021 Sustainability Report

# Why Green Plains?

## Game-changing ag-technology, diversifying product offering of higher-margin ingredients into high-growth markets

- Implementing MSC™ protein technology and DCO Technology™ to create diverse, non-cyclical, high margin products
- 50% uplift in corn oil yields, a low-CI feedstock for the growing renewable diesel industry
- Clean Sugar Technology™ provides competitive advantage in $450 billion specialty chemical and material markets requiring glucose / dextrose

## Commercialization well underway

- 25% increase in the pet food vertical for sales of Ultra-High Protein in 2023
- Negotiating and executing commercial agreements in aquaculture, swine and poultry; growing interest across species

## Focused on sustainability with ESG embedded in our DNA

- Transition into highly specialized production aims to meet the world's demand for sustainably sourced products, low carbon ingredients and cleaner technologies
- CCS project supports lower carbon intensity for biorefinery platform; IRA bill provides additional upside
- Investing in efficiency of our plants to lower the consumption of natural resources and our carbon footprint

## Strong balance sheet and ample liquidity to drive growth

- MSC commercialization fully funded, with over 50% of our platform converted by end of 2022

## Strategic partnerships and innovation to drive value-creation across our platform

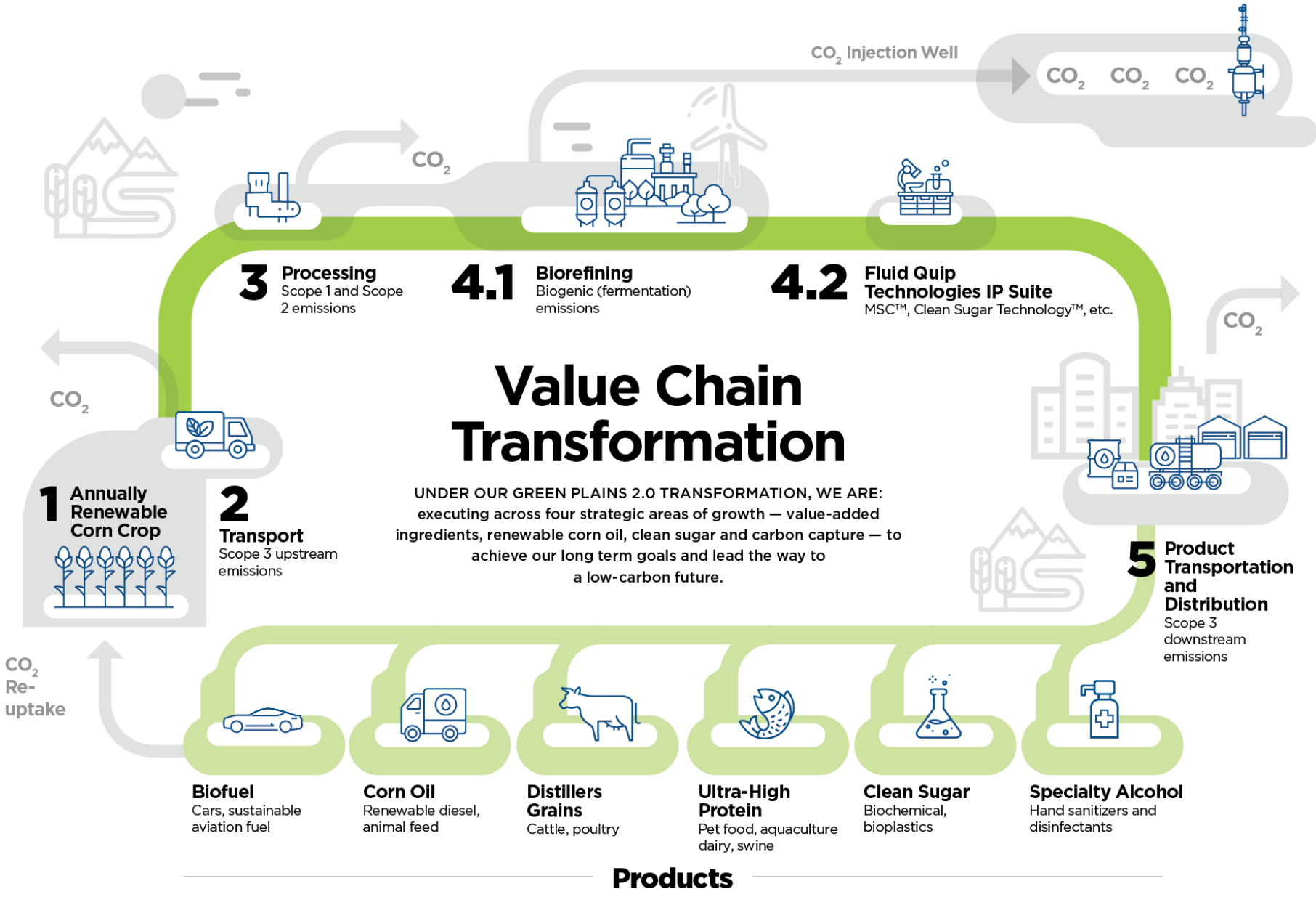
- Ultra-High Protein with a "J-curve" opportunity for higher margins
- Turnkey initiative to expand access to protein capacity without adding ethanol

# Appendix

# Reference Units - Operational Metrics

| Products | Purchase / Sale Transaction Units | GP 1.0 (per bushel) | GP 2.0 (per bushel) | GP 2.0 (per gallon) | GPRE 2.0 Annual Production Capacity * |
|---|---|---|---|---|---|
| Corn | Bushels | 56 pounds per bushel | 56 pounds per bushel | 19.3 pounds per gallon | **330 million bushels** |
| Ethanol | Gallons | 2.9 gallons per bushel | 2.9 gallons per bushel | - | **958 million gallons** |
| Clean Sugar – Glucose/Dextrose | Pounds | - | 36 pounds per bushel | ~12.4 pounds per equivalent gallon of capacity | **For every 10 million gallons of ethanol capacity converted to CST results in ~ 124 million pounds of dextrose capacity** |
| Dried distillers grains | Tons | 15.2 pounds per bushel | 11.3 pounds per bushel | 3.9 pounds per gallon | **1.9 million tons** |
| Renewable Corn Oil | Pounds | 0.8 pounds per bushel | 1.2 pounds per bushel | 0.414 pounds per gallon | **396 thousand pounds** |
| Ultra-High Protein | Tons | - | 3.5 pounds per bushel | 1.2 pounds per gallon | **578 thousand tons** |

* Indicative annual capacity assumptions excluding Thararldson JV


$CO_2$ Injection Well
$CO_2$ $CO_2$ $CO_2$
$CO_2$
3 Processing
Scope 1 and Scope 2 emissions
4.1 Biorefining
Biogenic (fermentation) emissions
4.2 Fluid Quip Technologies IP Suite
MSC™, Clean Sugar Technology™, etc.
$CO_2$
$CO_2$
Value Chain Transformation
UNDER OUR GREEN PLAINS 2.0 TRANSFORMATION, WE ARE: executing across four strategic areas of growth — value-added ingredients, renewable corn oil, clean sugar and carbon capture — to achieve our long term goals and lead the way to a low-carbon future.
1 Annually Renewable Corn Crop
2 Transport
Scope 3 upstream emissions
5 Product Transportation and Distribution
Scope 3 downstream emissions
$CO_2$ Re-uptake
Biofuel
Cars, sustainable aviation fuel
Corn Oil
Renewable diesel, animal feed
Distillers Grains
Cattle, poultry
Ultra-High Protein
Pet food, aquaculture dairy, swine
Clean Sugar
Biochemical, bioplastics
Specialty Alcohol
Hand sanitizers and disinfectants
Products

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