



Green Plains

INGREDIENTS THAT MATTER

2022 SUSTAINABILITY REPORT



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About This Report

This 2022 Sustainability Report is a testament to Green Plains' ongoing commitment to corporate citizenship and our strategic transformation. This report covers our environmental, social and governance (ESG) data and initiatives during calendar year 2022. We also share details on goals and initiatives that extend into 2023 and beyond.

The environmental data in this report, with the exception of the GHG emissions inventory, is limited to the biorefinery production segment of our operations, including our biorefining facilities. The GHG emissions inventory covers all relevant GHG emissions, from all relevant sources and subsidiaries. The boundary coverage for Scopes 1 and 2 emissions is 99.69%, and the boundary coverage for Scope 3 emissions is 100%.

The social and governance data in this report is enterprise-wide. Select data in this report has also received external limited assurance by a third party, Apex Companies, LLC. Please see page 91 for a copy of the assurance letter and complete listing of the metrics that received limited assurance.

Inquiries related to the report and its content should be directed to our sustainability team at sustainability@gpreinc.com. More information can also be found at gpreinc.com/sustainability.

Green Plains has reported the information cited in the GRI content index for the period January 1, 2022 through December 31, 2022 with reference to the 2021 Global Reporting Initiative (GRI) Standards. This report also references applicable United Nations Sustainable Development Goals (UN SDGs). We also disclose under the Biofuels Standard from the Sustainability Accounting Standards Board (SASB) and align with the Task Force on Climate-related Financial Disclosures (TCFD) framework. See page 71 for our Reporting Frameworks.



Letter From Our Chief Executive Officer

Green Plains has reached a pivotal point in our transformation, gaining momentum in 2022 with progress across all aspects of our evolution into a true biorefinery platform, creating sustainable ingredients that matter. We are expanding production of our novel ingredients, attracting new partners and entering new markets, all while lowering our carbon intensity. Our ingredients' quality is higher than ever before, each one a low-carbon alternative to competitors already on the market and each one a crucial component of our broader vision that encompasses the four pillars of our transformation: Protein, Renewable Corn Oil, Sugar and Carbon. Within these pillars, we are focused on developing cleaner technologies, providing lower-carbon solutions to existing industries, reducing our own carbon intensity and enhancing our role in the circular economy.

In 2022, we started up our protein technology installations at three additional locations and now have a total of five operational — over half of our production capacity — with Ultra-High Protein capacity of 330,000 tons. We announced a partnership with North America's premier aquaculture producer, Riverence Group, further validating the quality and efficacy of our product and platform. Our high-protein ingredients not only have a lower carbon intensity than available alternatives and are more nutritious, but they also help reduce the need to feed fish to fish, relieving pressure on aquatic ecosystems.

We broke ground on the first-of-its-kind commercial-scale Clean Sugar Technology™ facility at our biorefinery in Shenandoah, Iowa, and are already in discussions with potential co-location partners and customers. The dextrose molecules from this patented process, developed and owned by Fluid Quip Technologies, have a lower carbon intensity than alternatives traditionally produced at wet mills and have a wide range of applications, including bioplastics, biochemicals and synthetic biology. We believe we have only begun to unlock the potential for this ingredient to displace petroleum-based molecules and build a truly renewable supply chain to jump-start the fermentation revolution.



PRIORITIZING SUSTAINABLE CHOICES

Our customers in aquaculture, pet food, dextrose and other verticals want assurance that our ingredients are renewable and have a lower CI than available alternatives.



Fluid Quip Technologies' intellectual property has enabled us to achieve all-time record levels of renewable corn oil production. This inedible oil is a highly sought after feedstock for the production of biodiesel, renewable diesel and sustainable aviation fuel, due to its low carbon intensity. We've also teamed up with United Airlines and Tallgrass on a robust partnership to develop alcohol-to-jet sustainable aviation fuel with an exclusive license on Pacific Northwest National Laboratory's ketone technology. This joint venture, Blue Blade Energy, is the first such partnership to include feedstock, off-take, technology and infrastructure entities. Without a doubt, innovative technology was a noteworthy theme for Green Plains in 2022, as it guided the significant progress we have achieved in our transformation.

We are partners in one of the largest carbon capture and sequestration projects in the world and are exploring additional opportunities to ensure that our path to carbon neutrality by 2050 remains on track. We made these commitments before the passage of the Inflation Reduction Act, but this landmark legislation enhances the benefits of our carbon intensity reductions and opens the door to consideration of new technologies at our biorefineries as well as enhanced partnerships with our farmer customers to expand regenerative agriculture practices.

While decarbonization can stand on its own as a pillar of our transformation, it also underpins all other initiatives as the world shifts to more sustainable preferences for all things from fuels to food. Our customers in aquaculture, pet food, dextrose and other verticals want assurance that our ingredients are renewable and have a lower carbon intensity than available alternatives.

2022 brought notable improvements in our corporate governance as well. We added seasoned experts to our leadership team and reorganized to align with our evolving company, as our transformation into the biorefinery platform of the future achieves critical mass. Our Board of Directors and senior leadership team members are fully dedicated to our sustainability goals and are clear on their roles in ensuring that we achieve them.

Further aligning with stakeholder expectations, we enhanced our reporting to the Task Force on Climate-related Financial Disclosures to include scenario analysis and have secured approval of our near-term carbon reduction targets from the Science Based Targets initiative. Our stakeholders demand credibility and assurance that our goals are at the center of our operations, and we are putting in the work to demonstrate that our commitments are real.

Our ingredients are, by nature, renewable, and by producing more sustainable alternatives for our customers, we solidify our position as a thought leader at the intersection of agriculture, energy and technology. This vision guides decisions in our day-to-day operations, with all actions geared toward our overall strategy of providing the world with more environmentally friendly alternatives for feed, fuel and the emerging bioeconomy.

As you'll see in the pages that follow, we have continued to build an actionable road map to our ambitious goals, executing on strategies along the way and continuously improving as best practices evolve. We hold ourselves to high standards, but perhaps more importantly, you hold us to high standards. And we will continue to deliver.

A handwritten signature in black ink that reads "Todd Becker".

Todd Becker

PRESIDENT AND CEO

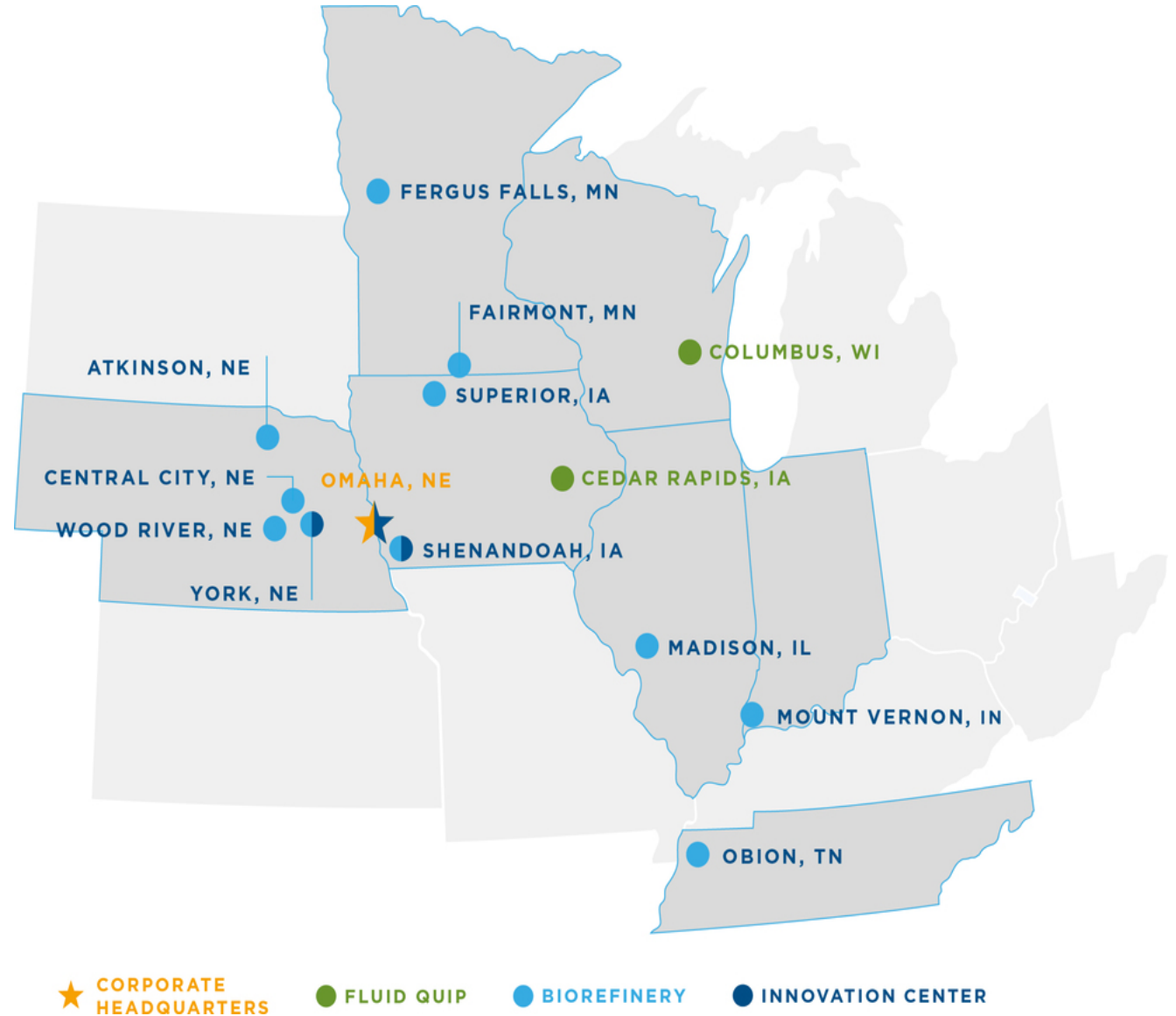
About Green Plains

Our Business

Green Plains Inc. (NASDAQ:GPRI) is an ag-tech innovator utilizing our experience in agribusiness and fermentation, along with our status as a leader in biorefining, to push technological advancement and innovation in our ingredient sectors. We produce low-carbon biofuels, renewable feedstocks for advanced biofuels, high-protein ingredients for animal diets, dextrose for use in bioplastics and biosynthetics, and high-purity alcohols. Every day we work to create more value from fewer resources, seize meaningful opportunities for our company and innovate ingredients to meet our customers' needs, all while serving as stewards of the environment.

We are focused on producing lower-carbon alternatives to help reduce greenhouse gas (GHG) emissions in the global supply chain and have a positive impact in the fight against climate change.

For more information, visit www.gpreinc.com.



OUR TECHNOLOGY SUITE AND STRATEGIC PARTNERS ENABLE the evolution and enhancement of our sustainable production capabilities. We continuously strive to find innovative ways to produce more from our existing renewable resources.

GREEN PLAINS AT A GLANCE



48,267,162

metric tons of carbon reduction to date⁽¹⁾



872,133,000

gallons of renewable biofuel sold in 2022



100%

of corn purchased from non-deforested, US-domestic sources⁽³⁾



958,000,000

gallons of renewable biofuel production capacity⁽²⁾



301,868,000

bushels of corn consumed in 2022



5

sustainable technology installations



281,730,000

pounds of renewable corn oil sold in 2022



2,280,000

tons of dry equivalent animal feed sold in 2022

Awards



Green Plains was among the Top 50 in the 2022 Real Leaders Eco Innovation Awards, a recognition of our achievements: reducing energy and water usage, lowering operating costs and reducing our carbon footprint. We were also named among America's Most Responsible Companies 2023 by Newsweek and Statista.

Memberships



1 Estimated CO₂ amount to have been kept out of the atmosphere due to Green Plains-produced low-carbon fuel between 2007 and 2022.

2 2022 10-K Production Capacity.

3 Based on compliance with RFS regulations (40 CFR § 80.1401), which requires the use of "renewable biomass" as an ethanol feedstock; by definition means that planted crops cannot come from deforested land. Additionally, we use U.S. corn and have not imported corn from international markets where deforestation might be prevalent.

Our Principles and Values

Our five core principles help us CHART our course and provide a framework for evolving in a rapidly decarbonizing world.

C H A R T

CUSTOMER CENTRIC

We make a difference in the world by providing quality ingredients to safely meet customer needs.

- Ingredient mindset
- Quality and safety focus
- Understand our impact

HUNGRY

We are passionate, collaborative and seek achievement across all areas of our business.

- Competitive spirit
- Collaborative
- All-in mentality

ACCOUNTABILITY

We exercise sound judgment and self-discipline to drive impactful results.

- Self-discipline
- Sound judgment
- Impactful results

RESPONSIBILITY

We serve our customers, communities, investors and families by striving for sustainability and diversity in all that we do.

- Leadership in ESG
- Diversity and inclusion
- Work / life balance

TRANSPARENCY

We respectfully challenge ourselves to achieve excellence, while focused on our clear mission to innovate and create sustainable ingredients that matter.

- Clear corporate mission
- Respectful candor
- Culture of innovation

Our Commitment to Sustainability

Sustainability is both a driver and an outcome of our ongoing transformation into a customer-centric producer of low-carbon ingredients.

Green Plains is committed to fully realizing this transformation. We are passionate about delivering on the rapidly expanding opportunities and crucial benefits of the emerging bioeconomy.

In concrete terms, this means that we continually innovate across our four pillars of Protein, Renewable Corn Oil, Sugar and Carbon. We are advancing and multiplying our renewable processes and coproducts to benefit a far-reaching set of stakeholders — employees, farmers, customers, suppliers, shareholders, communities and our shared environment.

In parallel, we continue to evolve our social and governance infrastructures to enable the success of our ambitious initiatives. We work to continually evaluate and improve our practices in these areas to position Green Plains to meet the growing sustainability needs of a changing world.

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ESG Highlights

ESG and Climate Change Governance



Board Oversight

The Green Plains Board monitors compliance with the company’s regulatory requirements and is dedicated to the oversight of ESG topics, including climate change, GHG emissions and employee safety. The Nominating and Governance Committee of the Board has primary oversight of our ESG initiatives, with the goal of integrating ESG strategy into our overall business strategy. The Board’s other committees provide support to the entire Senior Leadership Team (SLT) by overseeing certain key areas of impact.

Nominating and Governance Committee

Pursuant to its charter, the Nominating and Governance Committee oversees ESG topics, including the development, approval and updating of the Company’s ESG purpose, mission statements, strategies, policies and goals. It is responsible for monitoring progress of strategy and goals and reviewing climate-related topics on a quarterly basis. The committee is earnest about transparency and is responsible for oversight of ESG initiatives, including this Sustainability Report.

Audit Committee

The Audit Committee monitors compliance with the company’s Code of Ethics and hotline reporting and reviews conflicts of interest and related-party transactions. The Audit Committee is also responsible for assessing risks related to cybersecurity and mitigating those exposures with policies and procedures.

Compensation Committee

The Compensation Committee determines remuneration policies with help from third-party compensation consultants. The committee holds our executives accountable for our ESG priorities by integrating performance measures that align with our goals. Since 2012, we have included a safety metric in our annual incentive award program and adopted a compensation recovery policy that goes beyond legal requirements and puts emphasis on ethics and compliance. Our 2021 and 2022 compensation programs incorporated ESG performance criteria.

Management Governance

Green Plains' President and CEO is the most senior member of the SLT responsible for the company's overall strategy and performance, including oversight of ESG topics such as climate-related risks and opportunities. The SLT is composed of the President and CEO, Chief Financial Officer, Chief Transformation Officer, Chief Accounting Officer, Chief Legal & Administration Officer (CLAO), Chief Human Resources Officer, Executive Vice President of Investor Relations, Executive Vice President of Operations & Technology, Executive Vice President of Commercial Operations and Executive Vice President of Product Marketing & Innovation. The President and CEO is also a member of the Board, reporting to the Board on a regular basis. In recognition of the importance of collaboration and integration of ESG across the organization, our SLT is actively engaged with:

- Developing governance practices responsive to climate-related issues.
- Regularly reviewing the company's performance versus targets related to ESG goals such as GHG emissions, energy use, customer relationships, employee safety, customer safety and community outreach.
- Incorporating risk assessment and ESG strategy into financial and operational plans.
- Making recommendations to our Compensation Committee to link executive compensation to ESG performance.
- Implementing technical and operational changes that improve climate-related performance.
- Engaging with investors on climate-related issues.
- Participating in the company's climate-related disclosure practices.

The SLT is the highest management level responsible for climate-related issues, and the ESG Workgroup is responsible for the day-to-day identification and management of ESG topics and their impacts, risks and opportunities. This group consists of cross-functional subject matter experts at the associate, management and executive levels and is led by the ESG Program Manager and Senior Vice President (SVP), Sustainability, who coordinate with the Chief Legal & Administration Officer. The SLT and ESG Workgroup review and approve all policies and approaches developed by subject matter experts and track metrics relative to ESG goals over time to the fullest extent possible.

Our position as a leading biorefining company focused on transforming annually renewable crops into sustainable, value-added ingredients dictates our responsibility to ESG issues at all levels. By including representatives from all key areas and levels of the company, the ESG Workgroup ensures a coordinated, company-wide approach. The importance of ESG performance is well integrated across operations, legal, trade, finance, accounting, product sales, technology, EHSS, investor relations and human resources. The ESG Workgroup facilitates outreach between certain stakeholders and the Board, using various means to consult with stakeholders and subsequently reporting back through the CLAO to the Nominating and Governance Committee.

Members of the ESG Workgroup meet with the SLT quarterly to report on our environmental performance and status of initiatives and to discuss ESG-related strategy. The ESG Workgroup, through the ESG Program Manager

and SVP, Sustainability, reports directly to the CLAO, who meets quarterly with the Nominating and Governance Committee on all ESG matters, including climate-related risks and opportunities.

Our committee charters and corporate governance policies can be found on our website. We continuously monitor performance tracking related to ESG based on analysis from ESG rating agencies (including but not limited to Sustainalytics, MSCI™, ISS and S&P) as well as through stakeholder engagement processes, Q&A during quarterly earnings calls, annual shareholder meetings, feedback from our 24/7 ethics hotline and direct engagement with investors.



Stakeholder Engagement and Key ESG Topics

We identify and assess our impacts based on a wide range of information, including active and ongoing stakeholder engagement, internal assessments, enterprise risk management systems, legal reviews, governmental agency and non-governmental organization reports, peer filings and industry reports. These actions help us prioritize disclosure, data collection, goal-setting and strategy development. Throughout this stakeholder-oriented, data-driven and forward-looking approach to identify and assess our top environmental, social and governance impacts, we communicated directly with key internal and external stakeholders, leveraged ESG research and ratings, and vetted them against global frameworks and standards. Our ongoing stakeholder engagement process consists of a combination of formal materiality assessments, press releases, town halls, social media, 24/7 ethics hotline, earnings calls and direct outreach, among other tactics. Our key stakeholder groups and methods of engagement are outlined in this graphic. On page 21, we highlight the key ESG topics that are the most important to our business success and key stakeholder groups. This enables us to prioritize crucial ESG areas based on their relevance to stakeholders and impact on business.

Stakeholder Engagement

EMPLOYEES



- Town halls
- Company announcements
- Social media
- 24/7 ethics hotline
- Charitable events
- Weekly newsletter
- Company intranet
- Press releases

CUSTOMERS, VENDORS, SUPPLIERS AND BUSINESS PARTNERS



- Press releases
- Social media
- 24/7 ethics hotline
- Customer appreciation days

LOCAL COMMUNITIES



- Press releases
- Company announcements
- Social media
- 24/7 ethics hotline
- Charitable events
- Direct outreach initiatives, partnerships and site tours

LENDERS



- Press releases
- Social media
- Publicly accessible quarterly earnings conference calls
- Loan compliance and reporting

SHAREHOLDERS



- Annual shareholder meetings
- Press releases
- Social media
- Publicly accessible quarterly earnings conference calls
- Direct outreach
- National investor events

GOVERNMENT AGENCIES



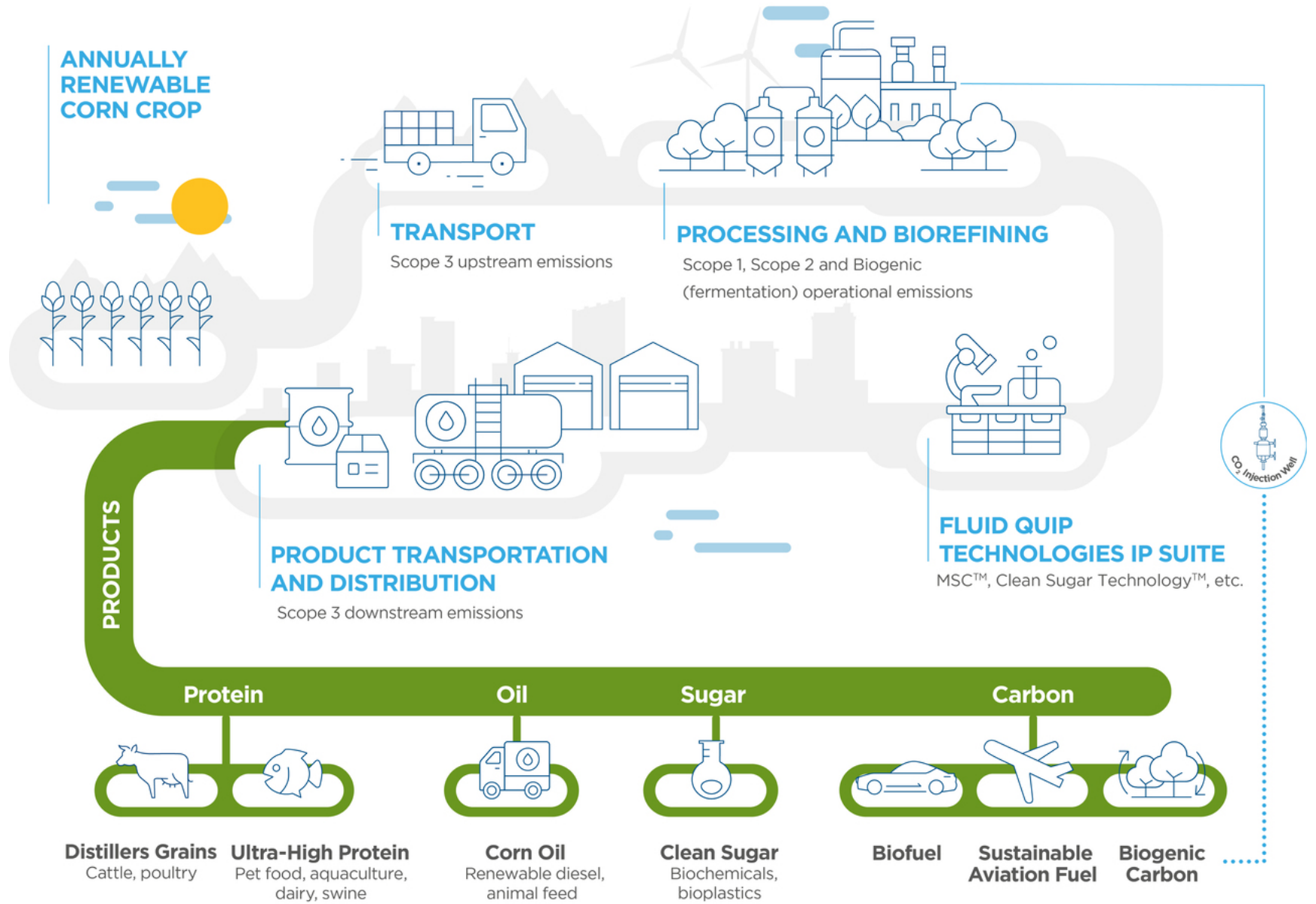
- Earnings releases
- Financial filings
- Regulatory reporting



Value Chain Transformation

UNDER OUR GREEN PLAINS 2.0 TRANSFORMATION, WE ARE:

Executing across four strategic areas of growth — value-added protein ingredients, renewable corn oil, clean sugar and carbon capture — to achieve our long-term goals and lead the way to a low-carbon future.



A Culture of Innovation

2022 was a year of innovation and technological milestones for Green Plains' ongoing transformation. Notably, we opened our Innovation Center at Omaha, the third such center across our platform.

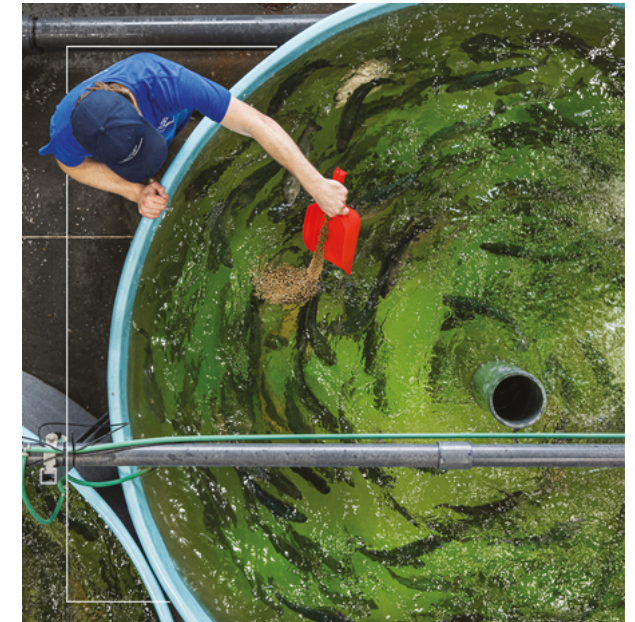


The **Innovation Center at Omaha** features a commercial-scale aquaculture feed mill, state-of-the-art laboratory space for aquaculture and Fluid Quip Technologies (FQT), and further lab space for potential future university partnerships. The facility also serves as a showroom for our company's transformation and technologies.

Alongside our existing Innovation Center at York, Nebraska and our Optimal Aqualab in Shenandoah, Iowa, the Innovation Center at Omaha rounds out our full suite of research, development and production capabilities.



The **Innovation Center at York** features a pilot fermentation train as well as a world-class analytical lab, allowing for rapid testing of process yields. Additionally, the Innovation Center has downstream separation equipment used for on-site pilot development of FQT's Clean Sugar Technology™ (CST™) and testing of process enhancements to the patented Maximized Stillage Co-Products™ (MSC™) protein recovery system.



At the **Aqualab** in Shenandoah, our Optimal team conducts feed trials on multiple species of fish, continuously improving the nutrient-rich, species-specific formulations for the Optimal Fish Food and Optimal Aquafeed product lines.

Being a leader in agricultural technology means investing in research and a devotion to identifying and scaling up the best available processes. These three innovation centers serve that crucial purpose for Green Plains.

2022 Technology Highlights:

Breakthroughs in Sugar, Protein and Feedstock

Ag-tech innovation is the catalyst of transformation at Green Plains, and it played a significant role in expanding our lower-carbon ingredient portfolio in 2022.

We are leveraging patented technologies developed by our majority-owned subsidiary FQT to unlock more value from each kernel of corn while simultaneously lowering the carbon intensity (CI) of our ingredients across our operations.

In this section, we highlight key technological innovations implemented last year that have significantly expanded our ability to offer new, lower-carbon alternatives for our customer partners in rapidly expanding markets.

feedstock

Any renewable, biological material that can be used directly as a fuel or converted to another form or fuel or energy product.⁴

⁴ Recent Advances in Thermochemical Conversion of Biomass, 2015

A New, Clean Sugar With Wide Applications

Developed by FQT, CST™ can be used in dry-milling facilities such as those operated by Green Plains to produce dextrose and glucose rather than ethanol as their primary products. It is at the core of the build-out of our biocampus model, which will contribute to and support the emerging biorevolution.

We are leveraging CST™ to add the production of low-carbon dextrose and glucose—the benefits of which are significant—to our biotechnology portfolio. As when producing ethanol, the process of making clean sugar also creates high-value co-products such as renewable corn oil and high-protein feed ingredients. Further, CST™ provides industrial quantities of carbohydrate feedstock that can be used in manufacturing applications in the growing biochemical, renewable chemical and synthetic biology industries. CST™ dextrose also has a lower CI score than dextrose produced with traditional wet-milling processes.

Scaling Clean Sugar

In 2022, we achieved food-grade certification, FSSC 22000, at our pilot CST™ production facility at our Innovation Center in York, Nebraska. Stringent quality management and a continuous improvement approach resulted in certification of our glucose and dextrose syrups at this facility, where production is ongoing.

Following this external validation, in the third quarter 2022, we broke ground on a first-of-its-kind, full-scale CST™ production facility co-located with our Shenandoah, Iowa, bio-campus. Initial outputs are estimated at 200 million pounds of dextrose/glucose annually, with the ability to scale up to 500 million pounds upon further investment. This new CST™ facility will utilize a portion of the current biorefinery corn grind as a feedstock to produce its sugar. It will also return all remaining components of the corn — proteins, fibers, oils, unused starches and sugars — to the biorefinery.

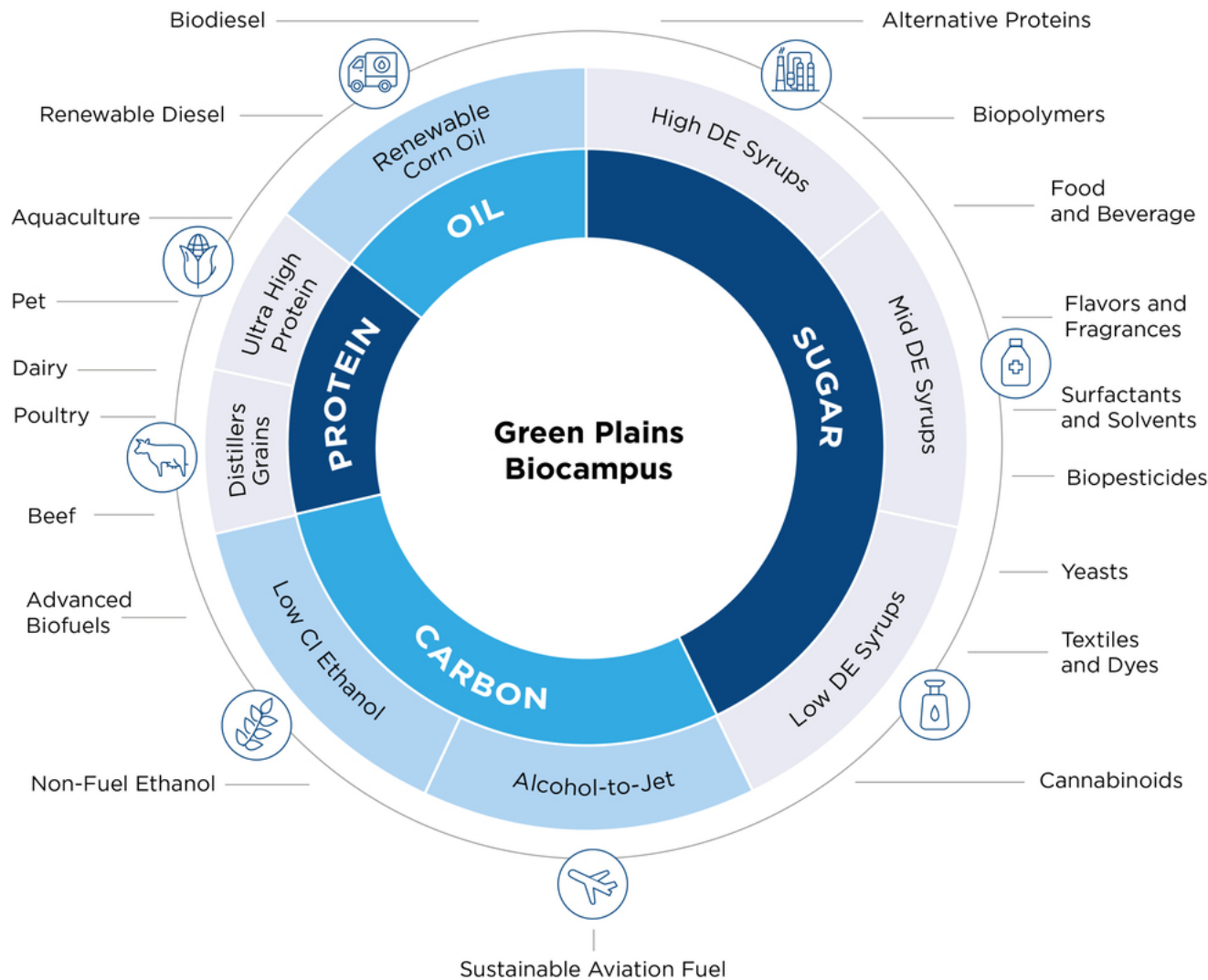
Scheduled to become operational by the first quarter of 2024, the Shenandoah CST™ facility is expected to produce 95% dextrose-equivalent (DE) and mid-DE products for shipment via rail and truck or eventually directly to over-the-fence partners.

2022 Breakthroughs

- Achieving food-grade certification at pilot CST™ facility
- Breaking ground on first-of-its-kind, commercial-scale CST™ facility
- Entering discussions with potential co-location partners and customers

From Biorefineries to Biocampuses: Leading a Biorevolution

Renewable feedstock from the most abundant renewable carbon source available



OUR PRODUCTS CONTRIBUTE TO THE CIRCULAR ECONOMY:

- 1** Produced cleanly, without harsh chemicals
- 2** Lower CI than alternatives
- 3** Renewable source of carbon

Providing Lower-Carbon Alternatives

Production of our new 95-DE and mid-DE products will expand opportunities for Green Plains and our customer partners across the food and beverage, synthetic biology and biochemical industries.

Due to their lower CI compared with competitors' offerings, CST™-produced ingredients can help companies reduce their carbon footprints and gain a competitive edge in today's sustainability-focused markets.

CST™-produced carbohydrate (renewable carbon) feedstocks can deliver considerably lower CI scores than conventional fossil-derived feedstocks, such as crude oil and coal. Additionally, Green Plains' dry milling process produces bio-based glucose and dextrose at a dramatically lower CI than other available technologies, such as wet milling.

A recent internal report shows this CI reduction compared to a wet mill to be anywhere from 20% to 48%, due to the unique advantages of FQT’s patented technology, which allows a dry mill to skip an energy-intensive portion of the sugar production process found on the front end of a wet mill. There are several reasons for this. First, CST™ is fundamentally focused on the production of sugars (glucose and dextrose), whereas wet mill technology focuses on the starch. Second, it is inherently simpler to separate the sugars from the other coproducts such as fiber, protein and renewable corn oil. Third, this innovative approach leads to more efficient processes and less equipment and energy use. Taken together, the use of CST™ equates to lower electrical, chemical and water usage per unit of production. Additionally, because CST™ uses some of the same processes as a dry mill ethanol facility, we can see further benefits in the production of low-Cl sugar and low-Cl ethanol.

**CARBON INTENSITY
(KG CO₂ E/MT DRY SUGAR)**

Dry Mill Clean Sugar 641

Wet Mill Sugar 1,050

Source: Recent internal report

SUPPLYING A BURGEONING MARKET

In North America, demand for bio-based glucose and dextrose derived from corn, one of the most abundant renewable carbon sources available, is high and expected to continue growing. Meeting this expanding demand will require new sources of glucose and dextrose, and Green Plains’ investment in CST™ strategically positions us to supply these markets.

The bio-based glucose and dextrose industry, including bioplastics, biochemicals, renewable chemicals and synthetic biology, is diverse and evolving quickly. According to the Biotechnology Innovation Organization, the global economic value of the biotechnology industry is estimated at \$355 billion.⁵

Going forward, it is expected that large amounts of fermentable sugars will be required for next-generation biopolymer, biochemical, biofuel and food products.⁶ Even if the world were to recycle 100% of its products, there would still be a need for virgin materials to keep pace with overall economic growth.⁷ In addition, consumer preferences are increasing demand for responsibly produced ingredients and products.

Consumers expect products to be derived from renewable sources and manufactured in a safe and non-invasive manner. By incorporating and driving the use of CST™ in our operations, Green Plains is well suited to help meet this demand; our process extracts sugar from corn using simple enzymes and mechanical separation, avoiding harsh chemicals traditionally used at wet mills.

Replacing widely used, non-renewable petroleum-based feedstocks with renewable carbon feedstocks, such as bio-based glucose and dextrose derived from corn, can deliver far-reaching sustainability benefits.

- 5 Biotechnology Innovation Organization. Renewable chemical platforms building the biobased economy. Ind. Biotechnol.14:109, 2018
- 6 Singh V, Stone J, Roberts JP, et al. Industrial biotechnology shaping corn biorefineries of the future. Cereal Foods World 2019;64(4)
- 7 Expert View: Five ways biotech supports the transition to a more circular economy. Bio Market Insights Feb 14, 2019 by Christophe Schilling, CEO, Genomatica



BETTER PROTEINS, MORE RENEWABLE CORN OIL, EVEN LESS CARBON

Green Plains is leveraging another of FQT’s patented tools, MSC™ technology, to achieve breakthroughs in higher-protein feed ingredients and valuable low-CI feedstock for the production of advanced biofuels such as renewable diesel and sustainable aviation fuel (SAF).

In using the MSC™ system, we can achieve 50% or greater protein concentration, which combined with the high yeast component, is a valuable ingredient for pet, aquaculture, poultry, swine and dairy rations. This technology is crucial in our work to produce sustainable higher-protein feed ingredients, optimal starch utilization and more — all without expanding crop acreage. Additionally, the MSC™ system can increase the volume of renewable corn oil we are able to extract from the process by 50%. Renewable corn oil serves as a valuable feedstock for the production of advanced biofuels like renewable diesel and SAF.

In 2022, Green Plains completed the construction of three additional MSC™ installations: Central City, Nebraska; Mount Vernon, Indiana; and Obion, Tennessee. These join our Shenandoah, Iowa, and

Wood River, Nebraska, biorefineries already producing Ultra-High Protein. These five facilities account for more than half of our total 2023 production capacity.

We also completed a Cradle-to-Gate Life Cycle Assessment of our Ultra-High Protein product, following the EU’s Product Environmental Footprint (PEF) methodology.⁸

The results of the assessment include a CI from the Climate Change impact category of PEF in kilograms of CO₂e per metric ton of Ultra-High Protein and utilize an economic allocation to easily compare our results to other common feed ingredients included in the Global Feed Life-Cycle Institute (GFLI) database.

According to the PEF analysis, the CI of our Ultra-High Protein is 1,340 kg CO₂e/ton UHP, which compares very favorably to many common alternative feed ingredients on the market today. Our protein products also have many functional characteristics that several alternatives, such as pea protein, lack, in addition to having a smaller carbon footprint.

2022 Breakthroughs

- Used MSC™ systems to create higher-protein animal feed, including aquaculture applications
- Extracted 50% more renewable corn oil with operational MSC™ systems — an important low-CI feedstock for advanced biofuels such as renewable diesel and SAF
- Added three new MSC™ installations, for a total of five, with annual capacity of 330,000 tons
- Achieved over 50% of total production capacity powered by MSC™ in 2023



GFLI DATABASE SAMPLE (CRADLE-TO-GATE, ECONOMIC ALLOCATION IN USD)		LIFE CYCLE IMPACT ASSESSMENT
Product Name		Climate Change (Kg CO ₂ e/Ton Product)
Corn DDGS at U.S. ethanol plant		655
Fishmeal at Norwegian fishmeal and oil production plant		1,041
Corn gluten meal at global wet mill plant		1,125
Ultra-High Protein at U.S. ethanol plant		1,340
Pea protein-concentrate, at German plant		2,559
Soybean meal at Brazilian crushing plant		4,257
Soybean protein concentrate at Brazilian crushing plant		7,271

⁸ The LCA study is not a formal PEF assessment due to the absence of a suitable PEF Category Rule (CR) for our product.

A CLEANER, HIGHER-QUALITY PROTEIN

Green Plains' protein products are plant-based, with key components of both corn and yeast. While other plant-based proteins rely on harsh chemicals and solvents to extract their product, Green Plains uses clean mechanical separation of fiber, fat and protein to produce consistent and nutritious Ultra-High Protein products. Corn has traditionally been considered an energy crop due to its starch content. However, **by employing fermentation in conjunction with MSC™ technology, we are transforming corn into a versatile dual-purpose energy and protein resource.**

A BETTER NUTRITIONAL PROFILE

Our MSC™ systems have achieved a baseline 50% crude protein with an optimum balance of inputs and yields. We have conducted further trials to achieve higher protein concentrations, with a proven path to commercial-scale concentrations above 60%.

Additionally, through exclusive technology partnerships, we are leveraging a suite of biotechnology enhancements to achieve further improvements to the nutrition profile of our Ultra-High Protein. These improvements aim to provide feed formulators with the option to partially replace an even wider range of animal and plant-based proteins in an effort to increase their feed quality and reduce overall costs.

However, this is not just a protein quantity story. It's also about greater digestibility and nutritional value.

A key parameter for nutritional evaluation is digestibility, also known as the amount of nutrients absorbed by the animal being fed. FQT's and Green Plains' nutrition researchers have evaluated our protein products' digestibility in several animal groups, including swine, poultry and fish. These studies have demonstrated that our amino acid digestibility is high (>87%) and consistent.⁹

Furthermore, Green Plains' Innovation Center at York lab team demonstrated our products' high quantity of small peptides, which support its consistently high digestibility values. MSC™ technology's unique separation and final drying process ensures that there is minimal protein quality degradation when the product is dried. The protein ingredient industry has been facing the perennial challenge of properly drying its product without causing heat damage and loss of digestibility. The gentle, non-contact drying used in the MSC™ system across the Green Plains production platform ensures consistent protein integrity.

Another important nutrition consideration is the amino acid distribution of a protein. Nutritionists typically evaluate the levels of amino acids in proteins, such as lysine, methionine, valine and tryptophan, among others. Various research studies led by FQT, Green Plains and independent research institutes have confirmed the significant presence of these desirable amino acids in our products as well as our products' excellent digestibility coefficients.

Finally, as nutritionists balance the needs of animals, they must consider the energy that feeds provide. A recent study concluded that the energy value of Green Plains' protein products is significantly higher than that of other common plant-based proteins.¹⁰

A YEAST GENERATOR

The MSC™ process recovers much of the spent yeast, a valuable ingredient in animal nutrition that is generated in the fermentation process.

The ethanol industry is a net producer of spent yeast, through the production of distillers grains and Ultra-High Protein, which is used to make animal feed. While the amount of yeast added to fermentation is measured and known, there is also an approximate 40-fold generation of yeast during the fermentation process. This yeast co-product of our Ultra-High Protein production helps reduce the carbon footprint of our feed

⁹ Source: Study conducted by Dr. Carl Parsons, University of Illinois

¹⁰ Nutritional value of ethanol coproduct evaluated for poultry, Bill Dudley-Cash, Feedstuffs Vol. 89, No. 11, November 6, 2017.

operations, needing no additional arable land for its generation and by extension promoting biodiversity. The yeast component self-propagates in a closed-loop fermentation system within the relatively small footprint of a modern-day biorefinery. Approximately 24% of the dry matter of our high-protein product is spent brewer's yeast.

Further, yeast has been studied extensively in animal nutrition and is known to be a high-quality protein source with further immunostimulatory properties.

Studies have shown that the use of yeast in animal diets results in high growth, feed intake and feed efficiency rates, with positive effects on robustness and health in fish.^{11,12} Similarly, yeast cell wall components and intracellular contents have been shown to have a valuable influence on health and immune competence. A recent study found that yeast as a protein source has a favorable amino acid profile, preferable taste and positive health effects.¹³ Experiments with yeast in diets for salmon concluded that yeast supports high-growth performance and improves fish health.¹⁴ Another study on the effect of yeast on gut health in Atlantic salmon found that yeast reduced inflammation in the gut, strengthened the gut barrier function and increased protection against pathogens.¹⁵

A SUPERIOR SCALABLE SOLUTION

The global feed industry relies on consistent sources of ingredients to manufacture approximately 1.36 billion tons of compound feed.¹⁶

A novel protein must be available year-round depending on the animal species, demonstrate consistency in its nutritional parameters and come in sufficient volumes to support the complex, large-scale logistics and production infrastructure of the feed industry. Volume, regulatory compliance and resilience in the supply chain are hurdles that other novel protein technologies, such as insect protein and single-cell proteins, are having difficulty clearing.

Using MSC™ technology, we are developing and commercializing a new protein alternative that can meet these criteria while also contributing to the circular economy — a major breakthrough in the global feed sector. We have a unique opportunity to produce a 50%+ plant-based protein at scale using our dry milling ethanol processes.

A CIRCULAR ECONOMY STANDOUT

MSC™ is making it possible for Green Plains to create high-quality animal feed ingredients from material that human beings would not consume rather than from additional valuable land or marine resources.

Because they are coproducts of existing biofuel operations, Green Plains' Ultra-High Protein products exemplify the dynamics of a circular economy, in which the reuse and regeneration of materials or products eases impacts on limited natural resources. These high-value alternative protein products have considerable environmental benefits. A recent study revealed that the replacement of 10% of a common vegetable protein with MSC™ proteins is associated with a 19% and 14% reduction in CO₂ emissions associated with poultry and salmon production, respectively.¹⁷ Feed accounts for the largest overall environmental impact of Atlantic salmon farming in all measured categories except eutrophication.¹⁸

POTENTIAL FOR AQUACULTURE MARKETS

Aquaculture is one of the fastest-growing industries in the world.

Green Plains has a unique opportunity to become a key supplier of high-quality, plant-based aquafeed for land-based recirculating aquaculture systems (RASs), which normally feed fish to fish.

Our Ultra-High Protein product is currently being tested in our aquafeed formulations and could potentially reduce demand for fishmeal in fish feed formulations, which in turn would help reduce the overfishing of the oceans.

We believe the inclusion of our Ultra-High Protein product in aquafeed formulations could positively impact the fish in/fish out (FIFO) ratio of aquafeed, where FIFO is a measure of kilograms of whole wild fish for fishmeal production per every 1 kilogram of farmed fish production.



- 11 Overland & Skrede 2016, Yeast derived from lignocellulosic biomass as a sustainable feed resource for use in aquaculture, J. Sci. of Food & Agriculture
- 12 Hauptman, B.S. et al. 2014; Aquaculture 432:7-14
- 13 Overland & Skrede 2017, Review, J. Sci. of Foods & Agriculture
- 14 Overland et al., 2013, Aquaculture, Sahlmann & Djordjevic et al., 2019; Aquaculture, Hansen et al., 2019, Aquaculture, Reveco & Hofosaeter et al., PlosOne In press
- 15 Grammes et al., 2013 Plos One; Reveco & Hofosaeter et al., Plos One In press; Hansen et al., 2019, Aquaculture; Sahlmann, Djordevic et al., 2019 Aquaculture
- 16 Alltech Agri-Food Outlook 2022
- 17 Burton et al., 2021, Use of an Ethanol Bio-Refinery Product as a Soy Bean Alternative in Diets for Fast-Growing Meat Production Species: A Circular Economy Approach, MDPI
- 18 Sherry, J. and J Koester Life cycle assessment of aquaculture council certified Atlantic salmon (*Salmo salar*). Sustainability 12:6079

ESG Highlights

Each year, our ESG reporting focuses on areas of greatest importance to both our business success and our key stakeholders.

Goal-setting, measurement, disclosure and continual progress are integral to our ESG efforts. In the tables that follow, we share an overview of the goals we set for 2022 for each of our Key ESG Topics, the progress made toward those targets in 2022 and some related goals that we have set for 2023 and beyond.



Environmental

- Climate Change & GHG Emissions
- Energy Use and Efficiency
- Water Management
- Biodiversity and Land Stewardship
- Waste, Circularity and Environmental Compliance



Social

- Employee Health and Safety
- Talent Acquisition, Engagement and DE&I
- Customers, Suppliers and Communities



Governance

- Board Composition and Structure
- Ethics and Compliance





Environmental



KEY ESG TOPICS	GOAL	Where We Are (Progress in 2022)	Where We Are Going (2023 and Beyond)
Climate Change & GHG Emissions	<ul style="list-style-type: none"> Short-term target to reduce our operational GHG emissions intensity 16.5% by 2026 compared to a 2020 baseline Medium-term target validated by SBTi to reduce Scopes 1 and 2 emissions 37.8% and Scope 3 emissions 22.5% by 2030 compared to a 2021 baseline Long-term carbon neutrality goal of 100% reduction in operational GHG emissions from 2018 baseline by 2050 Reduce other air permit deviations 60% by 2025 compared to 2020 baseline 	<p>1.87% reduction in operational GHG emissions intensity in 2022 over our 2020 baseline, keeping us ON TRACK to achieve our 2026 target</p> <p>12% increase in Scopes 1 and 2 and 22% increase in Scope 3 GHG emissions since 2021, which NEEDS IMPROVEMENT to achieve our 2030 SBTi targets</p> <p>26%* reduction in operational GHG emissions (thousand metric tons of CO₂e) in 2022 from 2018 baseline, keeping us ON TRACK to achieve our 2050 target</p> <p>89% reduction in air permit deviations in 2022 from 2020 baseline, ACHIEVING our 2025 target</p>	<ul style="list-style-type: none"> Currently developing carbon reduction strategy following the carbon management hierarchy model: Avoid, Reduce, Replace Began engineering and construction on several projects with expected emissions reduction, with plans to expand to additional biorefineries
		<p>Realized average renewable corn oil yield of 0.93 pounds/bushel in 2022, a 20% increase over 2020, keeping us ON TRACK to achieve our 2025 target</p> <p>1.86% reduction in natural gas intensity (MMBtu/Raw Material MT) in 2022 vs. 2021 baseline, FALLING SHORT of our 2026 target</p> <p>Completed evaporation system upgrades at our Obion, TN biorefinery, expected to reduce natural gas fuel consumption by approximately 10% at that biorefinery</p>	<ul style="list-style-type: none"> Planned evaporation system upgrades at our Central City, NE and Shenandoah, IA biorefineries, expected to reduce natural gas fuel consumption by approximately 10% at each Began engineering work on our first on-site electricity production project, a steam let-down turbine at our Shenandoah biorefinery

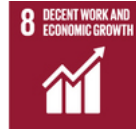
* Reductions a result of energy efficiency projects and asset divestments

KEY ESG TOPICS	GOAL	Where We Are (Progress in 2022)	Where We Are Going (2023 and Beyond)
Water Management	<ul style="list-style-type: none"> NEW GOAL: Reduce water intensity 10% by 2025 over 2021 baseline 	<p>3.01% reduction in water intensity (Thousand Cubic Meters/Raw Material MT) in 2022 vs. 2021 baseline, keeping us ON TRACK to achieve our target</p> <p>Successfully installed a controlled backwash system at our Otter Tail biorefinery that returns water previously being discharged back into the process, increasing water efficiency</p> 	<ul style="list-style-type: none"> Implementing efficiency and process improvements to reduce water use, such as eliminating water additions to yeast props Incorporating improvement ideas to reduce water usage (land application, wastewater pond projects and PEMS/CEMS system installs on scrubbers) into strategic plan
Biodiversity and Land Stewardship	<ul style="list-style-type: none"> NEW GOAL: 100% sustainably sourced primary feedstock by 2030* 	<p>We source 100% of feedstock from farmers, grain elevators and cooperatives in the U.S., with over 90% originating from local farmland surrounding our biorefineries</p> <p>Finalized a multiyear farm carbon strategy/grain origination road map by the end of 2022</p> <p>Defined "sustainably sourced" feedstock in the context of our farm carbon strategy</p> 	<ul style="list-style-type: none"> Beginning our phased approach to achieving our sustainable sourcing goal
Waste, Circularity and Environmental Compliance	<ul style="list-style-type: none"> Goal to enhance our corporate recycling program at our Omaha, NE headquarters in 2022 NEW GOAL: Zero waste to landfill by 2030 	<p>Finalized our corporate recycling program plan with planned initiation of phase I in 2023</p> <p>Completed tracking and consolidation of non-hazardous waste data at all of our biorefineries for 2022</p>	<ul style="list-style-type: none"> Developing active waste management plan in support of our zero waste goal

* Green Plains considers feedstock to be sustainably sourced when one or more of the following sustainable farming practices was implemented for the production of the feedstock, including but not limited to split application of nitrogen fertilizer, 4R nitrogen management (right time, right place, right form and right rate), use of cover crops, conservation tillage practices (low till/no till), use of manure as fertilizer, etc.



Social



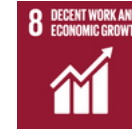
KEY ESG TOPICS	GOAL	Where We Are (Progress in 2022)	Where We Are Going (2023 and Beyond)
Employee Health and Safety	<ul style="list-style-type: none"> Reduce OSHA TRIR by 35% by 2025 compared to 2020 baseline Implement Cardinal Rules of Environment, Health, Safety and Security (EHSS) 	<p>46% decrease in OSHA TRIR in 2022 vs. 2020, ACHIEVING our 2025 target</p> <p>Safety metric included in executive compensation plan since 2012 and Cardinal Rules implemented in 2020</p> <p>Occupational Health & Safety Policy published in September 2021</p>	 <ul style="list-style-type: none"> 6S implementation across our platform, STOP Work Program, formalized shift change communication worksheets, standardize PPE and JSA card locations Integrate all EHSS training with new LMS launch and reimagine safety training for 2023 to be more interactive and inclusive
Talent Acquisition, Engagement and DE&I	<ul style="list-style-type: none"> Enhance the data quality and reliability of our candidate pool diversity metrics, to allow us to better measure and refine our recruiting action plans 	<p>In 2022, we enhanced our employee referral program and structured our new employee orientation and associated trainings</p> <p>Our 2022 internship program contributed to our talent needs as four interns in the program joined us as full-time employees</p>	<ul style="list-style-type: none"> In 2023, the new careers page on our website is going live, structured interviewing and selection training and implementation is set to occur, and traineeship programs are being established at select colleges and universities Enhance goals and plans on talent management, leadership training, and diversity, equity and inclusion Develop diverse recruiting pools and outreach throughout our communities and student group organizations. Examples are Society of Women Engineers, Rise Up Program and others

KEY ESG TOPICS	GOAL	Where We Are (Progress in 2022)	Where We Are Going (2023 and Beyond)
<p>Customers, Suppliers and Communities</p>	<ul style="list-style-type: none"> • 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 • Implement Quality Management System (QMS) and corresponding quality procedures at all facilities equipped with MSC™ technology coming online in 2023 • No findings on FDA audit for FSMA program in 2023 • Quality Deviation Report (QDR) training for all employees working at MSC™-equipped facilities coming online in 2023 • Establishment of KPI to track % of shipped products meeting specification • Maintain 50% bulk (rail and barge) shipping goal (in 2023) instead of truck to positively impact our CI scores and Scope 3 emissions 	<p>Donated \$274,338 in 2022, ACHIEVING our 2022 target</p> <p>Our people volunteered 4,004 hours in 2022, ACHIEVING our stated target of 2,000 hours</p> <p>ACHIEVED implementation of QMS at MSC™ facilities, no negative findings on U.S. FDA FSMA compliance audits and QDR training complete for all operational MSC facilities in 2022. Maintaining as ongoing goal for facilities coming online in 2023</p> <p>Infused over \$1.6 billion into local communities near our biorefineries via grain purchases in 2022, including over \$822 million in direct purchases from area farmers</p> <p>74% of biorefinery volume shipped by bulk transport (rail or barge) in 2022, ACHIEVING goal of 50%</p> <p>Met with all of our top outside carriers to discuss and collaborate on sustainability goals, alignments and backhaul program</p>	<ul style="list-style-type: none"> • Continue to engage with employee stakeholders to uncover new priorities for donations in 2023 and implement system for tracking and incentivizing employee volunteer hours • Continue to implement Product Quality and Food Safety Manual and implement QDR training across all new MSC™ facilities in 2023 • Continue internal audit program in 2023 to maintain no negative findings on future FDA audits and build the database to pull all testing (feed tags, COA, etc.) for product specifications to establish limits and identify out-of-specification products, keeping us on track to accomplish our goal of creating a key performance indicator (KPI) for tracking percentage of products meeting specification • Execute backhaul program with third-party carriers in 2023 to decrease deadheading (hauling from terminals to our biorefineries with an empty trailer) to reduce Scope 3 emissions





Governance



KEY ESG TOPICS	GOAL	Where We Are (Progress in 2022)	Where We Are Going (2023 and Beyond)
Board Composition and Structure	<ul style="list-style-type: none"> Goal to reduce Board size to eight members by 2023 Annual Meeting 	<p>Proposal to declassify Board voted on at our 2022 Annual Meeting of Shareholders and passed, resulting in start of multiyear declassification process</p> <p>ACHIEVED reduction to eight members with retirement of Board Chairman Wayne Hoovestol</p>	 <ul style="list-style-type: none"> At each Annual Meeting of Shareholders from 2023 to 2025, director elections will be for one-year terms, thus resulting in a completely declassified Board by 2025
Ethics and Compliance	<ul style="list-style-type: none"> By 2022, 100% of Green Plains employees will be trained on Code of Ethics, Anti-Corruption and Human and Labor Rights policies 	<p>100% of Green Plains employees received Ethics and Anti-Corruption Training and Human and Labor Rights Training through the Company's newly launched Learning Management System (LMS), with required completion dates of December 30, 2022, ACHIEVING our target.</p> <p>Enhanced Vendor Screening program in 2022, screening an additional 2,666 foreign and domestic suppliers against 880 different watches, sanctions and most-wanted lists, including key human rights list</p>	 <ul style="list-style-type: none"> Incorporate training for all employees on Code of Ethics, Anti-Corruption and Human and Labor Rights into company-wide launch of the new LMS in 2022, keeping us on track to accomplish our 2022 goal of 100% of employees trained

Environmental

Creating the biorefinery platform of the future is synonymous with expanding environmental stewardship.

OUR KEY TOPICS

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Climate Change
and GHG Emissions

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Energy Use and
Efficiency

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Water Management

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Natural Capital
and Land
Stewardship

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Waste,
Circularity and
Environmental
Compliance

Green Plains is driving innovation to further protect and benefit the environment.

In this section of our report, we present actions taken and milestones achieved in 2022 across our key environmental topics. Notable achievements include leveraging innovative technologies and partnerships to further decarbonize our proteins, oils, and sugars, with substantial implications for emission reductions. We also met or exceeded targets in energy efficiency, water management and sustainable sourcing last year.

Our targeted investments in carbon reduction are also creating their own next-level opportunities for environmental wins. Green Plains is partnering to develop a sustainable form of aviation fuel that, if brought to scale, would be a game-changer for global emissions. And we expect that our lowered CI levels will make us eligible for clean-energy incentives created and expanded with passage of the Inflation Reduction Act.

Climate Change and GHG Emissions

Global climate change continues to be the focus of considerable attention, with widespread concern about the impacts of human activity, especially the emission of greenhouse gases such as carbon dioxide and methane, which are known to trap heat in the Earth’s atmosphere.

As an ag-tech innovator and a producer of low-carbon fuels and ingredients, we are well positioned to serve as part of the solution to climate change. At the same time, we continually analyze and manage the potential risks that climate change poses to our business and communities.

In 2022, we continued to reduce the carbon footprint of our own operations, strengthened our climate risk analysis and management, and began an unprecedented collaboration to develop SAF.

We’ve set ambitious GHG reduction goals, with a path to carbon-neutral operations by 2050. As shown in the following tables, we are monitoring our progress with KPIs related to short-, medium- and long-term targets. We are excited to share that we have received validation of our near-term 2030 targets from the Science Based Targets initiative (SBTi), with the Scope 1 and 2 target ambition in alignment with a 1.5°C trajectory. This achievement demonstrates our commitment to credibility and accountability related to our impact on climate change.

Operational Emissions

Our products are created from annually renewable crops, primarily corn, with a low-carbon footprint. However, our biorefineries emit biogenic CO₂ through the process of fermentation, and additional CO₂ from the combustion of natural gas to run our boilers and dryers.

The majority of our operating emissions are released by the ethanol fermentation process and are classified as biogenic emissions. Most of the remaining emissions are from natural gas combustion (Scope 1) for steam generation and drying of distillers grains as well as indirect (Scope 2) emissions associated with electricity consumption. A very small amount of GHG emissions from gasoline, diesel and liquified petroleum gas (LPG) fuel combustion occurs on-site related to our mobile equipment and generators, and are included in our Scope 1 emissions.

Short-Term Target: Performance Tied to Our Sustainability-Linked Credit Facility

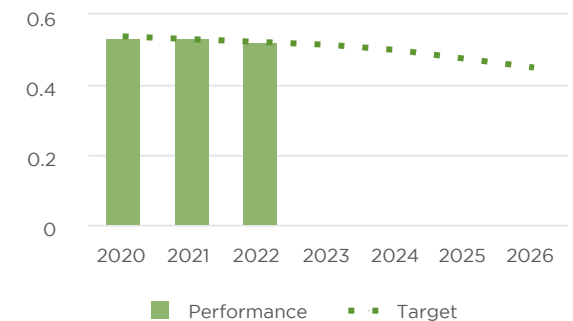
2026 GOAL:

16.5% reduction in operational GHG emissions intensity (vs. 2020)

2022 PROGRESS:

Reduced operational GHG emissions intensity by 1.87% (vs. 2020)

MT CO₂e/Raw Material MT





Medium-Term Targets: Validated by the Science Based Targets initiative (SBTi)

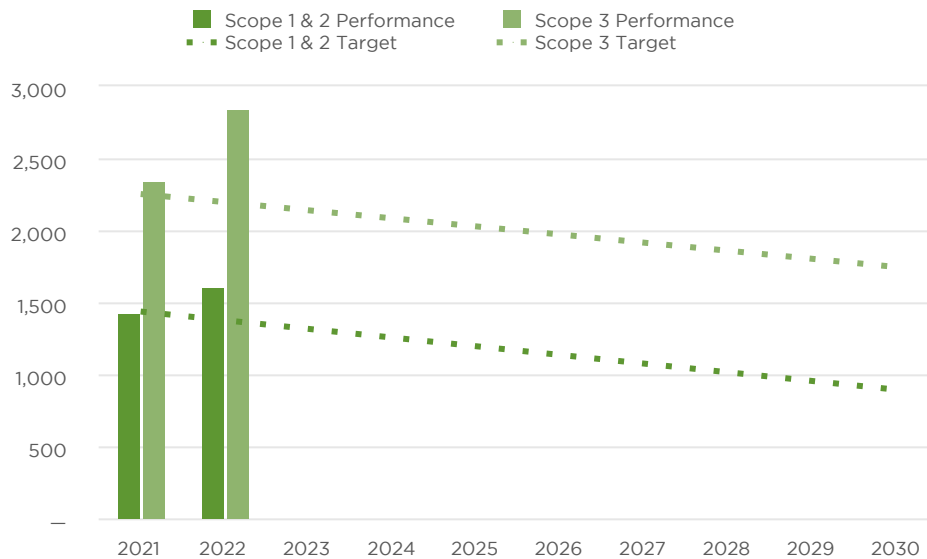
2030 GOAL:

Green Plains Inc. commits to reduce absolute scope 1 and scope 2 GHG emissions 37.8% by 2030 from a 2021 base year* Green Plains Inc. also commits to reduce absolute scope 3 GHG emissions 22.5% within the same timeframe.*

2022 PROGRESS:

12% increase in Scopes 1 and 2 and 22% increase in Scope 3 GHG emissions since 2021

Thousand Metric Tons CO₂e



* The target boundary includes land-related emissions and removals from bioenergy feedstocks

Long-Term Target: Carbon-Neutral Operations

2050 GOAL:

100% reduction in operational GHG emissions (Scopes 1, 2 and biogenic) (vs. 2018)**

2022 PROGRESS:

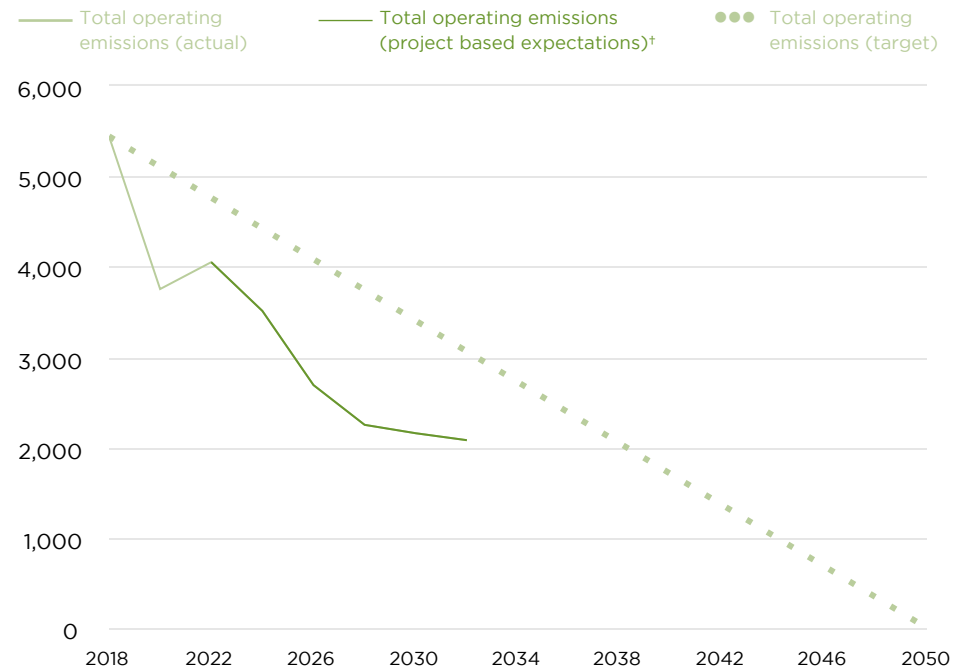
Reduced operational GHG emissions by 26% since 2018

**Not validated by the Science Based Targets initiative

PATH TO CARBON-NEUTRAL OPERATIONS BY 2050

(Scopes 1, 2 and Biogenic)

Thousand Metric Tons CO₂e



* 2022-2032 Project Based Expectations estimates based on various carbon and energy efficiency related projects and initiatives

Climate Risk and Opportunity Management

Green Plains recognizes that our business is not immune to potential physical or transitional impacts related to climate change. This global issue is likely to affect almost every aspect of our company, including potential impacts on the health and wellness of our employees, implications for how our facilities operate, sourcing of our raw materials and impacts on our customers' use of our products.

In 2022, we took a number of steps to further strengthen our climate risk strategy and management in the areas of governance, risk analysis and planning, and opportunity assessment and planning.

Enhanced ESG Governance

To decrease our exposure and build our resilience to climate change, we've enhanced our ESG governance, including a cross-functional ESG Workgroup comprising subject matter experts to systematically identify and assess our climate-related risks and opportunities. The ESG Workgroup met regularly in 2022, and members participated in a tabletop exercise and group discussion to further enhance our existing identification and assessment of climate-related risks and opportunities. Participants in the exercise considered the potential size and scope of identified risks, whether the identified risks and opportunities fall under short-, medium- or long-term time horizons, and whether the identified risks and opportunities could have a material financial impact on the organization. Consideration was also given to how the identified risks and opportunities could affect our business strategy and financial planning and how resilient our strategy is, considering different climate-related scenarios. We've set ambitious GHG reduction goals with a path to carbon-neutral operations by 2050.



We monitor our progress with KPIs that have short-, medium- and long-term goals.

Information about our ESG governance is set out in "ESG and Climate Change Governance" on page 10 of this report.

Climate Change Strategy: Scenario Analysis

We enhanced our climate change strategy in 2022 to include scenario analysis. Specifically, we chose two primary scenarios under which to consider our climate-related risks and opportunities: a 2° Celsius scenario and a Business-as-Usual scenario.

The 2°C scenario we selected aligns with the Intergovernmental Panel on Climate Change (IPCC) Representative Concentration Pathway (RCP) 2.6.

The Business-as-Usual scenario we selected aligns with the IPCC RCP 8.5. These IPCC scenarios are considered physical scenarios that describe the patterns of physical impacts attributable to climate change. We also considered how each scenario would align with the International Energy Agency (IEA) World Energy Outlook (WEO) transition scenarios meant to describe scenario pathways that deliver a given limit to warming. The 2°C scenario we selected aligns with the IEA WEO 450ppm Scenario, and the Business-as-Usual scenario we selected aligns with the IEA WEO Current Policies Scenario.

Our chosen 2°C scenario assumes that aggressive mitigation efforts are made to combat climate change, global emissions are halved by 2050 and global average temperature rise is not likely to exceed 2°C above pre-industrial levels. Businesses are primarily impacted by transition risks under this scenario, and the physical impacts are constrained but not completely avoided.

Many separate efforts to reduce CO₂ emissions from the energy sector occur between now and 2040, including stronger deployment of technologies that are currently available at commercial scale today, the building of significant additional nuclear capacity and rapid deployment of carbon capture and storage (CCS). Additional key drivers and signposts that would need to occur include strong efficiency-related policy action, increased renewable energy generation, implementation of carbon pricing mechanisms, rapid deployment of electric vehicles (EVs) charged with renewable electricity, and increased use of bioenergy where biofuels make up 17% of worldwide transportation fuel demand.

Our chosen Business-as-Usual scenario assumes that emissions continue rising at current rates and global average temperature rise likely exceeds 4°C above pre-industrial levels. Business is impacted most by physical risks as opposed to transition risks. More heat waves, changes in rainfall patterns and monsoon systems occur, Arctic summer sea ice almost disappears, and sea levels rise by one half to one meter. It is a future in which governments fail to follow through on policy proposals that have yet to be backed by legislation or other means of implementation and do not introduce any other policies that affect the energy sector. Additional key drivers and signposts that would occur include more unusually hot and fewer unusually cold days almost everywhere, increased ocean warming, dry areas becoming drier, wet areas becoming wetter and a decrease in glacier volumes.

Identified Risks

We have identified inherent climate-related risks with the potential to substantively affect our financials or broader business strategy. As the world moves toward a lower-carbon future, Green Plains acknowledges the possible risks associated with climate change, and we continually incorporate this understanding into our overall business strategy and planning.

Green Plains considers two types of climate-related risks: physical and transitional.

We regularly review and evaluate topics that have the potential to present physical risks under a Business-as-Usual scenario and actively develop methods to mitigate those risks. Climate change has been shown to increasingly-cause more extreme weather conditions such as intense hurricanes, thunderstorms, tornadoes and winter storms, as well as increased volatility in seasonal temperatures. In partnership with our property insurer, we focus on these physical climate risks, and we are actively working to identify and respond to high-exposure areas. Our property insurer offers premium credit to its insurance customers for their efforts to address these risks through projects aimed at improving climate resilience such as structural improvements to increase snow-load capacity and wind resistance. Extreme weather conditions, droughts, unpredictable or later-than-usual last freeze/frost, and associated crop damage and negative impacts on yields may adversely affect the availability, quality and price of the annually renewable agricultural commodities we rely on to supply our biorefineries, as well as our operations

and operating results. We also recognize that developments in drought-tolerant seed might not keep pace with these rapid changes. We may also see increased frequency of flood events similar to what occurred in our geographic area in 2019, which caused supply chain interruptions. This could also result in remapped floodplains, putting our assets in newly created flood zones and resulting in increased insurance premiums. Our Emergency Response Plans for all our operational sites detail the procedures for emergency scenarios, including adverse weather events. Rising mean temperatures and longer and more frequent summer heat waves would also make it more challenging to maintain the temperature of our refining process, resulting in the need to run supplementary summertime chillers longer or upgrade their capacities. Such adjustments would add to operating costs and could increase our emissions.





We also consider the potential risks associated with rapidly transitioning to a low-carbon economy under a 2°C scenario and pay close attention to relevant policy, legal, technology and market changes. We regularly engage with stakeholders, policymakers, regulators and our industry partners on climate change issues and how they might affect our business.

First, compliance with evolving environmental laws and regulations, particularly those related to climate change, could be costly. Enhanced emissions-reporting obligations and mandates on and regulation of existing products and services could result in increased operating costs, higher compliance costs and increased insurance premiums. Climate change legislation in the U.S. and abroad is likely to receive increased focus for the foreseeable future, with numerous past and future proposals made at the international, national, regional and state levels of government to reduce GHG emissions. Compliance with future laws or regulations to decrease GHG emissions may have an adverse impact on our operations, cash flows and financial position.

Second, our biorefineries are subject to extensive environmental regulations. Our ability to maintain the required regulatory permits or manage changes in environmental regulations is essential to successfully operating our biorefineries. Governing state agencies could impose costly conditions or restrictions that are detrimental to our profitability and may have a materially-adverse effect on our business. Costs to transition to lower-emissions process technology related to our decarbonization strategy is an important risk we consider that has the potential to result in increased research and development (R&D) expenditures related to new and alternative technologies in addition to capital investments in technology development. Possible unsuccessful investment in new technologies poses further risk. Uncertainty in market signals that result in abrupt and unexpected shifts in energy costs could have an adverse impact on our operations.

Our industry is particularly susceptible to large and unexpected spikes in fossil natural gas prices. For example, \$13 natural gas contributed to a series of widespread bankruptcies in the ethanol industry in 2008.

Also, transitioning to a low-carbon economy could result in increased cost of raw materials, such as corn, enzymes and yeast. Fluctuating input prices could increase our overall production costs. Many of our biorefineries are capable of processing a variety of primary feedstocks beyond corn, including sorghum/milo and sugar beets. In fact, two of our biorefineries have regulatory-approved pathways to process sugar beets into ethanol. We also have plans to secure regulatory approval to process sorghum/milo into ethanol at a select number of facilities where there is adequate local sourcing available. While we believe this risk to be of relatively low-probability, this feedstock versatility is just one way in which we seek to manage the various risks facing our business.

Further, our industry faces some level of scrutiny as it relates to debates around food vs. fuel and land use change/conversion. Please see page 45 for our analysis and position on these topics. This stigmatization could potentially result in reduced revenue from decreased production capacity (e.g., reduced/uncertain renewable volume obligations under the Renewable Fuel Standard (RFS), delayed planning approvals or delayed air permitting for expansion projects or new construction). Increased stakeholder concern or negative stakeholder feedback related to the perceived impact that our business has on climate change or food prices could result in a reduction in capital availability. Banks, lenders and other providers of capital may be more hesitant to invest in our business.

This discussion of our identified climate risks incorporates risks disclosed in the Risk Factors section of Green Plains Inc.'s Form 10-K SEC filing.

Identified Opportunities

We believe that low-carbon biofuel will continue to play a critical role in decarbonizing the economy, creating well-paying STEM jobs and reinforcing our domestic energy security. Green Plains is in a unique position to help address the most significant ESG risk of climate change, as we are in the business of producing low-carbon ingredients and fuels that displace traditional fossil fuel-based alternatives.

Use of our products helps Green Plains' customers comply with the RFS, a law enacted by the U.S. Congress in 2005 and expanded in 2007, with goals to reduce surface transportation GHG emissions, expand the nation's renewable fuels sector, decrease our reliance on imported fossil fuels and encourage ethanol production for use as a gasoline oxygenate to replace MTBE, which had been banned in multiple states.¹⁹

From 2007 through 2022, the renewable biofuels we produced have reduced GHG emissions by more than 48.3 million metric tons (MMT) of carbon dioxide equivalents, the equivalent of taking 10.4 million passenger vehicles off the road for one year.²⁰

As an additional environmental benefit, ethanol, the most cost-effective octane enhancer available, also displaces some of the toxic elements of gasoline — aromatics such as xylene, toluene and benzene — thereby reducing particulate matter that negatively impacts air quality in addition to reducing GHG emissions.

¹⁹ <https://www.epa.gov/renewable-fuel-standard-program>

²⁰ <https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator>

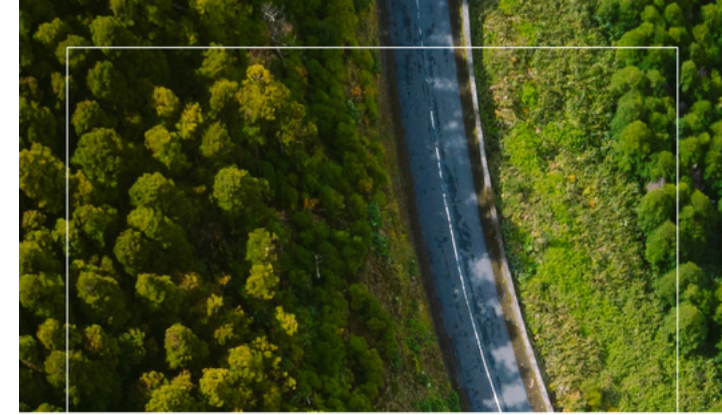
²¹ <https://iopscience.iop.org/article/10.1088/1748-9326/abde08/pdf>

While most of our opportunities exist in a 2°C scenario, we also recognize there may be some unexpected opportunities in a Business-as-Usual world. Rising mean temperatures could create the right circumstances for an increase in domestic double cropping, as is currently common in Brazil. This increase in the supply of crop feedstocks could positively impact availability and put downward pressure on corn prices.

Looking forward, we also believe that the transition opportunities available to Green Plains under a 2°C scenario cannot be overstated.

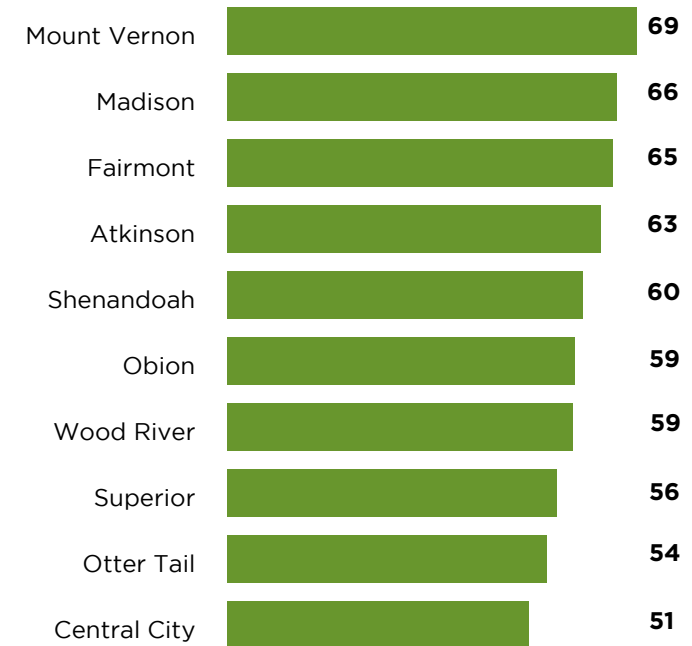
We believe the passage of the Inflation Reduction Act, and in particular the creation of the Clean Fuel Production Credit (CFPC) under section 45Z, presents an enormous opportunity for low-carbon liquid fuel producers like us. The CFPC would allow a biofuel producer to earn \$0.02 per gallon for every CI point below 50kgCO₂e/MMBtu up to \$1.00 per gallon. Our biorefinery platform has the capacity to produce nearly 1 billion gallons of renewable biofuels annually. The basis for the CI calculation under this program is the most recent Argonne Greenhouse Gases, Regulated Emissions and Energy Use in Transportation (GREET) model as measured in kilograms of CO₂e per million British Thermal Units. The current estimated Argonne GREET CI scores of our facilities are found in the accompanying table, and align with the most up-to-date studies analyzing the CI of corn ethanol. According to one such study,

U.S. ethanol has a 46% lower GHG profile on average than petroleum-based gasoline.²¹

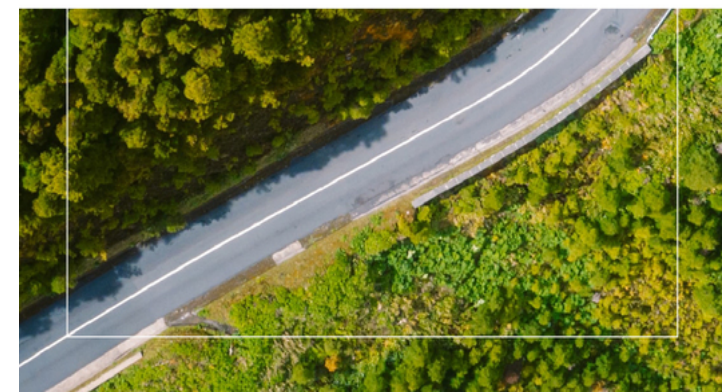


ARGONNE GREET CI SCORES

KG CO₂E/MMBTU



* York not listed as it primarily produces non-transportation ethanol.



Carbon Reduction Strategy

Our carbon reduction strategy is based on the carbon management hierarchy model: Avoid, Reduce, Replace.

Over the past 15 years, we have used existing low-carbon fuel markets that incentivize the use of low-carbon biofuels like California’s Low Carbon Fuel Standard (LCFS) program and other state programs, as the basis for identifying our energy transition opportunities, with a focus on analyzing existing technologies where possible and assessing new technologies to reduce our emissions and improve carbon efficiency.

With the passage of the Inflation Reduction Act and the creation of the CFPC, our carbon reduction and energy transition strategy now has an additional federal layer that allows for a consistent framework to evaluate the technical feasibility and, most importantly, the economic viability of energy transition investments. With eight of our biorefineries already on the Summit Carbon Solutions (SCS) carbon sequestration pipeline project, which is expected to capture approximately 1.9 million metric tons of CO₂ from our facilities, the same amount that would be sequestered by 2.3 million acres of U.S. forests in a year,²² the CI of our biofuel is expected to drop 25-30 points. This is why capturing and sequestering our biogenic CO₂ is our No. 1 priority and represents a major step in our decarbonization strategy. It is important to note that none of this captured CO₂ will be used for enhanced oil recovery. We are also exploring opportunities to capture and utilize or sequester CO₂ at our biorefineries that are not on the SCS pipeline.

In order to further reduce the CI of our biofuels and other products/ingredients, however, we will need to invest in additional technology. We are evaluating technologies such as combined heat and power (CHP) co-generation systems, anaerobic digesters and gasification systems to produce biogas and renewable natural gas (RNG), photovoltaic solar, wind turbines and other co-generation technologies like steam let-down turbines. In fact, we have already begun engineering and/or construction on several projects that are expected to result in emissions reductions. The CST™ installation at our Shenandoah biorefinery is expected to reduce our biogenic emissions. We are also driving a steam let-down turbine co-generation project at our Shenandoah biorefinery targeting our Scope 2 emissions, as well as evaporation system upgrades at our Obion biorefinery that are expected to reduce Scope 1 emissions from natural gas combustion.

Our decarbonization strategy is based on the unique operational circumstances and technical specifications of each of our biorefineries.

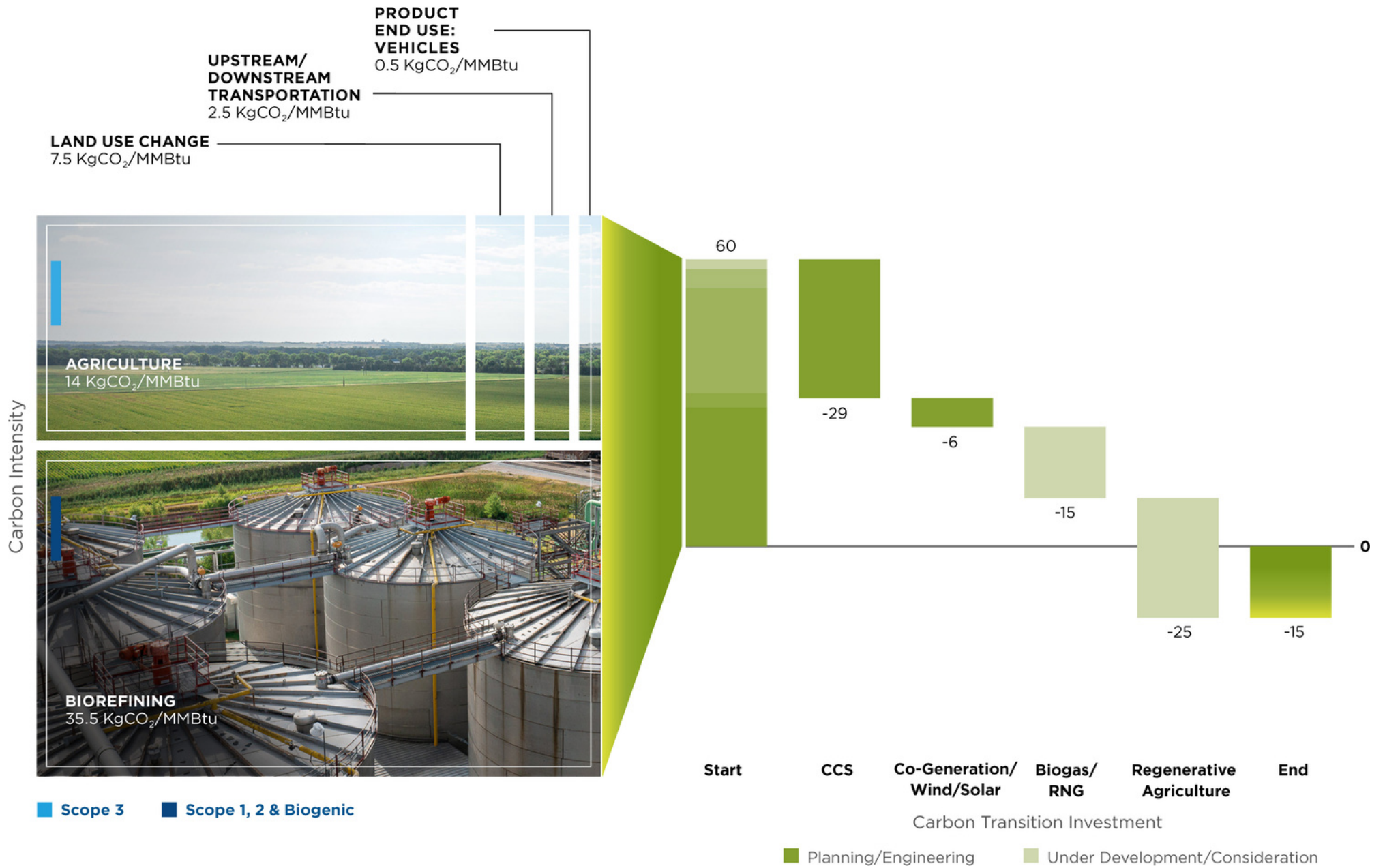
Each of our facilities has unique characteristics that will require a varying combination of low-carbon technologies. For example, while one facility may be suitable for wind turbines and photovoltaic solar due to land availability and wind speeds, another may lack Federal Aviation Administration clearance due to a nearby airport, and the available land may not be suitable due to wetlands or other protected habitat. Any sites not suitable for traditional low-carbon technology may have to rely more heavily on CHP systems and other co-generation opportunities.

Additionally, the viability of biogas and RNG production via anaerobic digestion and gasification will depend on sourcing feedstock of sufficient quality and regularity. Examples of how different technologies impact the CI of our biofuel under the GREET model are shown on the following page. Each location’s waterfall will be unique, with the end goal remaining the same: carbon-neutral or carbon-negative liquid biofuels. Whether it is converted into SAF or used in legacy internal combustion surface-transportation vehicles, there is a bright future ahead for biofuels that can achieve carbon neutrality.



²² <https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator>

BREAKDOWN OF 60 CI ETHANOL AND CARBON REDUCTION STRATEGY



Blue Blade Energy: Tomorrow's Aviation Fuel

All roads lead to SAF.

Decarbonization of the aviation industry is one of the most promising opportunities for biofuel producers like Green Plains. New alcohol-to-jet (ATJ) pathways will be necessary to achieve the U.S. government's ambitious volume targets for SAF. The "SAF Grand Challenge" calls for 3 billion gallons of SAF by 2030, and 35 billion gallons by 2050, up from the approximately 5 million gallons the country produces today. A goal that aggressive will require feedstock in large volumes, and the U.S. ethanol industry already produces 15 billion gallons of alcohol per year.



In September 2022, Green Plains announced a partnership with Tallgrass to develop a Pacific Northwest National Laboratory (PNNL) SAF technology with a new, robust and efficient catalyst that converts ethanol to a ketone with a carbon-oxygen bond, which is more energy efficient to break for conversion to the final jet fuel. Because the ethanol to ketone conversion is a single-step process, we believe the PNNL technology can be a game-changer in efficiently converting low-carbon alcohol to a drop-in SAF.

In January 2023, we announced that United Airlines had joined the project, creating a joint venture (JV) with Green Plains and Tallgrass — Blue Blade Energy — to develop the catalyst and, depending on successful optimization, construct pilot and then full-scale production facilities. We expect that Green Plains will contribute ethanol feedstock, as well as production and technological expertise. The JV is a first-of-its kind business strategy in the SAF space, capitalizing on the four key components of feedstock, technology, infrastructure and demand. Tallgrass and Green Plains envisioned a structure with a demand partner that would not only use the fuel, but also invest in the technology development.

This JV is the culmination of our transformation into a sustainable ingredient producer, marking significant progress in all our pillars of Protein, Renewable Corn Oil, Sugar and Carbon. ATJ pathways utilizing decarbonized ethanol as feedstock represent exciting opportunities for Green Plains and our shareholders, as well as for an evolving ethanol industry.

Tracking Climate Performance

To align our climate strategy and risk management process with our assessment of climate-related risks and opportunities, we began by tracking and publishing various relevant metrics and KPIs in our annual Sustainability Report. From those metrics, we developed short-, medium- and long-term goals and targets. Our ESG Workgroup evaluates, monitors and establishes targets by working with goal owners who develop specific plans, budgets and timelines to achieve individual goals. These are then reviewed and approved by the SLT and the Board's Nominating and Governance Committee.

We report on several key areas of impact, metrics and targets associated with climate-related risks and opportunities, including GHG emissions, energy use, water use and land stewardship. The primary metric associated with our climate-related risks and opportunities is our absolute GHG emissions and the procedures and methods to collect data critical for calculating these emissions. Additional metrics associated with our climate change strategy include operational GHG emissions intensity at the organizational level as measured in metric tons of CO₂e per metric ton of raw material feedstock, as well as the CI of our biofuel as measured in kilograms of CO₂e per MMBtu. Through the tracking of these metrics, we can closely monitor our environmental impact and adjust our approach as needed. We continue to analyze our overall environmental performance across our company and identify areas for improvement. We have robust processes in place and continue to implement improvements to better understand and minimize our environmental impact.

GREEN PLAINS PERFORMANCE DATA	UNIT OF MEASUREMENT	2022	2021	2020	2019	2018
Direct GHG Emissions (Scope 1)	Thousand Metric Tons (MT) CO ₂ e	1,252	1,098	1,179	1,316	1,688
Carbon Dioxide (CO ₂)	Thousand MT	1,251	1,096	1,178	1,315	1,686
Methane (CH ₄)	Thousand MT CO ₂ e	0.596	0.519	0.557	0.620	0.795
Nitrous Oxide (N ₂ O)	Thousand MT CO ₂ e	0.779	0.631	0.677	0.739	0.947
Indirect GHG Emissions (Scope 2)	Thousand MT CO ₂ e	357	338	348	527	655
CO ₂	Thousand MT	355	336	345	524	652
CH ₄	Thousand MT CO ₂ e	0.928	0.893	0.910	0.215	0.267
N ₂ O	Thousand MT CO ₂ e	1.608	1.536	1.567	2.599	3.230
Biogenic GHG Emissions (CO ₂ from Fermentation)	Thousand MT	2,441	2,101	2,225	2,444	3,100
Total Operational GHG Emissions (Scope 1, 2 and Biogenic)	Thousand MT CO ₂ e	4,050	3,537	3,752	4,287	5,443
Operational Emissions Intensity	MT of CO ₂ e/Raw Material MT	0.528	0.536	0.538	0.566	0.569
Indirect GHG Emissions (Scope 3)	Thousand MT CO ₂ e	2,849	2,342	—	—	—
Category 1	Thousand MT CO ₂ e	2,128	1,751	—	—	—
Category 2	Thousand MT CO ₂ e	47.6	45.4	—	—	—
Category 3	Thousand MT CO ₂ e	463	345	—	—	—
Category 4	Thousand MT CO ₂ e	52.0	44.8	—	—	—
Category 7	Thousand MT CO ₂ e	2.35	2.39	—	—	—
Category 9	Thousand MT CO ₂ e	78.2	87.2	—	—	—
Category 11	Thousand MT CO ₂ e	77.3	66.5	—	—	—

* 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](#). We use a grid/location-based method of converting purchased electricity into GHG emissions. Scope 3 emissions are reported for category 1 (purchased goods and services), category 2 (capital goods), category 3 (fuel & energy related activities not included in Scopes 1 or 2), category 4 (upstream transportation and distribution, category 7 (employee commuting), category 9 (downstream transportation and distribution) and category 11 (use of sold products).

NON-GHG EMISSIONS

2025 GOAL:

Reduce air permit deviations by 60% (vs. 2020)

2022 EARLY ACHIEVEMENT:

Air permit deviations reduced by 89.49% (vs. 2020)

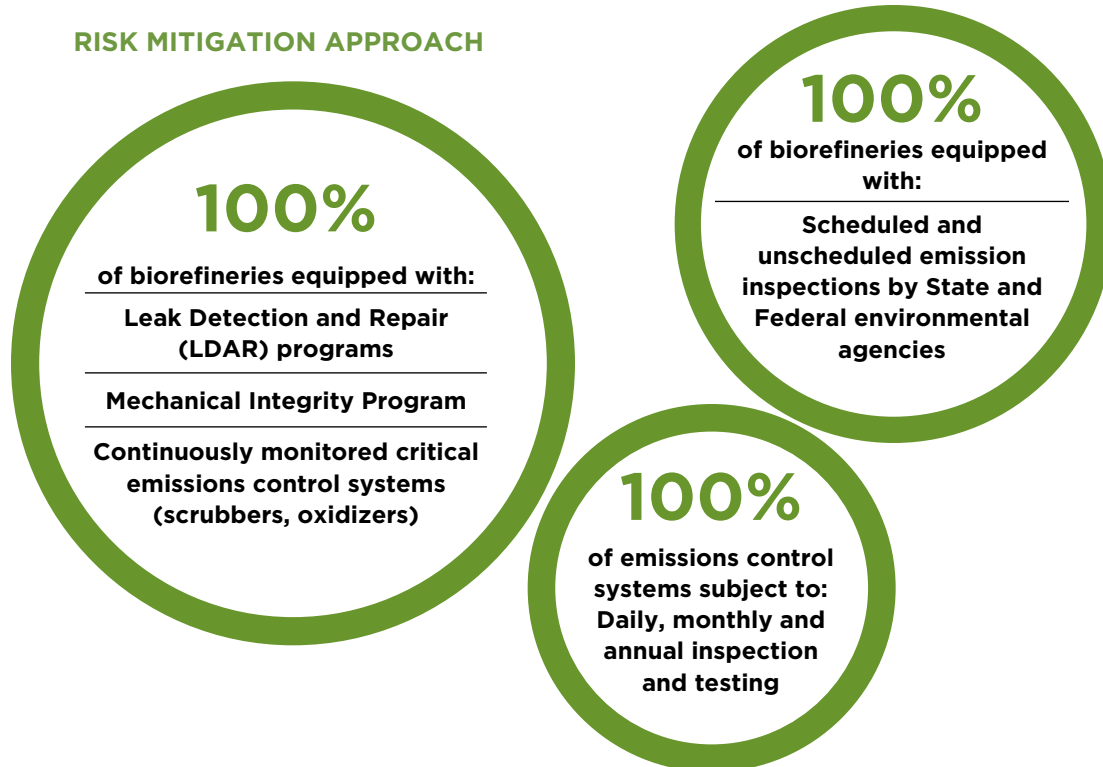
Biorefineries produce some level of volatile organic compounds (VOCs), hazardous air pollutants (HAPs) and particulate matter (PM) in the production of ingredients. To reduce these emissions from our operations, we employ thermal oxidizer (TO) and regenerative thermal oxidizer (RTO) emissions systems to remove up to 98% of the VOCs, HAPs and PM caused by the manufacturing process. For example, we upgraded the environmental controls for the dryers at our Mount Vernon, Indiana, biorefinery in early 2022 to reduce VOCs, HAPs and PM. These upgrades also lowered the biorefinery's natural gas consumption, thereby reducing Scope 1 GHG emissions (MT CO₂e) at the facility as well.

ENTERPRISE-WIDE AIR EMISSIONS (EXCLUDES GHGs)*

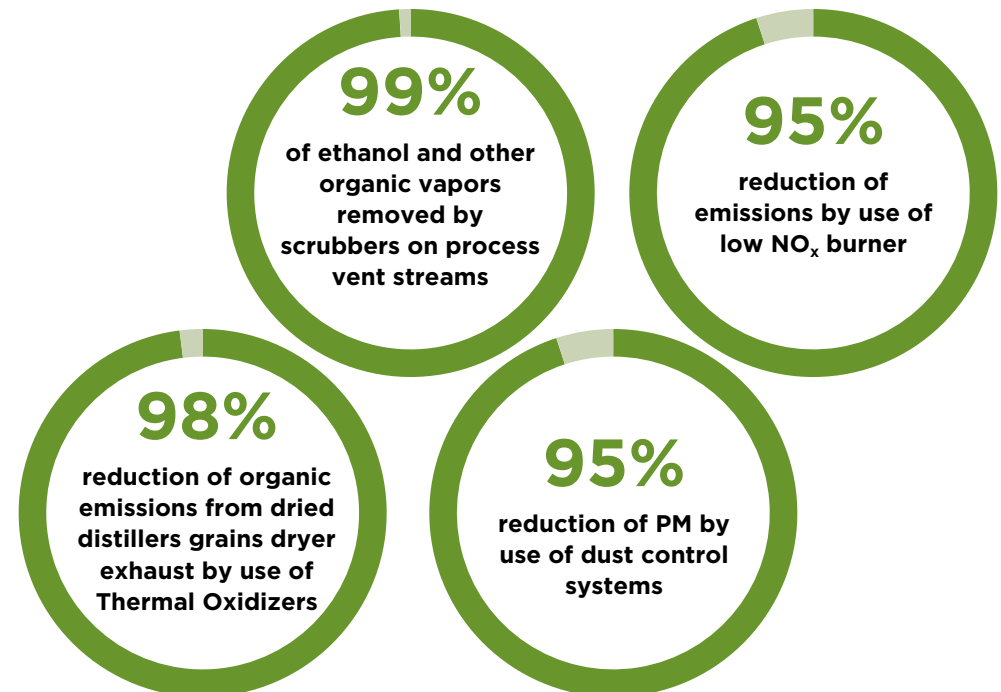
GREEN PLAINS PERFORMANCE DATA	UNIT OF MEASUREMENT	2022	2021	2020	2019	2018
Sulfur Dioxide (SO ₂)	Thousand Metric Tons	0.089	0.087	0.098	0.099	0.122
Nitrogen Oxides (NO _x)	Thousand Metric Tons	0.551	0.482	0.551	0.634	0.826
VOC Emissions	Thousand Metric Tons	0.696	0.649	0.563	0.583	0.746
Carbon Monoxide Emissions	Thousand Metric Tons	0.375	0.341	0.354	0.377	0.489
Particulate Matter Emissions	Thousand Metric Tons	0.371	0.329	0.379	0.397	0.452
Air Quality Permits, Standards and Regulations	Incidents of Non-Compliance	161	959	1,532	—	—

* Investments in emissions control systems exceed local environmental regulations.

RISK MITIGATION APPROACH



OPERATIONAL ACHIEVEMENTS



Natural Gas Intensity Decrease

1.86%

decrease by the end of 2022 over 2021 baseline



Energy Use and Efficiency

Green Plains is actively targeting and achieving new energy efficiencies across our operations and value chain.

Efforts in 2022 focused on setting new efficiency targets, contributing to increased production of renewable fuel, supporting reductions in CI and working with our transportation partners to optimize energy use.

Energy, in the form of purchased electricity and the combustion of natural gas fuel, is required to convert our feedstock into biofuels, feed and ingredients. That requirement won't change, but how and where we source energy and how efficiently we manage it can. We currently source grid electricity and fossil natural gas. While the share of renewables on the grid is constantly improving and natural gas is one of the least carbon-intense fossil fuels, we understand there is more that we can do.

In 2022, we continued to reduce our energy use and increase energy efficiency across our platform.

Energy use and efficiency are key components of our carbon reduction strategy.

A variety of clean energy-generation technologies are incorporated into the plan, including combined heat and power systems, co-generation, wind turbines, and photovoltaic solar. We have made steady reductions in both operational electricity and fuel consumption since 2018. We are also planning or engineering a number of energy efficiency projects, including drier exhaust energy reclamation and evaporator system upgrades. In addition, we regularly incorporate energy efficiency projects into our annual capital expenditures plan such as boiler and economizer upgrades, centrifuge power packs and variable frequency drives.

2026 GOAL:

2% reduction per year of our natural gas intensity (MMBtu/Raw Material MT)

2022 PROGRESS:

Reduced natural gas intensity by 1.86% (vs. 2021)

CONSUMPTION REDUCTION SINCE 2018

Off-site electricity consumption (thousand megawatt hours) reduced by 21.50%

On-site natural gas fuel consumption (MMBtu) reduced by 23.83%

GREEN PLAINS PERFORMANCE DATA	UNIT OF MEASUREMENT	2022	2021	2020	2019	2018
Electricity Use	Thousand Megawatt Hours	726	650	661	735	924
Energy Intensity	Kilowatt Hours (KWh) / Raw Material MT	94.635	98.438	94.846	97.038	96.585
Natural Gas	Million British Thermal Unit (MMBtu)	23,517,446	20,622,819	22,158,963	24,778,741	30,874,334
Natural Gas Intensity	MMBtu / Raw Material MT	3.067	3.125	3.179	3.271	3.226

Clean Energy From Renewable Corn Oil

We are a critical player in the production of clean fuels, in addition to creating low-carbon feedstocks for advanced biofuel production. One of our main goals is to contribute in a bigger way to the production of low-CI fuels, such as renewable diesel and SAF through increased renewable corn oil yields.

2025 GOAL:

50% increase in average renewable corn oil yield (vs. 2020)

2022 PROGRESS:

Increased average renewable corn oil yield by 20.19% (vs. 2020)

2025 GOAL:

Achieve average renewable corn oil yield of 1.2 pounds per bushel

2022 PROGRESS:

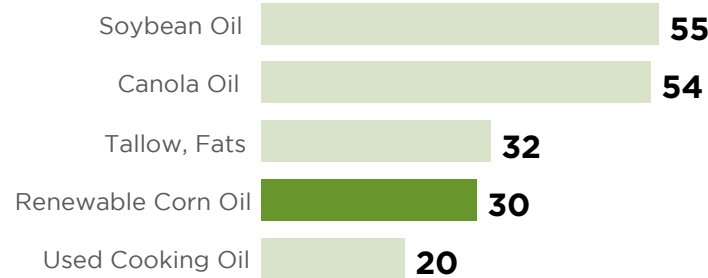
Achieved average renewable corn oil yield of 0.93 pounds per bushel

Renewable corn oil has a lower CI than most available feedstocks,²³ and because it is not suitable for human consumption, it is considered a “waste oil” under the RFS and LCFS programs. The renewable corn oil produced at our biorefineries is an ideal low-CI feedstock for renewable diesel, biodiesel and SAF, and we have already increased our renewable corn oil yields since 2020, on track to achieve our 2025 targets. This effort is a prime example of how we continually work on extracting additional value from every kernel of corn we procure, creating more value for farmers and our stakeholders, while also supplying fuels that reduce GHG emissions.

²³ <https://iopscience.iop.org/article/10.1088/1748-9326/abde08>



AVERAGE CI PATHWAYS FOR BIODIESEL AND RENEWABLE DIESEL FEEDSTOCK



Source: Company analysis of California Air Resources Board’s pathways

Product Transportation and Infrastructure

While the nature of our business lends itself to majority bulk transport with its smaller carbon footprint, Green Plains is partnering to optimize efficiencies in the local trucking services we also employ.

According to the Association of American Railroads, moving freight by rail rather than trucks reduces GHG emissions by up to 75%.²⁴

Today, Green Plains moves the majority of our biorefinery output via rail or barge. We met our 2022 goal of maintaining at least 50% in bulk transport last year in order to keep our CI scores low, achieving 74%.

2022 GOAL:

Maintain at least 50% bulk transport

2022 ACHIEVEMENT:

Maintained 74% bulk transport

The balance of our freight moves by truck. Our primary strategic initiative for this key area of impact is to execute a volunteer backhaul program with our third-party carriers in 2023 to decrease deadheading.

2022 GOAL:

Meet with all of our top outside carriers to align on backhaul program by year end

2022 ACHIEVEMENT:

Met with all of our top outside carriers to discuss and collaborate on sustainability goals, alignments and backhaul program

2023 GOAL:

Execute a volunteer backhaul program with third-party carriers to decrease deadheading

In such a program, third-party carriers would voluntarily share what percentage of shipments originating out of our plants and terminals are backhauls. Deadheading is any trip from our product's destination, usually our terminals, back to our biorefineries with an empty trailer. Traveling with an empty trailer significantly increases the GHG emission intensity of the trip (MT CO₂e per ton-mile). Studies show that decreasing deadheading can reduce Scope 3 emissions between 3% and 20%.²⁵

In 2022, our immediate objective was to directly engage with third-party carriers and trucking companies to discuss and collaborate on sustainability goals, alignments and the backhaul program, with a goal of meeting with all of our top outside carriers by the end of the year. Having met this goal in 2022, we are in the process of implementing the backhaul program this year.

Our established network of biofuel storage facilities, at or near our 11 biorefineries, also helps

us manage our transportation footprint.

These facilities allow fuel and other value-added products to be easily loaded into railcars and tanker trucks. Each location features fuel storage tanks and access to major rail lines for transportation. By utilizing rail transportation assets, we are further reducing the need to truck biofuel long distances. Through our controlling stake in Green Plains Partners, a master limited partnership, we oversee a leased railcar fleet with an aggregate capacity of 85 million gallons dedicated to transporting end products. Green Plains Partners' wholly owned subsidiary, BlendStar LLC, and its network of rail-accessible fuel terminals, with a combined storage capacity of approximately 6.9 million gallons, puts us in an effective position to reach southern markets that previously did not have efficient access to renewable fuel.



24 <https://www.aar.org/wp-content/uploads/2020/06/AAR-Sustainability-Fact-Sheet.pdf>

25 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.

Water Management

We are acting with urgency to decrease water use in our operations wherever possible, applying new technologies and processes to help safeguard this vital natural resource.

In 2022, Green Plains continued to drive new water-use efficiencies in our biorefineries, reduce our water intensity and water-permit deviations and work with our farmer customers to support sustainable agricultural practices.

Water Sourcing

Each of our biorefineries requires a consistent and reliable supply of water, and we understand that efficient water use in production minimizes water disruption and pollution in the communities where we operate. The water used is sourced from groundwater (well water) and to a lesser degree from third-party providers (municipal water, including recycled municipal water). Much of the water used is recycled back into our biorefinery process. Since 2018, we have realized a 3.68% reduction in water withdrawn (thousand cubic meters), and we are acting to build on this progress.

Goals and Achievements

Our approach is being validated by the steady or early achievement of important water-management goals:

2025 GOAL:

Reduce water intensity by 10% (vs. 2021)

2022 PROGRESS:

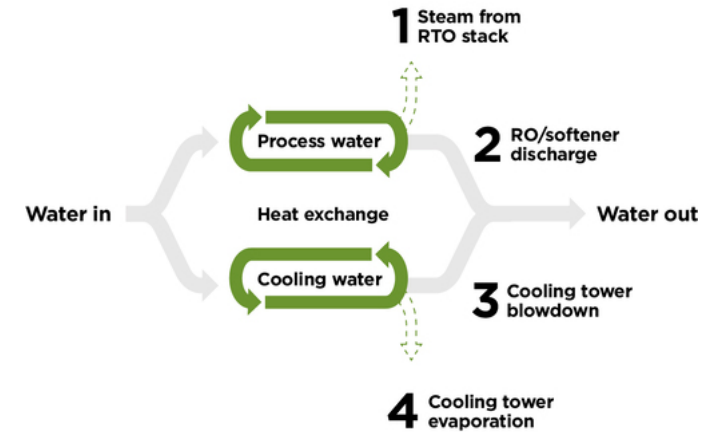
Water intensity reduced by **3.01%** (Thousand Cubic Meters/Raw Material MT) (vs. 2021)

Water Resource Management

We are currently developing a water resource management plan to guide us toward achieving our water management goals and are actively incorporating ways to reduce water usage (e.g., land application, wastewater pond projects, eliminating water additions to yeast props) into our strategic plan.

In 2022, we implemented a number of efficiency and process improvements to reduce our operational water use. These included eliminating water additions to yeast props and successfully installing a controlled backwash system at our Otter Tail facility, which now returns water that was previously being discharged to the river back into our processes, increasing water efficiency. In 2022, we also performed periodic stack testing, which has allowed us to reduce the water flow and consumption of our CO₂ scrubbers at some of our biorefineries. Planned efficiency solutions include implementing a drier-exhaust energy reclamation system that is able to condense the process water vapor exiting our dryer stack back into liquid for recycling.

As seen in the diagram below, two streams of water are used in our biorefinery processes — cooling water and process water — and they do not come into contact with each other. Due to this stream separation, the majority of our cooling water and nearly all of our process water can be recirculated. Some water is lost through water treatment discharge (reverse osmosis reject and softener regeneration), boiler blowdowns, evaporation via dryer stacks, evaporation via cooling tower, or (at all but one of our facilities) the discharge of cooling water via continuous or periodic cooling tower blowdowns. Continuously recirculating cooling water eventually builds up dissolved solids to the point where it needs to be replenished with fresh water.



Environmental Compliance

We comply with all local and federal appropriation, pollution and permitting requirements for water utilization at our facilities, and all but one of our facilities have zero liquid process water discharge. Additionally, our Shenandoah facility utilizes treated municipal recycled water in its cooling tower, reducing the amount of fresh water we pull from the local

community. We currently do not have any known significant water-related impacts identified by local authorities or other stakeholders.

All of our facilities are regulated for effluent standards via various state and federal regulatory agencies. Each state or federal authority is able to apply specific standards to meet the needs of

local water bodies receiving effluents.

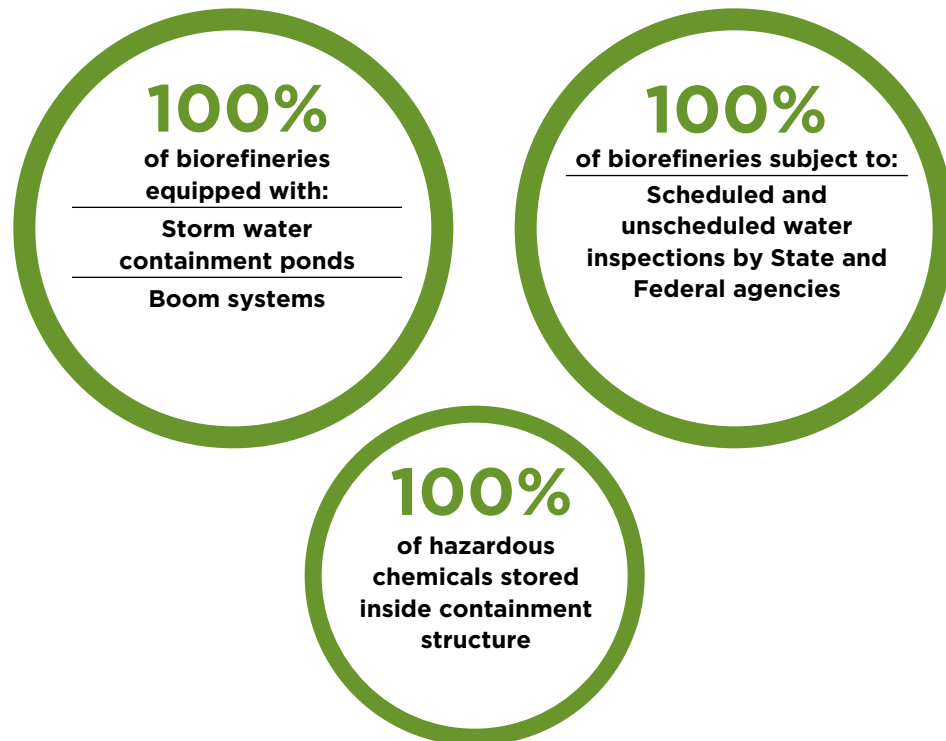
Green Plains works with these authorities to ensure that proper standards are applied. Our water discharge is managed through stormwater monitoring planning & National Pollutant Discharge Elimination System (NPDES) permitting, monitoring and reporting.



GREEN PLAINS PERFORMANCE DATA	UNIT OF MEASUREMENT	2022	2021	2020	2019	2018
Groundwater Withdrawal	Thousand Cubic Meters	9,187	9,182	8,861	9,328	9,366
Municipal Water Withdrawal	Thousand Cubic Meters	1,683	759	1,239	1,458	1,897
Reclaimed Water Withdrawal	Thousand Cubic Meters	257	288	313	317	290
Saltwater Withdrawal	Thousand Cubic Meters	0	0	0	0	0
Surface Water Withdrawal	Thousand Cubic Meters	0	0	0	0	0
Total Water Withdrawal	Thousand Cubic Meters	11,128	10,229	10,413	11,103	11,553
Total Water Discharged	Thousand Cubic Meters	3,596	3,546	3,966	4,151	5,102
Total Water Use	Thousand Cubic Meters	7,532	6,683	6,447	6,952	6,451
Total Water Intensity	Cubic Meters Water / Raw Material MT	0.982	1.013	0.925	0.918	0.674
Water Quality Permits, Standards and Regulations	Incidents of Non-Compliance	7	15	41	—	—

Water Management in Manufacturing

BEST AVAILABLE CONTROL SYSTEMS



RISK MITIGATION APPROACH

Recycled water goal

Process water, internal recycling/
zero liquid discharge by design

Heat/cooling efficiencies
by design

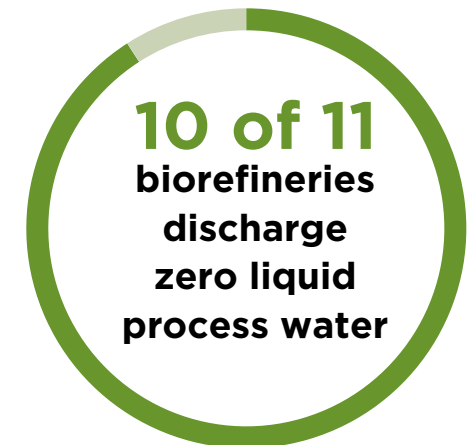
Process efficiency measures
(energy use)

Recycled water for
evaporative cooling

Evaporative reuse

Scrubbing efficiency

Utility efficiency (offset
by environmental)



Natural Capital and Land Stewardship

Green Plains is committed to protecting biodiversity and reducing deforestation while also partnering with our farmer customers to advance sustainable sourcing and farming.

In 2022, we continued to assess the broader biodiversity and other nature-related impacts of our operations. This work is ongoing. Over the long term, we help ensure sustainable land use by keeping existing land in agriculture production, which in turn fosters soil regeneration and resilient ecosystems. By contrast, urban development claims 2 million acres of farmland per year in the U.S.²⁶

In 2022, we developed a multiyear farm carbon strategy and grain origination road map to coordinate and drive sustainable farming practices and outcomes going forward.

26 Farmland losing to urban sprawl | Farm Progress

Sustainable Agriculture

We are working with our farmer customers to help reduce the CI of the feedstock they produce and we process, keep carbon in the soil, reduce water use and minimize erosion of valuable topsoil.

Focus on Carbon Intensity

Our farmers are always innovating, using the latest production practices, available technologies and latest science to produce more crops on the same number of acres. Leaps forward in seed technology have dramatically increased yields and enhanced drought tolerance and weed resistance. When coupled with regenerative production practices such as cover crops, reduced tillage and split application of crop nutrients, these new seed technologies also enable farmers to produce more while using fewer inputs, conserving water and making fewer trips across the field.

As opportunities to advance sustainable agriculture expand every year, we seek to partner

with farmers to lower their CI even further. These CI reductions are not only the right thing to do, they are also supported by state and federal policy, including LCFS programs and incentives codified in the Inflation Reduction Act in 2022. Technology-neutral clean fuel policy, such as the Section 45Z Clean Fuel Production Credit, can incentivize dramatic improvements in on-farm conservation if the policy is designed and implemented properly. Additionally, having an accurate and complete picture of the CI and sustainable characteristics of our primary feedstock is becoming more essential to participation in high-value end-use markets. This is demonstrated by the fact that many of our downstream customers are beginning to more closely scrutinize the CI of our animal feed products, which is itself impacted heavily by feedstock CI. As we begin implementing the first stages of our farm carbon strategy in 2023, we are gaining greater visibility into the true CI and sustainability of our baseline feedstock. We are driven to reduce the carbon footprint throughout our supply chain and plan to work side by side with our farmers to incentivize and scale sustainable farming practices.



Land Stewardship

Because of our foundational relationship with farmers and their crops, land stewardship and the conservation of natural resources are top priorities for Green Plains.

We source 100% of feedstock from farmers, grain elevators and cooperatives in the U.S., with over 90% sourced within a 30-mile trucking distance from each of our biorefineries. Our practice of buying locally from U.S. farmers not only keeps family farms in business and supports local communities but also helps mitigate deforestation around the globe and decrease the use of long-haul transportation and its environmental impact. Further, our new FQT MSC™ systems enhance renewable corn oil yields, allowing us to increase the production of an important clean energy feedstock source without expanding cropland acreage. The amount of corn we processed in 2022 can be grown on 261,000 fewer acres than in 2007,²⁷ and none of our feedstock comes from land converted to cropland from forests, grasslands or wetlands, in compliance with RFS regulations related to renewable biomass.

²⁷ (301,868,000 bushels of corn processed in 2022 / average US corn yield in 2007 of 150.7 bushels per acre) – (301,868,000 bushels of corn processed in 2022 / average US corn yield in 2022 of 173.3 bushels per acre) = 261,224.38

Sustainable Sourcing

Each of our biorefineries uses on average approximately 30 million bushels of corn annually, and we rely on our strong relationships with local farmers to ensure that we receive a steady supply of corn. A number of farmers in our supply chain use sustainable farming techniques, such as precision agriculture and the split application of nutrients, to increase yields while simultaneously lowering the levels of traditional inputs needed (such as land, water, fertilizer, herbicides and insecticides).²⁸ Many of these farmers also use cover crops and conservation tillage practices to reduce the risk of land degradation and often enroll marginal ground in federal conservation programs.

2030 GOAL:

Source 100% of primary feedstock sustainably

2022 PROGRESS:

Finalized a multiyear farm carbon strategy/ grain origination road map
Defined what "sustainably sourced" feedstock means to Green Plains

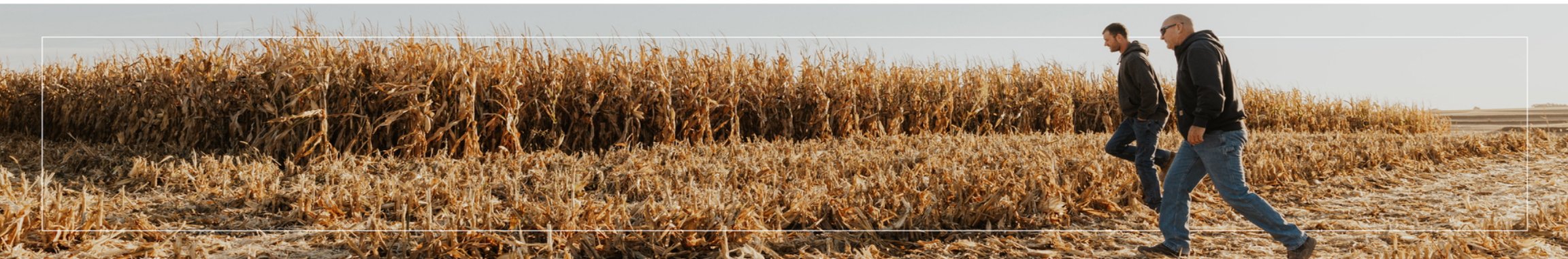
²⁸ See <https://sustainableamerica.org/blog/what-is-precision-agriculture/> and <https://nutrientstewardship.org/implementation/split-fertilizer-application-helps-optimize-nutrient-management/>.

GREEN PLAINS CONSIDERS FEEDSTOCK TO BE SUSTAINABLY SOURCED WHEN ONE OR MORE OF THE FOLLOWING SUSTAINABLE FARMING PRACTICES WAS IMPLEMENTED FOR THE PRODUCTION OF THE FEEDSTOCK, INCLUDING, BUT NOT LIMITED TO:

- Split application of nitrogen fertilizer
- 4R nitrogen management (right time, right place, right form and right rate)
- Use of cover crops
- Use of conservation tillage practices (low till/no till)
- Use of manure as fertilizer

2023 GOALS:

Build Corn Procurement team to include additional carbon and traceability experience
Continue to implement phased approach to achieving 2030 sustainable sourcing goal



BIOFUELS: FEEDING THE FOOD SYSTEM, USING FEWER RESOURCES AND COMBATING INFLATION

New and evolving technologies and agricultural practices are changing the way that corn is grown and biofuels are produced in the U.S. — for the better. These advances are making it possible to grow more corn on fewer acres while using fewer inputs, creating positive environmental trend lines in biofuel production. Our Green Plains 2.0 roadmap incorporates and builds on these improvements.

Producing Feed that Supports the Human Diet

Many valued and sustainable products are made from corn — most notably ethanol, a clean, environmentally friendly and necessary octane booster for gasoline that helps extend the liquid fuel supply. Other coproducts include low-carbon feedstock for renewable diesel, CO₂ for commercial use or permanent sequestration, feed for animals (~30% of the kernel) that would otherwise consume corn and other row crops, and feed for land-based farmed fish that would otherwise be fed fish.

Historically, an unfounded criticism associated with biofuel production has to do with the amount of U.S. farmland used to grow corn that is not directly used for human consumption. It is important to note, however, that biofuels and the food system are not separate entities. The corn kernels processed in biorefineries do not leave the food system entirely. Rather, nearly a third of each kernel becomes feed for poultry, cattle, fish, and other animals consumed in human diets. As detailed on the following page, less than 10% of corn grown in the U.S. is processed directly into products for human consumption.

USING LESS LAND TO GROW MORE CORN

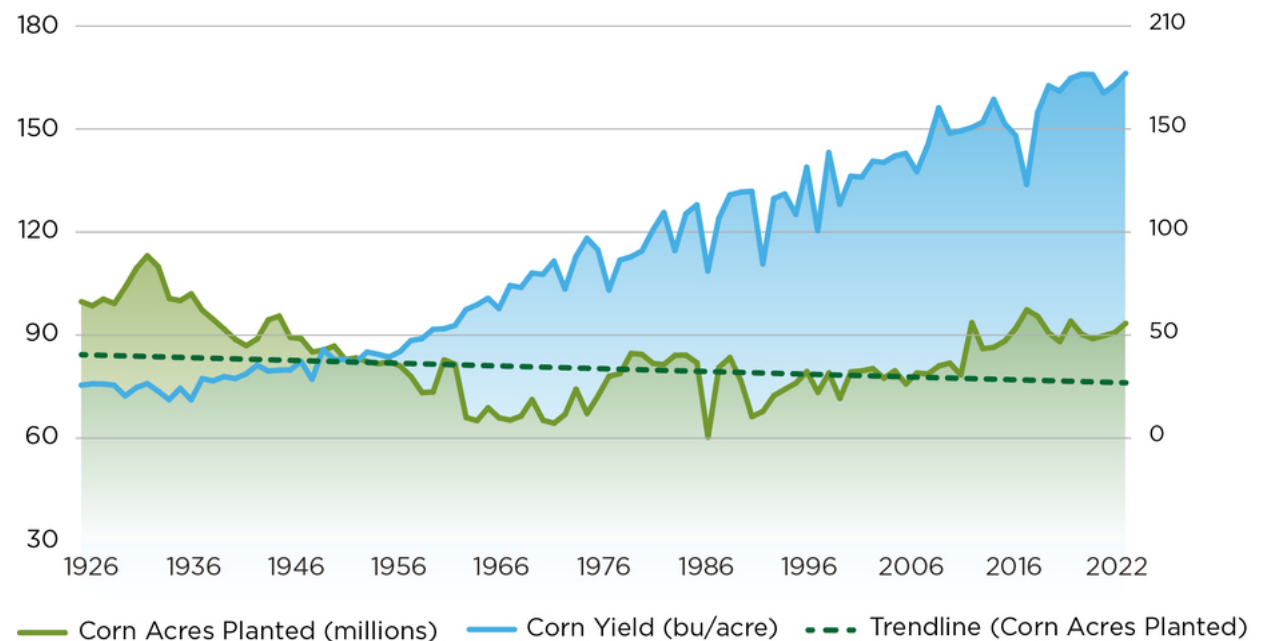
While overall production of corn, the most abundant crop in the U.S., has indeed increased dramatically over the past 100 years, the amount of land used to grow corn has actually been decreasing over time. As shown in the graph below, the total acres planted have gone down while corn yields have increased: from averages that hovered near 100 million acres in the early 1900s, to an average of 90 million acres between 2007 and 2021, to fewer than 90 million acres in 2022²⁹ as estimated by the USDA.

29 USDA/NASS QuickStats Ad-hoc Query Tool

Scientific and technological advances, along with new production practices, notably precision agricultural technology and better seed genetics, are responsible for these higher yields per acre of corn planted. As shown in the graph below, yields have risen by 15% since 2007, when the RFS was expanded. These increased yields per acre have also been accompanied by reductions in chemical, fertilizer, and water inputs for every kernel grown, including a 50% reduction in the amount of nitrogen fertilizer application (in pounds per bushel of corn) since the 1970s.³⁰

30 USDA ERS - Fertilizer Use and Price

CORN ACRES PLANTED VS. YIELD (1926-2022)



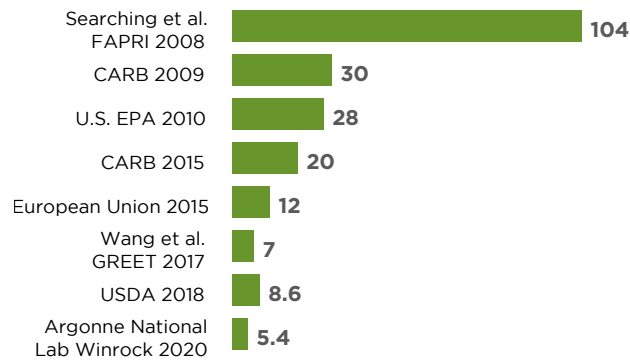
SEEING FEWER ESTIMATED EMISSIONS

Another positive trend is that estimated emissions from land use change (LUC) related to corn biofuel production have decreased since 2008. Improved and more sustainable farming practices as well as more accurate data collection methods are credited for the new estimations, among other factors.

To name one example, an early technique for analyzing land use change in the 2008 Searching et al. FAPRI model was found to be faulty. According to the study: “To predict land specific crop acres, FAPRI relies upon Moderate Resolution Imaging Spectroradiometer (MODIS) satellite imagery data, which has been demonstrated to misclassify agricultural and non-agricultural lands, resulting in inaccurate predictions of land types that convert to cropland and unreliable emission estimates associated with LUC” (Melissa J Scully, 2021).³¹

31 Carbon intensity of corn ethanol in the United States: state of the science (iop.org)

LAND USE CHANGE EMISSIONS (gCO₂/MJ)



COMBATING PRICE INFLATION FOR FOOD AND GAS

In addition to these positive trends, biofuel production also helps combat price inflation for food items as well as fuel. The price of oil directly and significantly contributes to both food and fuel price inflation.

Specifically, gas and diesel prices at the pump are a combination of the price of oil, refining costs, distribution and marketing, and taxes. These prices are largely fixed, with the exception of oil prices, which have a direct correlation with gas prices.³² Similarly, retail food prices are most significantly correlated with transportation costs (petroleum use),³³ marketing and labor costs.

32 Fuels Prices - In Context, not Hype | Fuels Institute

33 Luft, R. Z. (2008, May 6). Food vs. fuel a global myth. Chicago Tribune.

The cost of the underlying commodity has a lower impact on the final retail prices of food.

Increased biofuel use, therefore, actually brings down food and fuel prices for the consumer by extending the liquid fuel supply and making it more cost-effective: 10% ethanol blended into gasoline can reduce the price at the pump dramatically and higher blends such as E15 and E85 provide even greater savings. A recent study showed that ethanol saves the average U.S. household over \$750 per year, or \$0.77/gal on average, for total savings of \$95 billion per year.³⁴

34 <https://ethanolrfa.org/media-and-news/category/news-releases/article/2023/02/new-study-ethanol-industry-s-impact-on-the-u-s-economy-strengthened-in-2022>

U.S. CORN USAGE BY SEGMENT 2022



38.1%

Feed & Residual



28.8%

Ethanol—Fuel

25.9% Octane Required in Fuel Supply
2.3% Higher Blends & Exports
0.5% Renewable Corn Oil for Renewable Diesel/Biodiesel



16.3%

Exports



7.1%

Ethanol—Animal Feed



9.7%

Other

2.8% High-Fructose Corn Syrup
2.5% Glucose & Dextrose
1.7% Starch
1.4% Cereal/Other
1.1% Beverage & Industrial Alcohol
0.2% Seed

Waste, Circularity and Environmental Compliance

Inherently Little Waste

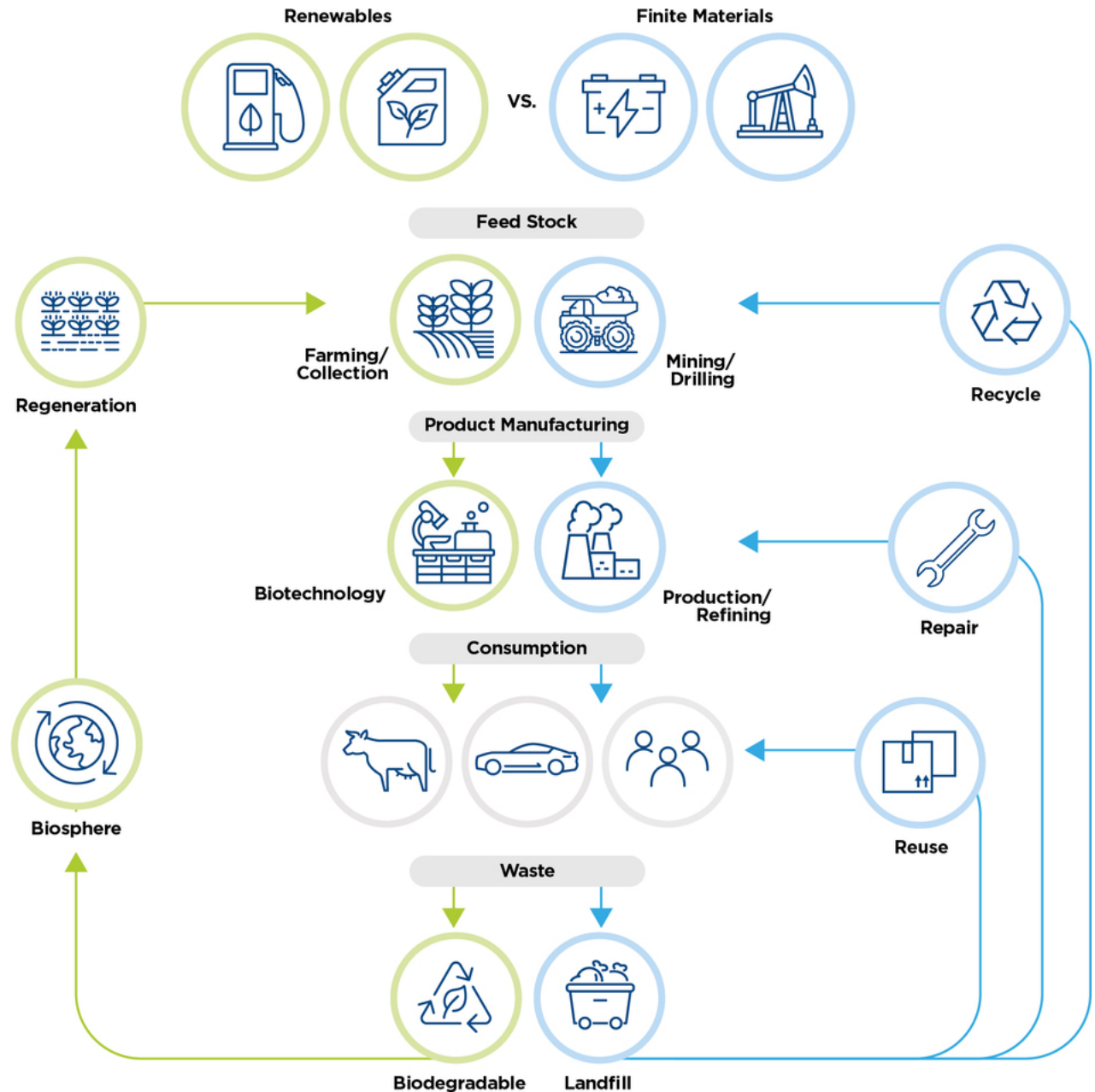
Our biorefinery operations, by their very nature, produce very little waste.

When feedstock, primarily corn, arrives on-site, it is unloaded from trucks in bulk and dumped directly into a receiving pit. From there, the corn is passed through a scalping deck that removes any cobs and husks, leaving only corn kernels. The number of cobs and husks is very low as the farm machinery that harvested the corn has already separated the kernels from the rest of the plant. The water treatment process at some of our biorefineries produces some lime cake, which is disposed of as solid waste. However, our Superior, Iowa facility donates that lime to local area farmers for field application.

Inherently Little Packaging

In addition, our products require almost no packaging.

The ingredients we produce are shipped in bulk quantities and loaded directly onto outbound rail cars and trucks. From there, the products are consumed relatively quickly, either by being blended and then combusted in an engine or consumed by livestock and other animals, leaving behind no packaging waste. Only a very small number of our products ship in packages. This lack of packaging for a majority of our products differentiates us and our industry from others that rely more heavily on finite materials and make products that require or have a lot of packaging and are more difficult to recycle at the end of life.



Goals and Achievements

Beyond the circularity of our biorefinery operations, we take steps to manage other waste at our facilities. In 2022, Green Plains:

- Completed the tracking and consolidation of non-hazardous waste data for all our biorefineries
- Finalized an enhanced corporate recycling program for implementation in 2023
- Set a new goal of zero waste to landfill by 2030

LOOKING FORWARD: 2023 WASTE MANAGEMENT GOALS

- 1 Implement enhanced corporate recycling program throughout 2023
- 2 Develop an active waste management plan to support our goal of zero waste by 2030

ENHANCED RECYCLING: PLANNED 2023 ROLLOUT

The pilot phase where we incorporate additional recycling bins, begin to measure volumes of recyclable commodities via a collection survey, and further refine program strategy for a self-sustaining/revenue-generating recycling program.

The scale-up phase where we decide upon final bin numbers based on volumes and efficiency and procure additional equipment to condense and market various recyclable commodities as determined by collection surveys.

Further enhancements like a composting program and expanding the strategy to additional Green Plains locations.

Environmental Compliance

We work to protect natural resources and comply with all related laws and regulations, including around waste prevention and management.

GREEN PLAINS PERFORMANCE DATA	UNIT OF MEASUREMENT	2022	2021
Hazardous Waste Disposal	Thousand Metric Tons	0.001	0.002
Non-Hazardous Waste Disposal	Thousand Metric Tons	4.67	—

We are committed to the protection of natural resources and compliance with all related laws and regulations, including around waste prevention and management. Throughout our operations, we seek to comply with all applicable environmental laws and regulations, including the management of hazardous chemicals.³⁵ All of our biorefinery locations are registered as Renewable Fuel Producers with the U.S. Environmental Protection Agency (EPA) and meet the requirements for the RFS (Title 40 CFR Part 80). Additionally, 100% of the denatured fuel ethanol we produce is RFS compliant.

ENVIRONMENTAL COMPLIANCE	UNIT OF MEASUREMENT	2022	2021	2020	2019	2018
Number of Sites	Count	11	12	14	14	17
Number of Reportable Spills ³⁶	Count	0	1	1	1	0
Volume of Reportable Spills	Liters	0	1,210	9,971	22,933	0
Number of Environmental Fines	Count	0	1	1	1	2
Amount of Environmental Fines	USD	\$0	\$13,992	\$25,000	\$2,720	\$11,570

³⁵ GPRE complies with environmental laws and regulations from the following U.S. based agencies: NDEE, DHHS, IDNR, MPCA, MNDNR, MDH, EIPA, IDEM and TDEC.

³⁶ As defined by the U.S. EPA, a reportable spill is an uncontrolled release of material to the ground in excess of the reportable quantity. Ethanol facilities are classified as Very Small Quantity Generators (VSQGs) per U.S. EPA HazWaste Requirements (40 CFR Part 262.14), disposing of hazardous materials or waste according to authorized HazWaste haulers (Categories of Hazardous Waste Generators | US EPA).

Social

Green Plains respects the critical role of all stakeholders in our transformation journey.

We continually work to enhance our programs and policies to support and empower our employees, customers, suppliers and communities.

OUR KEY TOPICS

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Employee Health and Safety

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Talent Acquisition, Engagement and DE&I

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Training, Learning & Career Development

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Customers

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Suppliers

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Communities

Social

We invest in the people on whom Green Plains depends: our employees, customers, suppliers and communities.

Key investments in this area include prioritizing employee health and safety efforts; working to advance workforce diversity, equity and inclusion; partnering with our customers and suppliers to create shared benefits; and giving back to our local communities.

Our occupational health and safety management system is based on the following recognized risk management standards:

- Occupational Safety and Health Administration (OSHA)
- Process Safety Management (PSM)
- American National Standards Institute (ANSI)
- National Fire Protection Association (NFPA)
- Steel Tank Institute (STI)

Employee Health and Safety

We actively work to protect the health and safety of our employees by monitoring and evaluating our EHS programs, practices, and outcomes. Our goal is continual assessment and improvement in all EHS areas going forward, as we transform and grow our business.

As described by the U.S. Department of Energy, industrial plant activities often involve "working with heavy industrial equipment, fixing any worn or broken machinery parts, and testing the quality of the end products. Within the bioenergy sector, plant workers can also be engaged with combining chemicals and testing fuel and chemical end-product quality."³⁷

Given the scientific and technical nature of the work performed in our biorefineries, Green Plains fully appreciates the critical importance of effective EHS policies and practices for both our valued employees and our business. Further, we believe that transparency and disclosure around incidents and hazards, as well as safety achievements, is the straightest line to optimal employee safety.

In 2022, we continued to make good progress in our safety journey, notably exceeding our 2025 target for reducing OSHA Recordable Incidents three years early:

2022 EARLY ACHIEVEMENT:

OSHA TRIR reduced by 46% (vs. 2020 baseline)

2025 GOAL:

Reduce OSHA Total Recordable Incident Rate (TRIR) by 35% (vs. 2020 baseline)

In 2022, we also continued to factor safety metrics into the calculation of executive compensation, required implementation of our **Cardinal Rules** for the third consecutive year, and applied the tenets of our new **Occupational Health & Safety Policy** for a second year in a row.

We also experienced 0 process safety incidents in 2022.

2023 GOALS:

Reimagine safety training for 2023 to be more interactive and inclusive

Implement layered audit program across the platform

³⁷ <https://www.energy.gov/eere/bioenergy/bioenergy-career-map-plant-manager>

EHS Programs and Policies

To support operational safety, we evaluate and seek to improve our **Health and Safety program** on an ongoing basis through our **Program Review and Enterprise Implementation framework**, which consists of policies, controls, hazards elimination and safety training.

Specifically, Green Plains conducts regularly scheduled safety trainings, inspections, and incident reporting and investigations. We also ensure the completion of internal and independent external audits. Each of our facilities has its own Health and Safety Committee that meets monthly. All employees are invited to participate in these meetings, which feature multifunctional panel discussions and decision-making.

All employees at our 11 biorefineries are covered under our **Process Safety Management (PSM)** policy and procedures, which define protocols for regulated, highly hazardous chemicals as well as non-regulated chemicals, among other safety protocols.

Additional Green Plains programs, policies and procedures designed to prevent or mitigate significant negative occupational health and safety impacts linked to our operations include:

- OSHA policies and procedures
- Our PSM policies and procedures
- Our Contractor Management System
- Our Emergency Response Planning & Training program

Occupational Health and Safety Policy

PROGRAM REVIEW AND ENTERPRISE IMPLEMENTATION

- Cardinal Rules

SAFETY TRAINING

- Program Matrix
- Emergency Response Planning & Training

HAZARD ASSESSMENT AND IDENTIFICATION

- Process Hazard Analysis
- Inspections
- Audits

CONTROLS

- Hierarchy of Controls
- Contractor Management System (First, Verify)
- PSM Program Policy

RISK MANAGEMENT STANDARDS

- American National Standards Institute (ANSI)
- National Fire Protection Association (NFPA)
- American Petroleum Institute (API)
- Steel Tank Institute (STI)

HAZARD COMMUNICATION PROGRAM

- Globally Harmonized System (GHS) of Classification and Labeling of Chemicals

OSHA POLICIES

- Industrial Hygiene Testing
- Audiometric Surveys
- Hearing Conservation
- Respiratory Fit Testing

INCIDENT REPORTING SYSTEM

- Incident Investigation Policy and Procedure
- Incident Investigation Teams
- Corrective Actions

HEALTH AND SAFETY COMMITTEES

- Meet monthly
- All employees welcome to participate

2022 Strategic Safety Initiatives

Key health and safety initiatives implemented by Green Plains in 2022 included:

- 6S Lean implementation across our platform
- Stop-Work Authority training and implementation
- Formalized communication worksheets for shift changes
- Standardized personal protective equipment (PPE) and job safety analysis (JSA) card locations

6S LEAN: 5S + SAFETY

6S Lean, otherwise known as 5S + Safety, is a system that aims to promote and sustain a high level of productivity and safety throughout a workspace.



Source: www.safetyculture.com

EHSS CARDINAL RULES

We believe that all occupational incidents, injuries and environmental harm are preventable. As such, we continue to require adherence to what is known internally as our Environmental, Health, Safety and Security (EHSS) Cardinal Rules. We monitor adherence to the Cardinal Rules in several ways, including monthly internal scoring, semi-annual corporate audits and regular "walk around" safety compliance monitoring.

All employees and contractors of Green Plains and its related subsidiaries, as well as visitors to Green Plains and its subsidiaries, are expected to understand and abide by our Cardinal Rules. Each of the above-described individuals has stop-work authority when and if that person believes that a rule is not being followed or that an unsafe condition or hazard is present in the workplace.

HAZARD AND INCIDENT RISK ASSESSMENT

Green Plains works to assess safety risks, and identify and prevent potential work-related hazards, on both a routine and ad hoc basis. Per best practice, we use a variety of methods to collect and evaluate safety-risk information, including:

- Job hazard assessments
- Process hazard analyses
- Safety committees
- Periodic internal and independent external audits and inspections
- Hierarchy of controls
- Industrial hygiene testing
- Audiometric surveys
- Hearing-conservation programs
- Respiratory fit testing
- Internal and independent external health and safety assessments

HAZARD AND INCIDENT REPORTING AND REMEDIATION

Green Plains employees are encouraged to report work-related hazards and hazardous situations through our **Incident Reporting System, Employee Concerns Reporting system** and GP Alert Line System.

Work-related incidents are investigated and corrective actions and needed improvements are determined by our Incident Investigation Policy & Procedure and Incident Investigation teams. Employees may also participate in Safety and PSM committees and meetings to voice concerns and identify solutions.

Green Plains also follows the **Globally Harmonized System (GHS) of Classification and Labeling of Chemicals Hazard Communication Program**. This program has been recognized by multiple government agencies as best practice for the biofuel, petroleum and chemical industries.

In addition, each of our applicable biorefinery facilities with hazardous chemicals has instituted a **Hazard Communication Policy**, which comprises employee training, management responsibilities, maintenance of chemical listings and associated documentation (e.g., safety data sheets (SDS), container labeling and pictogram requirements). Green Plains reviews and updates this policy annually.

EMPLOYEE SAFETY TRAINING

The Green Plains **Safety Training Program Matrix** includes all OSHA-covered and related applicable topic areas. Our employee safety training consists of:

- Monthly online training
- Quarterly classroom training
- On-the-job training for all production employees

Production employees at each of our 11 biorefineries must complete at least 25 hours of safety training each year.

2022 ACHIEVEMENTS:

Completed integration of EHSS training into LMS as of December 31, 2022

Consolidated and updated EHSS training courses specific to Green Plains

2022 SAFETY TRAINING GOALS:

Integrate all EHSS training with Learning Management System (LMS) launch

SAFETY GOALS AND EXECUTIVE COMPENSATION

We continued to link executive compensation to the achievement of safety goals in 2022, our 10th consecutive year of prioritizing and incentivizing safety in this structured manner.

Our annual incentive bonus is linked to a biorefinery safety goal with 11 leading and lagging safety and environmental metrics, including:

- OSHA and lost time injury rates
- Safety training and safety drill completion rates
- Environmental plan reviews and training
- Environmental incident and third-party audit closeouts
- Process safety management compliance

GREEN PLAINS PERFORMANCE DATA

	TOTAL NUMBER			RATE		
	2022	2021	2020	2022	2021	2020
Employee fatalities as a result of work-related injury	0	0	1	0.00	0.00	0.12
Employee days away from work (DAFW) injuries	1	2	10	0.11	0.24	1.17
Employee total recordable work-related injuries and rate (TRIR)	17	22	30	1.88	2.66	3.51
Hours worked	1,807,662	1,656,538	1,710,636			

* per 200,000 hours worked



Talent Acquisition, Engagement and DE&I

Our highly skilled and valued employees are the linchpin of our ongoing transformation toward the biorefinery platform of the future.

Green Plains relies on top talent to execute daily operations across our 11 biorefineries, implement and leverage innovative technologies, and realize our Green Plains 2.0 road map.

In 2022, we launched a host of new initiatives to help ensure that we keep our existing talent and are best able to recruit additional talent as needed. Key initiatives included:

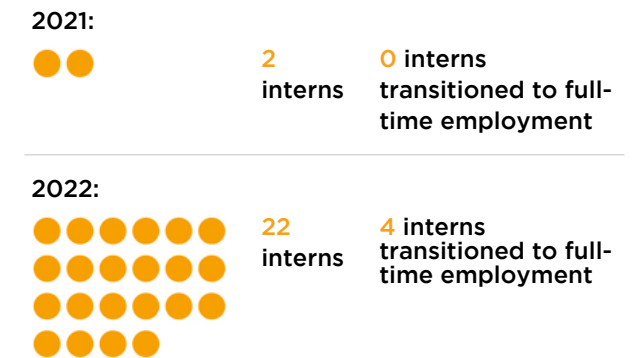
- Embraced new talent acquisition software and tools allowing us to better connect with talent in both a high tech and high touch manner
- Leveraged communications pathways to better reach diverse audiences, via media such as:
 - Women in Agriculture (WIA)
 - Radio Lobo
 - El Perico
 - Omaha Star
 - New Era
- Enhanced our Employee Referral Program
- Structured our new employee orientation and associated trainings
- Created a more interactive and informative Careers page on our website
 - Live as of January 2023
 - Features mechanisms to stay engaged with the company via our talent community while also highlighting our uniqueness as an employer, technically and culturally

- Enhanced our talent acquisition infrastructure, including standardizing key components of our interviewing and selection systems, manager training and laying the groundwork for traineeship programs at select universities.
- The traineeship is being piloted at one of our top university partners that will bring 30-40 students to one of our biorefineries, where the students will receive application exercises that they will apply to their classroom project, and receive course credit.

Also in 2022, we introduced additional means of engagement with our newest employees at Green Plains. This includes an internal communication channel, The Loop, where we have a New Hire channel that keeps new hires connected. This one-stop location contains relevant information on key events happening within the company and externally. Common topics include customer updates, employee recognition, benefits available to our employees, key events, executive insights and other relevant topics.

A Growing Uni-to-Green Plains Pipeline

In 2022, we welcomed 22 student interns who worked across multiple areas of our business, our largest intern class to date. What's more, they represented a significant increase from the previous year:



2022 Employment Type	FULL-TIME	PART-TIME	
Male	716	3	
Female	164	6	
Total	880	9	
Employee Turnover	2022	2021	2020
All Employees	30%	24%	18%
Male	80%	76%	87%
Female	20%	24%	13%
Under 30	32%	23%	34%
30-50	41%	51%	43%
Over 50	27%	26%	23%

Compensation and Benefits

Offering competitive wages and employee benefits is essential to attracting and retaining the top talent required by Green Plains.

2022 presented many challenges for both employers and employees. Among these were a continuation of the elevated inflation rate seen in 2021, surpassing 7% in 2022, and a competitive talent market for employers. Despite these headwinds, Green Plains continued to provide competitive wage increases in 2022, in addition to having boosted wages by 13.5% in 2021.

We are committed to regularly analyzing credible salary data guides and related resources to remain competitive in total compensation packages and top-tier benefits for our employees. We continue to ensure competitive total rewards for our employees, regularly benchmarking to ensure attractive pay and benefit programming that addresses our employees' key needs.

All of our hourly employees are paid well above the federal minimum wage. We monitor local minimum wages to ensure that we are in compliance and paying above the higher applicable wage rate.

Additionally, we further upgraded our Employee Benefits Package in 2022 to now include:

- An enhanced wellness program that leverages high-tech ways to monitor physical activity and earn incentives
- 100% increase in paid bonding leave for birthing parents
 - Up from 6 weeks in 2021 to 12 weeks in 2022
- Additional paid time off (PTO)
 - Two new floating holidays of the employee's choosing
- Pet insurance and pet wellness benefits

Employee Benefits

401(K)

Green Plains offers a defined contribution 401(k) plan to interns and temporary, part-time and full-time employees that features 100% immediate vesting and matches up to 6% of eligible employee contributions upon hire and 8% at five years of service.

EMPLOYEE WELLNESS PLAN

Employees can participate in a wellness program that will reward them for the steps they are already making toward their overall wellness and incentivize them to start a more healthy lifestyle. They complete tasks for points in the system that they can redeem for gift cards.

Corporate employees have access to an on-site wellness facility and are offered free weekly fitness classes.

COMPANY HOLIDAYS

New Year's Day, Martin Luther King, Jr. Day, Presidents Day, Good Friday, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, Christmas Day and two floating holidays of the employee's choosing.

OTHER BENEFITS

- Flexible Spending Account (Medical and Dependent)
- Health Savings Account
- Travel Assistance
- Identity Protection
- Hearing Discount Program

HEALTH BENEFITS

All full-time employees can enroll in the following:

- Medical insurance coverage that offers three options
- Dental insurance and two options for vision insurance
- Voluntary supplemental medical coverages
 - Accident insurance
 - Critical illness insurance
 - Hospital indemnity insurance
- Voluntary life and AD&D for the employee, spouse, and children
- Pet wellness benefit and pet insurance

Green Plains also offers and pays for:

- Life and AD&D for employees, spouse and children
- Short-term disability
- Long-term disability

Bonding leave for:

- Birthing parent - 12 weeks 100% paid
- Non birthing parent - 2 weeks 100% paid

EMPLOYEE ASSISTANCE PLAN

Our Employee Assistance Plan (EAP) is available to all full-time employees and their dependents.

The EAP assists with matters related to:

- Family and relationships
- Emotional well-being
- Financial wellness
- Substance abuse and addiction
- Legal assistance
- Physical health
- Work and career

5.21x

Ratio of average new employee wage to the federal minimum wage (2022)

Training, Learning & Career Development

Given the exacting nature of biorefinery operations, including emerging technologies and ESG opportunities, Green Plains invests in continual learning and career development programs. We offer virtual and in-person learning and development opportunities for all our employees.

To meet the need for continual learning at Green Plains, in 2022 we launched our new **Learning Management System (LMS)**, the learning portal for Green Plains University, a one-stop shop for learning and developmental resources.

Through LMS, all employees at all levels can access:

- 2,700+ courses to complete compliance, technical skills, and professional trainings
- Courses in subject areas that include workplace safety, business skills, ethics, HR compliance, information technology (IT), cybersecurity, leadership and management essentials, legal policies and procedures, technical skills development, and more

Green Plains also continues to offer the following avenues of learning and development:

Ongoing Performance Feedback

- Annual goal-setting, development planning and ongoing feedback process in which managers and employees engage in ongoing discussions to ensure progress relative to company and individual objectives
- Provided to all employees

Average Hours of Training	2022	2021	2020
Male	25.78	25	25
Female	25.98	25	25
Production	25.79	25	25
Corporate	1.067	0	0



Diversity, Equity and Inclusion

Green Plains believes in the value of an increasingly diverse, equitable and inclusive workplace to drive operational excellence and good corporate citizenship.

Our talent management system includes policies and programs in furtherance of workforce DE&I. We establish goals, and we proactively work to include more women and employees who enhance the diversity of our Green Plains family. Throughout 2022, we have accomplished DE&I objectives associated with attracting diverse talent. We remain on track for long-term development of gender balance. We acknowledge there is still much work to be done in the area of DE&I and have committed to enhancing our data quality and reliability related to candidate pool diversity metrics, with the ultimate goal to eventually set measurable targets to ensure that we have a diverse candidate pool for all of our open positions.

2023 GOAL:

Enhance the data quality and reliability of our candidate pool diversity metrics, to allow us to better track the success of our recruiting action plans

Proactive Outreach

In 2022, we continued to partner with recruiting and outreach networks within organizations that support more women and diverse candidates in STEM and other professional fields.

Internal Audits and Restructuring

Beyond recruiting efforts, Green Plains is taking a multi-pronged approach to translating DE&I aspirations and goals into on-the-ground realities. In 2022, we focused on starting up internal trainings and evolving practices to support the achievement of our DE&I objectives.

DE&I Training

- Developing a **Learning & Development program** to communicate the value of diversity, equity and inclusion and having all voices represented throughout the employee life cycle
- Making programs available to **hiring managers and employees** throughout Green Plains
- Providing all employees with access to **equal training opportunities** within their respective departments and roles

Onboarding Updates

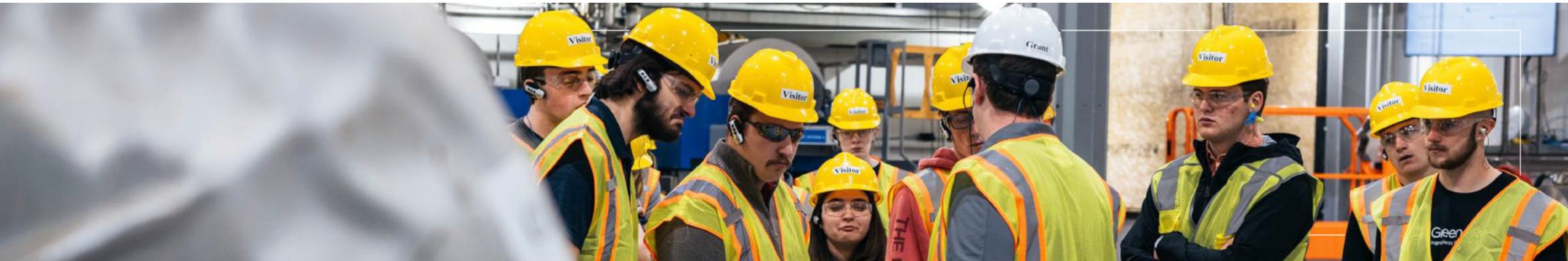
- Began **updating Green Plains onboarding and orientation programs** and materials
- Program and materials to reflect company history, current strategy, company pillars, safe and secure practices, HR compliance, accounting/finance, business technologies, legal policies and procedures, and employee benefits

Job Description Audits

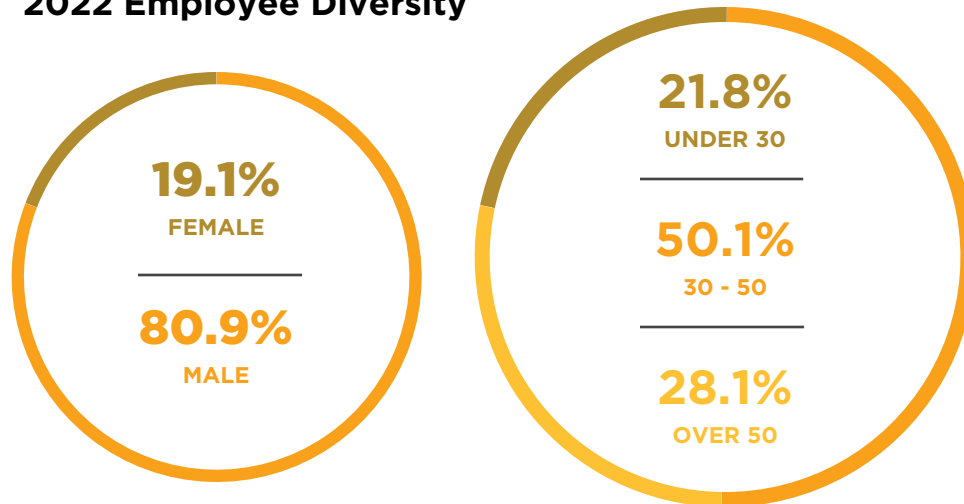
- Began **reviewing company job descriptions** to ensure that postings are attracting all potential employees
- All potential and current employees should understand the company mission and our commitment to sustainable practices

Hiring Process Improvements

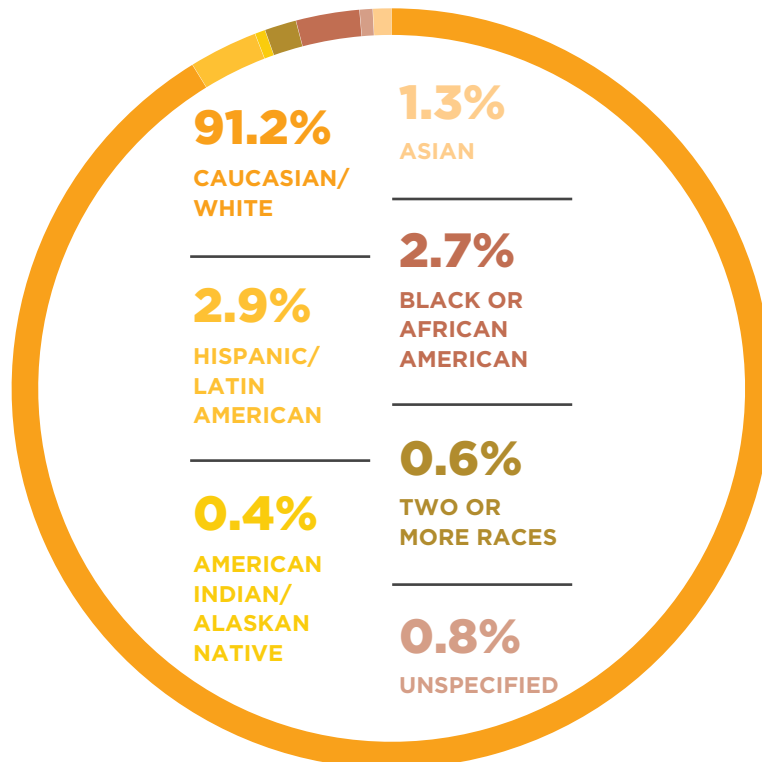
- Introduced **new interview and hiring training and practices**
- Trainings and practices developed by experts within our business



2022 Employee Diversity



Employees per diversity category*



Employees per diversity category*	2022		2021		2020	
Male	719	(80.9%)	680	(80.3%)	630	(81.1%)
Female	170	(19.1%)	167	(19.7%)	147	(18.9%)
Under 30	194	(21.8%)	162	(19.1%)	133	(17.1%)
30-50	445	(50.1%)	415	(49.0%)	403	(51.9%)
Over 50	250	(28.1%)	270	(31.9%)	241	(31.0%)
Caucasian/White	811	(91.2%)	788	(93.0%)	726	(93.4%)
Hispanic/Latin American	26	(2.9%)	18	(2.1%)	15	(1.9%)
American Indian/Alaskan Native	4	(0.4%)	4	(0.5%)	3	(0.4%)
Asian	12	(1.3%)	8	(0.9%)	6	(0.8%)
Black or African American	24	(2.7%)	23	(2.7%)	21	(2.7%)
Two or More Races	5	(0.6%)	4	(0.5%)	5	(0.6%)
Unspecified	7	(0.8%)	2	(0.2%)	1	(0.1%)
Total Employees	889	(100.0%)	847	(100.0%)	777	(100.0%)

* All of our employees are based in North America.

Employment Type



Customers

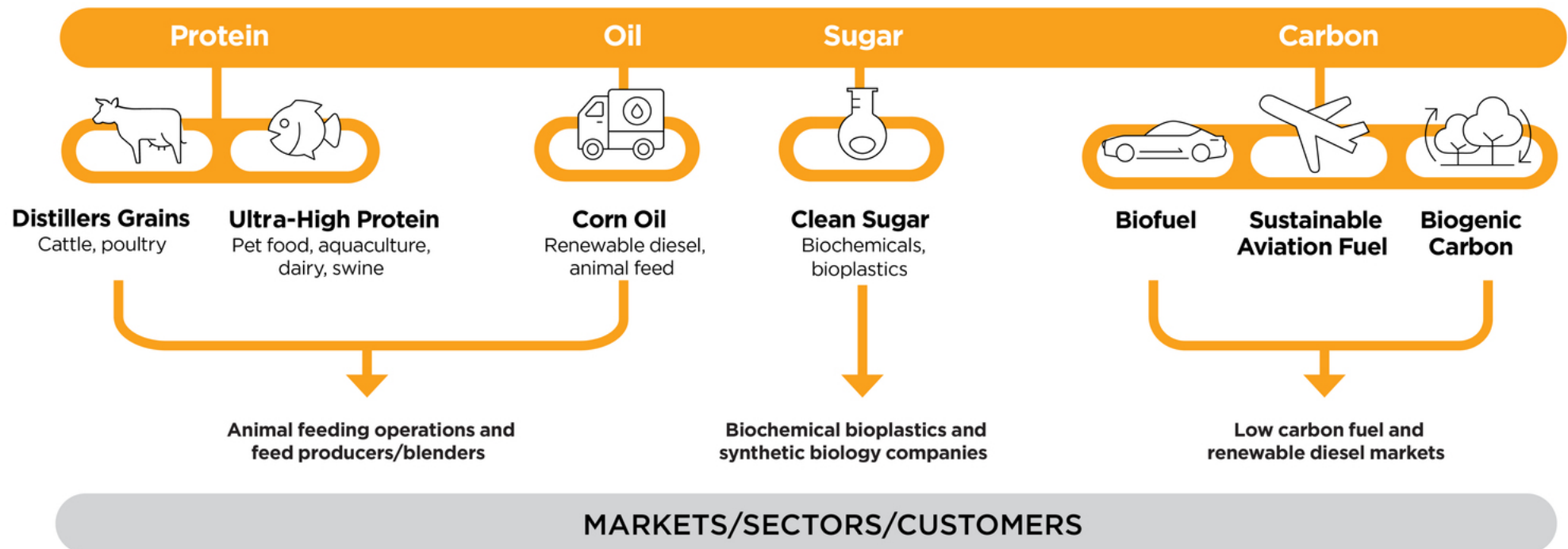
We have evolved from an early commodity business that turned corn into ethanol to a modern biorefinery platform that transforms byproducts into valuable low-carbon coproducts in the areas of protein, renewable corn oil, sugar and carbon.

Our loyal customer base includes individual farmers and retailers, many of whom are our neighbors across six U.S. states. We also sell to traders and international corporations in a host of countries. For our diversified markets, we produce a variety of products across our 11 biorefineries and three innovation centers, as depicted below, all with the opportunity to be truly low carbon due to our planned carbon-capture project.

Green Plains Trade Group, our marketing and distribution segment, sells and distributes ingredients from our 11 biorefineries. In 2022, we delivered 872 million gallons of renewable biofuel, 2.3 million tons of animal feed and 282 million pounds of renewable corn oil to the market. We strive to deliver the best product at the highest value as safely and efficiently as possible. Delivery from our facilities in the Midwest to almost anywhere in the country is convenient, fast and efficient. We utilize trucks for transport to local markets, major U.S. rail carriers and barges to ship to other parts of the country and ocean vessels to ship internationally. Our terminals also allow us to deliver to blenders in previously underserved regions, further expanding our customer base.

Contributing to an emerging bioeconomy, our low-CI oils are helping customers meet the following U.S. and international clean-energy standards and laws:

- U.S. RFS
- California Air Resources Board LCFS
- Oregon Clean Fuels Program
- Washington State Clean Fuel Standard
- British Columbia’s Greenhouse Gas Reduction (Renewable & Low Carbon Fuel Requirements) Act and the Renewable & Low Carbon Fuel Requirements Regulation
- Canadian Clean Fuel Standard
- Brazil’s RenovaBio



Protecting Product Quality and Safety

The quality and safety of our ingredients are crucial to our customers, to food and fuel systems, and to us.

Green Plains employs a range of tools and standards to help ensure the safety and quality of our products for our customers and their purposes:

- First, all our products are subject to either a Certificate of Analysis process, testing to earn feed tags with guarantees, or other forms of quality assurance testing.
- Further, our facilities are audited by the FDA to assess our compliance with Food Safety Modernization Act (FSMA) regulations. There have been no negative findings at any of our facilities from these FDA audits.
- Additionally, we maintain [Safety Data Sheets \(SDS\)](#) for all of our products that record such information as sourcing of components, substances that might produce an environmental impact, and safe use and disposal.

Because product quality and safety are a fundamental responsibility of our business and integral to our success, we assess and evolve our assurance processes on an ongoing basis.

In 2022, we implemented the following for all facilities equipped with MSC™ technology as they came online:

- Product Quality and Food Safety Manual
- Quality Management System (QMS) and corresponding Quality Procedures
- Quality Deviation Report (QDR) and QDR training
- Corrective action and preventative action (CAPA) programs/tools and training for all employees

Additional product quality and safety initiatives accomplished in 2022 include:

- Implementing an internal audit program to maintain no negative findings on future FDA audits
- Building a database to pull testing (e.g., feed tags, COA) for product specifications to establish limits and identify out-of-specification products
- Creating a KPI for tracking percentage of products meeting specifications
- Planning QDR training for all new MSC™ facilities coming online in 2023



Suppliers

We strive to partner with suppliers that are, like Green Plains, working to advance sustainability in their operations and practice good corporate citizenship. Our choice of suppliers affects our larger ESG impact and potential for progress.

Our dedicated group of suppliers, primarily based in North America, consistently meet the needs of our growing business. We do not outsource any significant part of our activities.

Our Code of Vendor Conduct

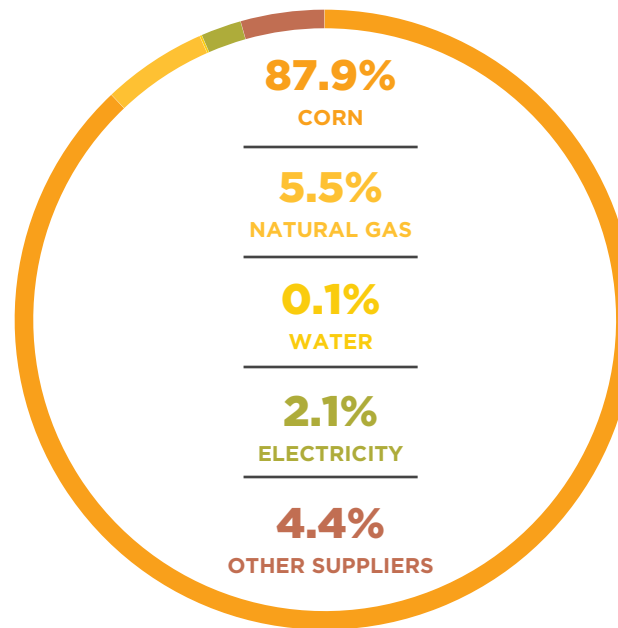
- Green Plains monitors our suppliers' compliance with our sustainability goals
- Green Plains assesses and screens third parties, including corn suppliers as of 2022

SCREENING OUR ENZYME, YEAST AND OTHER CHEMICAL SUPPLIERS

- 2018–2019: Majority screened using limited ESG criteria
- 2020: 100% screened using limited ESG criteria
- 2021: Enhanced ESG screening
- 2022: Increased watch lists and other sources used in screenings from 63 to 880

Our Suppliers and Service Providers

We rely on our strong relationships with suppliers and local municipalities for the following goods and services:



CORN

Each of our biorefineries requires on average approximately 30 million bushels of corn annually, depending on production capacity. We spend over 80% of our procurement budget on local corn suppliers, the majority of which are family farms. Corn is an annually renewable crop that captures CO₂ from the air as it grows and sequesters it in the soil and in the kernel.



NATURAL GAS

Our biorefineries use approximately 29,000 BTUs of natural gas per gallon of production. We have service agreements to acquire the natural gas we need and transport it through pipelines to our biorefineries.



WATER

Many of our biorefineries use groundwater, including one that uses recycled municipal water, for operations. Drinkable water is also obtained from the city. Local municipalities supply the necessary water to biorefineries that do not have on-site wells.



ELECTRICITY

Local utilities supply on average approximately 0.8 kilowatt hours of electricity per gallon of production to each of our biorefineries. Many of these utilities source a significant portion of their energy from renewable sources, like the utility that supplies our Superior, Iowa biorefinery, which is located near a wind farm.



OTHER SUPPLIERS

Enzymes, yeast, denaturant and bulk commodity chemicals are obtained from domestic suppliers.



Communities

Giving Back: A Banner Year

In 2022, Green Plains surpassed our goal of increasing monetary donations by 10%-20% over the 2021 figure, donating \$274,338 to meaningful causes and events. Across Green Plains, our people also volunteered a total of 4,004 hours, surpassing our stated target of 2,000 hours by 100%. Together, we pushed beyond expectations to make an even greater impact in our communities.

We are only as successful and healthy as the communities where we live and work, and 2022 was a banner year in helping to strengthen our communities. We volunteered at food banks, homeless shelters, animal shelters, youth events and more. In 2023, we are considering new ways to further encourage service to our communities, with more opportunities for our teams to volunteer together.

We continue to develop and enhance partnerships with organizations that support our strategic goals, including cleanup and beautification projects, youth agricultural organizations and events, health and safety entities, STEM-related events and nonprofits, rural schools, community disaster-recovery events, diversity, equity and inclusion efforts, and more.

In addition, our teams sponsor state and county fairs, school district events, career fairs and unique local partnerships. We sponsor booster clubs, local safety campaigns and volunteer firefighter appreciation events.

In 2022, we also enhanced our sponsorship procedures, outlining budgets for all locations and prioritizing local giving. In Omaha, we are the leading sponsor of the American Lung

2022 ACHIEVEMENT:

Monetary donations increased by 12.47% (vs. 2021)

2022 GOAL:

Increase monetary donations by 10-20% (vs. 2021)

Association Corporate Cup. This annual event raises approximately \$330,000 for education, as well as lung disease research, support, programs and services. Beyond the company donation, our team of employees consistently ranks in the top-five fundraising teams across the entire event.

At Green Plains, we take our citizenship seriously and hold ourselves accountable as good stewards and good neighbors.

ENVIRONMENTAL STEWARDSHIP

Further, to help protect the health and safety of our local communities, we evaluate the environmental impacts of our operations by:

- Ensuring that 100% of our operations have implemented environmental impact assessments
- Performing ongoing monitoring via EPA's Risk Management Program and our own Process Safety Management policy and procedures

CAPITAL INVESTMENT

Green Plains also supports local communities by contributing to rural economies and livelihoods, as well as into the U.S. economy as a whole.

In 2022, we continued to maintain a mutually beneficial relationship with local farmers, infusing capital into rural economies and communities throughout the Midwest:

- Green Plains directly infused over \$1.6 billion into local communities near our biorefineries via grain purchases in 2022, including over \$822 million in direct purchases from area farmers
- Green Plains' MSC™ installations have an \$11 million impact in their communities, through increased hotel, restaurant, entertainment and local contract spending

As a whole, the biofuel industry made significant monetary contributions to rural communities and the U.S. economy in 2022:

- Directly and indirectly supported more than 421,600 jobs in the U.S.
- Added more than \$57 billion to the U.S. Gross Domestic Product (GDP) through annual operations, transportation and new project construction
- Provided an additional \$34.8 billion to U.S. households through biofuel production

Source: <https://ethanolrfa.org/media-and-news/category/news-releases/article/2023/02/new-study-ethanol-industry-s-impact-on-the-u-s-economy-strengthened-in-2022>

Governance

We shape our sustainability governance to address the evolving needs and opportunities of our transformation road map, and to help ensure the utmost accuracy and integrity in our work.

In 2022, we reconfigured and expanded our ESG leadership, and continue to enhance our climate-related financial reporting and bolster our carbon-assurance efforts.

OUR KEY TOPICS

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Board Composition
and Structure

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Ethics and
Compliance

Board Composition and Structure












Board Overview

The Green Plains Board of Directors consists of nine members with diverse qualifications, qualities and skills that support our near- and long-term strategies, including our ongoing transformation.

The company made a key governance enhancement in 2022, having been the first Iowa corporation of which we are aware to act on a change in Iowa law eliminating the requirement that company boards remain classified. In February 2022, we put forward a proposal to our shareholders for a vote at its Annual Meeting of Shareholders in May 2022 to declassify our board. This proposal was approved by an overwhelming majority of shareholders.

The declassification process is a multiyear initiative. All future director elections, beginning with the elections at our 2023 Annual Meeting of Shareholders, will be for one-year terms. Three incumbent directors up for reelection at the 2023 Annual Meeting will serve one-year terms, expiring in 2024. These three directors, along with three incumbent directors, will be up for reelection at the 2024 Annual Meeting and will serve one-year terms, expiring in 2025. These six directors, along with two incumbent directors, will be up for reelection at the 2025 Annual Meeting and will serve one-year terms. This will result in fully declassified board elections occurring at the 2025 Annual Meeting, where all eight members will be up for reelection.

We will also achieve our current goal to reduce the size of our board to eight members by the 2023 Annual Meeting of Shareholders with the retirement of Board Chairman, Wayne Hoovestol.

2022 KEY SKILLS AND EXPERIENCE		JIM ANDERSON	FARHA ASLAM	TODD BECKER	WAYNE HOOVESTOL	EJNAR KNUDSEN	BRIAN PETERSON	MARTIN SALINAS, JR.	ALAIN TREUER	KIMBERLY WAGNER
INDUSTRY	 Industrial Manufacturing & Ingredient Production	●	●	●		●	●		●	●
	 Commodity Markets/Marketing	●	●	●	●	●	●	●	●	
	 Strategy Development	●	●	●	●	●		●	●	●
STRATEGIC	 International Business	●	●	●		●			●	●
	 M&A / Partnerships	●	●	●	●	●		●	●	●
	 Capital Markets	●	●	●		●		●	●	
	 Audit / Risk / Cybersecurity	●	●	●		●	●	●	●	●
LEADERSHIP	 Legal / Regulatory / Govt. Relations	●	●	●						●
	 Public Company / Corp. Governance / ESG	●	●	●		●		●	●	●
	 Executive Leadership	●	●	●	●	●	●	●	●	●
	 Executive Compensation	●	●	●	●			●	●	

**2022 BOARD COMPOSITION
AND PARTICIPATION**

**Board of
Directors**

67%

INDEPENDENT



**Audit
Committee**

100%

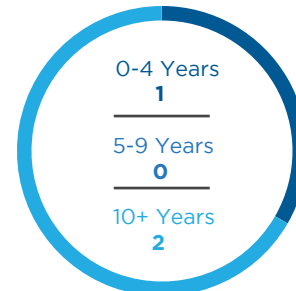
INDEPENDENT



**Compensation
Committee**

100%

INDEPENDENT



**Nominating &
Governance
Committee**

100%

INDEPENDENT



	2022	2021	2020
Executive	11%	11%	9%
Independent	67%	67%	73%
TENURE			
0-4 years	3	3	1
5-9 years	1	1	3
10+ years	5	5	7

	2022	2021	2020
Executive	0%	0%	0%
Independent	100%	100%	100%
TENURE			
0-4 years	2	2	0
5-9 years	0	0	1
10+ years	1	1	3

	2022	2021	2020
Executive	0%	0%	0%
Independent	100%	100%	100%
TENURE			
0-4 years	1	1	0
5-9 years	0	0	2
10+ years	2	2	2

	2022	2021	2020
Executive	0%	0%	0%
Independent	100%	100%	100%
TENURE			
0-4 years	2	2	0
5-9 years	0	0	1
10+ years	1	1	3

93%

Results of Annual Say on Pay Vote

97%

Board Meeting Attendance Rate

	UNIT OF MEASUREMENT	2022	2021	2020
Board Meeting Attendance Rate	%	97%	85%	96%
EXECUTIVE COMPENSATION				
Annual Total Compensation ratio of CEO to median employee	Ratio	63/1	69/1	42/1
Annual Say on Pay Vote	Yes/No	Yes	Yes	Yes
Results of Annual Say on Pay Vote	%	93%	88%	97%

Commitment to Board Diversity

The board recognizes the value of nominating directors who bring varying perspectives, opinions, skills, experiences, backgrounds and personal characteristics to discussion and decision-making. Diversity is one of several key factors that our Nominating and Governance Committee considers when identifying director candidates. Our Board Qualifications and Diversity Policy requires that each time a vacancy arises on the Board, the Nominating and Governance Committee must ensure that any search firm hired is instructed to provide a candidate pool that is comprised of at least 50% candidates that are women or otherwise considered diverse and at least 25% of the interviewed candidates are women or otherwise considered diverse. The Nominating and Governance Committee views diversity broadly and considers diversity of experience, skills and viewpoint, as well as traditional diversity concepts such as race/ethnicity, gender identity or expression, national origin, religion and sexual orientation when making nominations.

Green Plains is committed to maintaining a board comprising diverse viewpoints and has made significant progress related to board diversity since 2020. With the addition of two new board members in 2021, we accomplished our goals to appoint two female directors and one director who adds diversity and reach 33% gender/ethnically diverse board members prior to the 2022 Annual Meeting. As part of an ongoing refreshment initiative, the Board has also appointed a lead independent director, rotated the leadership and adjusted the composition of its key committees. Jim Anderson serves as the Lead Independent Director. Martin Salinas, Jr. serves as Audit Committee Chair, Kimberly Wagner serves as the Nominating and Governance Committee Chair and Brian Peterson serves as the Compensation Committee Chair.

2022 BOARD DIVERSITY



PERCENTAGE OF INDIVIDUALS WITHIN OUR HIGHEST GOVERNANCE BODY IN EACH OF THE FOLLOWING DIVERSITY CATEGORIES	UNIT OF MEASUREMENT	2022	2021	2020
Gender				
Male	%	78%	78%	91%
Female	%	22%	22%	9%
Age				
30-50	%	0%	11%	9%
Over 50	%	100%	89%	91%
Race/Ethnicity				
Caucasian/White	%	78%	78%	100%
Hispanic/Latin American	%	11%	11%	0%
Black/African American	%	0%	0%	0%
Asian/Pacific Islander	%	11%	11%	0%
American Indian/Alaskan Native	%	0%	0%	0%
Two or More Races	%	0%	0%	0%
Unspecified	%	0%	0%	0%

IN 2022 WE MADE

financial and in-kind political corporate contributions in the amount of \$25,000 and political action committee (PAC) contributions in the amount of \$68,000.

Ethics and Compliance

Green Plains has made several enhancements in the areas of ethics and compliance in recent years. Throughout 2022, we continued to maintain or build upon initiatives put into place in 2021, including our Vendor Screening Program. The screening process utilizes 880 different watch lists and other data sources to search for unlawful business practices, including corruption, human rights violations, sanctions or criminal activity. At least 2,666 additional parties (consisting of prospective or new international customers, suppliers and other vendors) were screened in 2022, ensuring that Green Plains was not conducting business with sanctioned or blocked counterparties. Further, all Green Plains employees received Ethics and Anti-Corruption Training and Human and Labor Rights Training through the company's newly launched LMS, with a required completion date of December 30, 2022.

Green Plains has a robust compliance program modeled from guidelines and/or recommendations of the United States Department of Justice as well as the United States Sentencing Commission. The program includes approximately 163 areas of compliance that the company has identified as being applicable to its business. Each area of compliance is assigned to one or more Responsible Corporate Employee(s), who are primarily responsible for 1) maintaining a thorough knowledge of laws, regulations and guidelines applicable to their area and 2) implementing compliant policies and procedures (with support from secondary departments or employees as needed). Our Legal Department conducts audits of the compliance functions, choosing several primary areas to focus on each year. During 2022, Investor Relations and multiple Engineering-related areas underwent Legal Department audits. Findings, recommendations and courses of action were discussed with the CLAO and other key personnel as applicable.

We abide by our [Code of Ethics](#) (Code) and aim to operate at the highest levels of integrity and good corporate citizenship. The Board is responsible for the Code and has entrusted our management team with its implementation in satisfaction of Section 406 of the Sarbanes-Oxley Act of 2002. The Code:

- Prohibits employees and directors from taking unfair advantage of anyone through manipulation, concealment, abuse of privileged information, misrepresentation of material facts or any other unfair dealing practice
- Contains a Conflicts of Interest policy that applies to all directors and employees, and outlines expectations and requirements, including mandatory reporting. Employees and directors are obligated to report any potential conflict of interest, and they cannot personally take opportunities or achieve personal gain using company property, information or position. Additionally, employees and directors may not compete with the company in any manner
- Provides advice about ethical and lawful behavior and offers various methods for seeking additional information, in addition to summarizing certain government laws and regulations

Employees, customers, suppliers and the general public have access to a Compliance Hotline to report concerns about unethical or unlawful behavior either by telephone (844.957.2596) or via our [online portal](#). This hotline is operated by a third party and is completely confidential. The CLAO and Audit Committee Chair receive all reports and the CLAO, or their designee, investigates all complaints. Every employee upon hire needs to acknowledge both the Code of Ethics and Code of Business Conduct. All new hires are obligated to participate in our New Employee Legal Orientation, where we highlight our corporate policies and procedures, including the Code of Ethics.

Anti-Corruption Policy

We make every effort to conduct our business in accordance with the highest ethical standards to maintain the complete confidence and trust of our consumers, shareholders and the public. Every employee, officer and director is expected to carry out the performance of their business responsibilities ethically and in accordance with our Anti-corruption Policy.

Human and Labor Rights Policy

We are committed to upholding human rights where we operate, and this includes protecting and promoting labor rights of our employees and providing a safe work environment. We are also dedicated to respecting the rights of disadvantaged people. We monitor suppliers and customers for human rights violations and aim to create a positive impact in our communities. We abide by our [Human and Labor Rights Policy](#) and [Code of Vendor Conduct](#), both of which prohibit child and forced labor at Green Plains and our suppliers and customers.

Cybersecurity

Cyberattacks are a leading risk and continue to evolve and increase in sophistication and frequency. Our Information Security Program utilizes the latest technologies to keep our systems secure and provide training resources to keep our users informed. As a key producer in the ag-tech space, we have the same vision for our cybersafety as we do for our employee health and safety — a vision of zero: zero incidents, zero breaches and zero leaks thefts or losses of customer data. In 2022, we maintained 0 identified leaks, thefts or losses of customer data.

As with any operational risk, Green Plains has a strong governance structure around cybersecurity. We have a centralized IT function at our corporate headquarters to have clear visibility into how well our policies enhance cybersecurity. We continuously monitor for potential threats, perform regular tests of our ability to respond and recover, and conduct continuous assessments of our cybersecurity standards. To further mitigate threats, we collaborate with governments and regulatory agencies, and take part in external events to enhance our knowledge of the emerging threat landscape. We also engage independent third parties to audit our cybersecurity program, in accordance with top information security standards such as ISO 27001.

Cybersecurity is embedded in our organizational structure and overall business strategy, where the SLT briefs the Audit Committee about cybersecurity matters on a quarterly basis. The most senior manager responsible for cybersecurity matters is our Chief Financial Officer, who, along with our Senior Vice President of Business Technology, discusses the current state of information security with the rest of the SLT on a regular basis. The Board Audit Committee provides oversight for the Cybersecurity Program. We engage in response readiness, cybersecurity training, disaster recovery and business continuity considerations. Our cybersecurity training program is a multi-dimensional information security learning experience with annual online video training sessions as well as ongoing dynamic and interactive learning exercises throughout the year that are designed to hone our employees' cybersecurity awareness and enhance our overall information security performance. Green Plains carries a broad cyber insurance policy covering information security risks and partners with our insurers for optimal transparency and risk mitigation.



Reporting Frameworks

This report references certain 2021 GRI standards. We also disclose under the SASB Biofuels Standard and align with the TCFD framework and UN Sustainable Development Goals.

FRAMEWORKS AND STANDARDS

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Global Reporting
Initiative (GRI)

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Biofuels Standard from
the Sustainability
Accounting Standards
Board (SASB)

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Task Force on Climate-
Related Financial
Disclosure (TCFD)

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Alignment with United
Nations Sustainable
Development Goals

Global Reporting Initiative (GRI)

GRI 2: General Disclosures 2021

Disclosure Number	Disclosure Title	Response or Disclosure Location
2-1	Organizational details	<p>Green Plains Inc.</p> <p>1811 Aksarben Drive, Omaha, NE 68106</p> <p>2022 Sustainability Report: About Green Plains, pages 6-7</p> <p>2022 Form 10-K: Item 1: Business – Overview, page 5; Operating Segments, pages 7-11</p> <p>We are a publicly traded company on the NASDAQ Stock Exchange. Our state of organization is Iowa and our legal form is domestic for-profit corporation.</p> <p>2022 Form 10-K: Cover, page 1</p>
2-2	Entities included in the organization’s sustainability reporting	2022 Form 10-K: Exhibit 21.1: Subsidiaries of the Company
2-3	Reporting period, frequency and contact point	<p>This report covers our environmental, social and governance (ESG) data and initiatives from January 1, 2022 through December 31, 2022, though we also share details on goals and initiatives that extend into 2023 and beyond.</p> <p>2022 Sustainability Report: About This Report, page 3</p> <p>Annual</p> <p>Inquiries related to the report and its content should be directed to our sustainability team at sustainability@gpreinc.com. More information can also be found at www.gpreinc.com.</p> <p>2022 Sustainability Report: About This Report, page 3</p>
2-4	Restatements of information	There have been no restatements of information.
2-5	External assurance	<p>Our current policy and practice includes seeking external assurance for certain data in our report through APEX Companies, LLC.</p> <p>APEX Companies, LLC has assured the data as outlined in their letter.</p> <p>The relationship between Green Plains Inc. and APEX is limited in scope to ESG disclosure auditing services.</p> <p>There are no known conflicts of interest between Green Plains Inc. and APEX.</p> <p>Senior executives, including the CEO, approved the selection of the external assurance provider.</p>

GRI 2: General Disclosures 2021

Disclosure Number	Disclosure Title	Response or Disclosure Location
2-6	Activities, value chain and other business relationships	<p>2022 Sustainability Report: Letter from our Chief Executive Officer, pages 4-5; About Green Plains, pages 6-7; Social – Customers; Suppliers, pages 61-63</p> <p>2022 Form 10-K: Item 1: Business – Overview, page 5; Operating Segments, pages 7-11; Human Capital Resources, page 13</p> <p>Net Revenues: \$3,662,849,000 Total Capitalization (Assets): \$2,123,131,000</p> <p>2022 Sustainability Report: Social – Diversity, Equity and Inclusion, pages 59-60</p> <p>There were no significant changes to our supply chain during the reporting period that can cause or contribute to significant economic, environmental, and social impacts. All of our corn suppliers and the majority of our other suppliers are based out of North America and we do not outsource any significant part of our activities.</p> <p>2022 Form 10-K: Item 7: Liquidity and Capital Resources, pages 43-44</p>
2-7	Employees	<p>2022 Sustainability Report: Social – Diversity, Equity and Inclusion, pages 59-60</p> <p>2022 Form 10-K: Item 1: Business – Human Capital Resources, page 13</p> <p>The data was compiled from internal employee records</p>
2-8	Workers who are not employees	The portion of Green Plains’ activities performed by workers who are not employees is not significant
2-9	Governance structure and composition	<p>2022 Sustainability Report: Governance – Board Composition and Structure, pages 66-68</p> <p>2023 Proxy Statement: Corporate Governance – Committees of the Board, page 26</p> <p>2023 Proxy Statement: Proxy Summary – Board Highlights, pages 7-10; Corporate Governance – Director Biographical Information and Experience, pages 14-21; Corporate Governance – Leadership Structure – Diversity and Refreshment, page 25</p>
2-10	Nomination and selection of the highest governance body	<p>2022 Sustainability Report: Governance – Board Composition and Structure – Commitment to Board Diversity, page 68</p> <p>2023 Proxy Statement: Corporate Governance – Director Nomination Process, page 23</p>
2-11	Chair of the highest governance body	<p>Board Chairman, Wayne Hoovestol is a non-executive director.</p> <p>2023 Proxy Statement: Corporate Governance – Leadership Structure, page 24</p>

GRI 2: General Disclosures 2021

Disclosure Number	Disclosure Title	Response or Disclosure Location
2-12	Role of the highest governance body in overseeing the management of impacts	<p>2022 Sustainability Report: Our Commitment to Sustainability – Stakeholder Engagement and Key ESG Topics, page 12; ESG and Climate Change Governance, pages 10-11</p> <p>Pursuant to its charter, the Nominating and Governance Committee oversees ESG topics, including the development, approval and updating of the Company’s ESG purpose, mission statements, strategies, policies and goals.</p> <p>2023 Proxy Statement: Corporate Governance – Board Oversight, pages 29-32</p> <p>2023 Proxy Statement: Corporate Governance – Board Oversight – Risk Oversight, page 29</p>
2-13	Delegation of responsibility for managing impacts	2022 Sustainability Report: Our Commitment to Sustainability – ESG and Climate Change Governance, pages 10-11
2-14	Role of the highest governance body in sustainability reporting	<p>The Nominating and Governance Committee is responsible for the review and approval of our ESG reporting, including this Sustainability Report.</p> <p>2022 Sustainability Report: Our Commitment to Sustainability – ESG and Climate Change Governance, pages 10-11</p>
2-15	Conflicts of interest	<p>2022 Sustainability Report: Governance – Ethics and Compliance, pages 69-70</p> <p>Code of Ethics</p> <p>Code of Business Ethics and Conduct</p>
2-16	Communication of critical concerns	<p>2022 Sustainability Report: Governance – Ethics and Compliance, pages 69-70</p> <p>2023 Proxy Statement: Corporate Governance – Other Governance Principles – Communications with the Board, page 35</p>
2-17	Collective knowledge of the highest governance body	<p>2022 Sustainability Report: Governance – Board Composition and Structure, pages 66-68</p> <p>2023 Proxy Statement: Proxy Summary – Board Highlights – Board Snapshot – Skills and Experience, pages 8-10</p>
2-18	Evaluation of the performance of the highest governance body	Corporate Governance Guidelines: Annual Performance Evaluation of the Board, page 3
2-19	Remuneration policies	<p>2022 Sustainability Report: Our Commitment to Sustainability – ESG and Climate Change Governance, pages 10-11</p> <p>2023 Proxy Statement: Corporate Governance – Compensation of Directors, page 36; Executive Compensation – Compensation Discussion and Analysis, pages 44-65</p>
2-20	Process to determine remuneration	2023 Proxy Statement: Corporate Governance – Investor Engagement, page 32; Compensation of Directors, page 36; Executive Compensation – Compensation Discussion and Analysis, pages 44-65

GRI 2: General Disclosures 2021

Disclosure Number	Disclosure Title	Response or Disclosure Location
2-21	Annual total compensation ratio	2022 Sustainability Report: Governance – Board Composition and Structure – 2022 Board Composition and Participation, page 67 2023 Proxy Statement: Executive Compensation – CEO Pay Ratio, page 77
2-22	Statement on sustainable development strategy	2022 Sustainability Report: Letter from our Chief Executive Officer, pages 4-5
2-23	Policy commitments	Although we do not currently apply the Precautionary Principle or approach, as defined by the ‘Rio Declaration on Environment and Development’, in our operational risk management planning or when we develop and introduce new products, we do consider potential environmental issues including whether the proposed operation or product could pose a serious threat of irreversible environmental damage. 2022 Sustainability Report: About Green Plains – Our Principles and Values, page 8
2-25	Processes to remediate negative impacts	2022 Sustainability Report: Governance, pages 65-70
2-26	Mechanisms for seeking advice and raising concerns	2022 Sustainability Report: Governance – Ethics and Compliance, pages 69-70 2023 Proxy Statement: Corporate Governance - Other Governance Principles - Code of Ethics and Other Policies, page 34
2-27	Compliance with laws and regulations	2022 Sustainability Report: Environmental – Waste, Circularity and Environmental Compliance, pages 49-50
2-28	Membership associations	2022 Sustainability Report: About Green Plains – Awards and Memberships, page 7
2-29	Approach to stakeholder engagement	2022 Sustainability Report: Stakeholder Engagement and Key ESG Topics, page 12 We engage with stakeholder groups based on an analysis of our business impacts.
2-30	Collective bargaining agreements	None

GRI 3: Material Topics 2021

Disclosure Number	Disclosure Title	Response or Disclosure Location
3-1	Process to determine material topics	2022 Sustainability Report: About This Report, page 3; Our Commitment to Sustainability – Stakeholder Engagement and Key ESG Topics, page 12
3-2	List of material topics	2022 Sustainability Report: Stakeholder Engagement and Key ESG Topics, page 12; Our Commitment to Sustainability – ESG Highlights, pages 21-26 No significant changes in the list of key ESG topics or topic boundaries.

GRI 3: Material Topics 2021

Disclosure Number	Disclosure Title	Response or Disclosure Location
3-3	Management of material topics	<p>Although we do not currently apply the Precautionary Principle or approach, as defined by the 'Rio Declaration on Environment and Development', in our operational risk management planning or when we develop and introduce new products, we do consider potential environmental issues including whether the proposed operation or product could pose a serious threat of irreversible environmental damage.</p> <p>The environmental data within this report, with the exception of the GHG emissions inventory, is limited to the biorefinery production segment of our operations, including our biorefining facilities. The GHG emissions inventory covers all relevant GHG emissions, from all relevant sources and subsidiaries. The boundary coverage for scope 1 and 2 emissions is 99.69% and the boundary coverage for scope 3 emissions is 100%.</p> <p>The social and governance data in this report is enterprise-wide.</p> <p>2022 Sustainability Report: About this Report, page 3; Our Commitment to Sustainability, pages 9-26; Environmental section, pages 27-50; Social section, pages 51-64; Governance section, pages 65-70</p>
200	Economic topics	
201	Economic Performance 2016	
201-2	Financial implications and other risks and opportunities due to climate change	<p>2022 Sustainability Report: Environmental - Climate Change and GHG Emissions, pages 28-38</p> <p>2022 Form 10-K: Item 1A: Risk Factors, pages 13-28</p>
202	Market Presence 2016	
202-1	Ratios of standard entry level wage by gender compared to local minimum wage	<p>All of our hourly employees are paid well above the federal minimum wage, and we monitor local minimum wages to ensure we are complying and are paying above the higher applicable wage rate.</p> <p>2022 Sustainability Report: Social - Employees - Talent Acquisition, Engagement and DE&I - Compensation and Benefits, page 57</p>
203	Indirect Economic Impacts 2016	
203-1	Infrastructure investments and services supported	2022 Sustainability Report: Social - Communities, page 64
203-2	Significant indirect economic impacts	2022 Sustainability Report: Social - Communities, page 64
204	Procurement Practices 2016	
204-1	Proportion of spending on local suppliers	2022 Sustainability Report: Environmental - Natural Capital and Land Stewardship, pages 45-48; Social - Suppliers, page 63
205	Anti-corruption 2016	
205-1	Operations assessed for risks related to corruption	Anti-Corruption Policy, Scope, page 1
205-2	Communication and training about anti-corruption policies and procedures	Green Plains Board receives annual compliance updates Anti-Corruption Policy, Scope, pages 1 and 6

GRI 3: Material Topics 2021

Disclosure Number	Disclosure Title	Response or Disclosure Location
205-3	Confirmed incidents of corruption and actions taken	2022 Sustainability Report: Governance - Ethics and Compliance - Anti-Corruption Policy, page 70
206	Anti-competitive Behavior 2016	
206-1	Legal actions for anti-competitive behavior, anti-trust, and monopoly practices	2022 Sustainability Report: Governance - Ethics and Compliance - Anti-Corruption Policy, page 70
300	Environmental topics	
301	Materials 2016	
301-1	Materials used by weight or volume	Our products are almost completely absent of any packaging. 2022 Sustainability Report: About Green Plains — Our Business, pages 6-7; Environmental - Waste, Circularity and Environmental Compliance, pages 49-50; Social - Suppliers, page 63
302	Energy 2016	
302-1	Energy consumption within the organization	2022 Sustainability Report: Environmental - Energy Use and Efficiency, pages 39-41
302-2	Energy consumption outside of the organization	2022 Sustainability Report: Environmental - Energy Use and Efficiency, pages 39-41
302-3	Energy intensity	2022 Sustainability Report: Environmental - Energy Use and Efficiency, pages 39-41
302-4	Reduction of energy consumption	2022 Sustainability Report: Our Commitment to Sustainability — ESG Highlights, pages 21-26; Environmental - Energy Use and Efficiency, pages 39-41
303	Water and Effluents 2018	
303-1	Interactions with water as a shared resource	2022 Sustainability Report: Environmental - Water Management, pages 42-44
303-2	Management of water discharge-related impacts	2022 Sustainability Report: Environmental - Water Management, pages 42-44
303-3	Water withdrawal	2022 Sustainability Report: Environmental - Water Management, pages 42-44
303-4	Water discharge	2022 Sustainability Report: Environmental - Water Management, pages 42-44
303-5	Water consumption	2022 Sustainability Report: Environmental - Water Management, pages 42-44
304	Biodiversity 2016	
304-1	Operational sites owned, leased, managed in, or adjacent to, protected areas and areas of high biodiversity value outside protected areas	2022 Sustainability Report: Environmental - Natural Capital and Land Stewardship - pages 45-48
304-2	Significant impacts of activities, products and services on biodiversity	2022 Sustainability Report: Environmental - Natural Capital and Land Stewardship - pages 45-48
304-3	Habitats protected or restored	2022 Sustainability Report: Environmental - Natural Capital and Land Stewardship - pages 45-48

GRI 3: Material Topics 2021

Disclosure Number	Disclosure Title	Response or Disclosure Location
305	Emissions 2016	
305-1	Direct (Scope 1) GHG emissions	2022 Sustainability Report: Environmental – Climate Change and GHG Emissions, pages 28-38
305-2	Energy indirect (Scope 2) GHG emissions	2022 Sustainability Report: Environmental – Climate Change and GHG Emissions, pages 28-38
305-3	Other indirect (Scope 3) GHG emissions	2022 Sustainability Report: Environmental – Climate Change and GHG Emissions, pages 28-38
305-4	GHG emissions intensity	2022 Sustainability Report: Environmental – Climate Change and GHG Emissions, pages 28-38
305-5	Reduction of GHG emissions	2022 Sustainability Report: Environmental – Climate Change and GHG Emissions, pages 28-38
305-7	Nitrogen oxides (NO_x), sulfur oxides (SO_x), and other significant air emissions	2022 Sustainability Report: Environmental – Climate Change and GHG Emissions, pages 28-38
306	Waste 2020	
306-1	Waste generation and significant waste-related impacts	2022 Sustainability Report: Environmental – Waste, Circularity and Environmental Compliance, pages 49-50
306-2	Management of significant waste-related impacts	2022 Sustainability Report: Environmental – Waste, Circularity and Environmental Compliance, pages 49-50
306-3	Waste generated	2022 Sustainability Report: Environmental – Waste, Circularity and Environmental Compliance, pages 49-50
307	Environmental Compliance 2016	
307-1	Non-compliance with environmental laws and regulations	2022 Sustainability Report: Environmental – Waste, Circularity and Environmental Compliance, pages 49-50
400	Social topics	
401	Employment 2016	
401-1	New employee hires and employee turnover	2022 Sustainability Report: Social – Talent Acquisition, Engagement and DE&I page 56
401-2	Benefits provided to full-time employees that are not provided to temporary or part-time employees	2022 Sustainability Report: Social – Talent Acquisition, Engagement and DE&I – Compensation & Benefits, pages 57
401-3	Parental leave	2022 Sustainability Report: Social – Talent Acquisition, Engagement and DE&I – Compensation & Benefits, pages 57
403	Occupational Health and Safety 2018	
403-1	Occupational health and safety management system	2022 Sustainability Report: Social – Employee Health and Safety – Occupational Health & Safety Management System, page 53
403-2	Hazard identification, risk assessment, and incident investigation	2022 Sustainability Report: Social – Employee Health and Safety, pages 52-55
403-3	Occupational health services	2022 Sustainability Report: Social – Employee Health and Safety, pages 52-55

GRI 3: Material Topics 2021

Disclosure Number	Disclosure Title	Response or Disclosure Location
403-4	Worker participation, consultation, and communication on occupational health and safety	2022 Sustainability Report: Social – Employee Health and Safety, pages 52-55
403-5	Worker training on occupational health and safety	2022 Sustainability Report: Social – Employee Health and Safety, pages 52-55
403-6	Promotion of worker health	2022 Sustainability Report: Social – Employee Health and Safety, pages 52-55
403-7	Prevention and mitigation of occupational health and safety impacts directly linked by business relationships	2022 Sustainability Report: Social – Employee Health and Safety, pages 52-55
403-8	Workers covered by an occupational health and safety management system	2022 Sustainability Report: Social – Employee Health and Safety, pages 52-55
403-9	Work-related injuries	2022 Sustainability Report: Social – Employee Health and Safety, pages 52-55
404	Training and Education 2016	
404-1	Average hours of training per year per employee	2022 Sustainability Report: Social – Training, Learning and Career Development, page 58
404-2	Programs for upgrading employee skills and transition assistance programs	2022 Sustainability Report: Social – Training, Learning and Career Development, page 58
404-3	Percentage of employees receiving regular performance and career development reviews	2022 Sustainability Report: Social – Training, Learning and Career Development, page 58
405	Diversity and Equal Opportunity 2016	
405-1	Diversity of governance bodies and employees	2022 Sustainability Report: Social – Diversity, Equity and Inclusion, pages 59-60; Governance – Board Composition and Structure – 2022 Board Diversity, page 68
408	Child Labor 2016	
408-1	Operations and suppliers at significant risk for incidents of child labor	Green Plains does not permit the employment of underage children in our workforce or the use of forced or compulsory labor in any of our operations. Human and Labor Rights Policy
409	Forced or Compulsory Labor 2016	
409-1	Operations and suppliers at significant risk for incidents of forced or compulsory labor	Green Plains does not permit the employment of underage children in our workforce or the use of forced or compulsory labor in any of our operations. Human and Labor Rights Policy
410	Security Practices 2016	
410-1	Security personnel trained in human rights policies or procedures	All security personnel hired are required to attend formal training relating to our Human and Labor Rights Policy.
413	Local Communities 2016	

GRI 3: Material Topics 2021

Disclosure Number	Disclosure Title	Response or Disclosure Location
413-1	Operations with local community engagement, impact assessments, and development programs	2022 Sustainability Report: Our Commitment to Sustainability – ESG Highlights, pages 21-26; Social – Communities, page 64
414	Supplier Social Assessment 2016	
414-1	New suppliers that were screened using social criteria	2022 Sustainability Report: Social – Suppliers, page 63; Governance – Ethics and Compliance, page 69
414-2	Negative social impacts in the supply chain and actions taken	2022 Sustainability Report: Social – Suppliers, page 63; Governance – Ethics and Compliance, pages 69-70
415	Public Policy 2016	
415-1	Political contributions	2022 Sustainability Report: Governance – Ethics and Compliance, page 69
416	Customer Health and Safety 2016	
416-1	Assessment of the health and safety impacts of product and service categories	We ensure the health and safety of our customers by guaranteeing that 100% of our products are subject to either a Certificate of Analysis process, feed tag with guarantee or another type of quality assurance document. 2022 Sustainability Report: Social – Customers, pages 61-62
416-2	Incidents of non-compliance concerning the health and safety impacts of products and services	Our facilities continue to perform well during audits by the FDA regarding compliance with the Food Safety Modernization Act (FSMA) regulation, with no facilities receiving negative findings. 2022 Sustainability Report: Social – Customers, pages 61-62
418	Customer Privacy 2016	
418-1	Substantiated complaints concerning breaches of customer privacy and losses of customer data	In 2022, we have not had any identified leaks, thefts or losses of customer data. 2022 Sustainability Report: Governance – Ethics and Compliance – Cybersecurity, page 70

Biofuels Standard from the Sustainability Accounting Standards Board (SASB)

Topic	Metrics	Category	Unit of Measure	Code	Answer, Cross-Reference, Omissions and Explanations	Location
Air Quality	Air emissions of the following pollutants: (1) NOx (excluding N2O), (2) SOx, (3) volatile organic compounds (VOCs), (4) particulate matter (PM10), and (5) hazardous air pollutants (HAPs)	Quantitative	Metric tons (t)	RR-BI-120a.1	Yes, except (5) hazardous air pollutants (HAPs)	2022 Sustainability Report: Environmental - Climate Change and GHG Emissions, page 38
	Number of incidents of non-compliance associated with air quality permits, standards, and regulations	Quantitative	Number	RR-BI-120a.2	161 incidents	2022 Sustainability Report: Environmental - Climate Change and GHG Emissions, page 38
Water Management in Manufacturing	(1) Total water withdrawn, (2) total water consumed, percentage of each in regions with High or Extremely High Baseline Water Stress	Quantitative	Thousand cubic meters (m3), Percentage (%)	RR-BI-140a.1	Yes, except (2), percentage of each in regions with High or Extremely High Baseline Water Stress	2022 Sustainability Report: Environmental - Water Management, pages 42-44
	Description of water management risks and discussion of strategies and practices to mitigate those risks	Discussion and Analysis	n/a	RR-BI-140a.2	We currently do not have any known significant water-related impacts identified by local authorities or other stakeholders.	2022 Sustainability Report: Environmental - Water Management, pages 42-44
	Number of incidents of non-compliance associated with water quality permits, standards, and regulations	Quantitative	Number	RR-BI-140a.3	7	2022 Sustainability Report: Environmental - Water Management, page 44
Lifecycle Emissions Balance	Lifecycle greenhouse gas (GHG) emissions, by biofuel type	Quantitative	Grams of CO2-e per megajoule (MJ)	RR-BI-410a.1	Discloses Scope 1, Scope 2 and Scope 3 GHG emissions as well as lifecycle GHG emissions	2022 Sustainability Report: Environmental - Climate Change and GHG Emissions, pages 28-38
Sourcing & Environmental Impacts of Feedstock Production	Discussion of strategy to manage risks associated with environmental impacts of feedstock production	Discussion and Analysis	n/a	RR-BI-430a.1	Yes, under Natural Capital and Land Stewardship section	2022 Sustainability Report: Environmental - Natural Capital and Land Stewardship, pages 45-48
	Percentage of biofuel production third-party certified to an environmental sustainability standard	Quantitative	Percentage (%) of gallons	RR-BI-430a.2	All of our biorefinery locations are registered as Renewable Fuel Producers with the U.S. Environmental Protection Agency (EPA) and meet the requirements for the Renewable Fuel Standard (Title 40 CFR Part 80). Additionally, 100% of the denatured biofuel we produce is RFS compliant.	2022 Sustainability Report: Environmental - Waste, Circularity and Environmental Compliance, pages 49-50

TOPIC	METRICS	CATEGORY	UNIT OF MEASURE	CODE	ANSWER, CROSS-REFERENCE, OMISSIONS AND EXPLANATIONS	LOCATION
Management of the Legal & Regulatory Environment	Amount of subsidies received through government programs	Quantitative	Reporting currency	RR-BI-530a.1		
	Discussion of corporate positions related to government regulations and/or policy proposals that address environmental and social factors affecting the industry	Discussion and Analysis	n/a	RR-BI-530a.2		2022 Form 10-K: Item 1: Business – Regulatory Matters, pages 12-13; Item 1A: Risk Factors – Risks Related to our Business and Industry, pages 13-28
Operational Safety, Emergency Preparedness & Response	Process Safety Incidents Count (PSIC), Process Safety Total Incident Rate (PSTIR), and Process Safety Incident Severity Rate (PSISR)	Quantitative	Number, Rate	RR-BI-540a.1	There were no Process Safety Incidents in 2022	2022 Sustainability Report: Social – Employee Health and Safety, page 52
Activity Metrics	Biofuel production capacity	Quantitative	Millions of gallons (Mgal)	RR-BI-000.A	958,000,000 gallons renewable biofuel production capacity	2022 Sustainability Report: About Green Plains – Our Business, page 7
	Production of: (1) renewable fuel, (2) advanced biofuel, (3) biomass-based diesel, and (4) cellulosic biofuel	Quantitative	Millions of gallons (Mgal)	RR-BI-000.B	872,133,000 gallons sold in 2022	2022 Sustainability Report: About Green Plains – Our Business, page 7
	Amount of feedstock consumed in production	Quantitative	Metric tons (t)	RR-BI-000.C	301,868,000 bushels of corn consumed in 2022	2022 Sustainability Report: About Green Plains – Our Business, page 7

Task Force on Climate-Related Financial Disclosure (TCFD)

Topic	Recommended Disclosure	Response or Location
Governance: Disclose the organization's governance around climate-related risks and opportunities.	a. Describe the board's oversight of climate-related risks and opportunities.	2022 Sustainability Report: Our Commitment to Sustainability – ESG and Climate Change Governance, pages 10-11; Environmental – Climate Change and GHG Emissions, page 30 2023 Proxy Statement: Corporate Governance – Board Oversight – ESG and Sustainability Oversight, pages 31-32
	b. Describe management's role in assessing and managing climate-related risks and opportunities.	2022 Sustainability Report: Our Commitment to Sustainability – ESG and Climate Change Governance, pages 10-11; Environmental – Climate Change and GHG Emissions, page 30
Strategy: Disclose the actual and potential impacts of climate-related risks and opportunities on the organization's businesses, strategy, and financial planning where such information is material.	a. Describe the climate-related risks and opportunities the organization has identified over the short, medium, and long term.	2022 Sustainability Report: Environmental – Climate Change and GHG Emissions, pages 30-33
	b. Describe the impact of climate-related risks and opportunities on the organization's businesses, strategy, and financial planning.	2022 Sustainability Report: Environmental – Climate Change and GHG Emissions, pages 30-36
	c. Describe the resilience of the organization's strategy, taking into consideration different climate-related scenarios, including a 2°C or lower scenario.	2022 Sustainability Report: Environmental – Climate Change and GHG Emissions, pages 30-36
Risk Management: Disclose how the organization identifies, assesses, and manages climate-related risks.	a. Describe the organization's processes for identifying and assessing climate-related risks.	2022 Sustainability Report: Environmental – Climate Change and GHG Emissions, page 30
	b. Describe the organization's processes for managing climate-related risks.	2022 Sustainability Report: Environmental – Climate Change and GHG Emissions, pages 28-36
	c. Describe how processes for identifying, assessing, and managing climate-related risks are integrated into the organization's overall risk management.	2022 Sustainability Report: Environmental – Climate Change and GHG Emissions, pages 30-33; Our Commitment to Sustainability – ESG and Climate Change Governance, pages 10-11
Metrics and Targets: Disclose the metrics and targets used to assess and manage relevant climate-related risks and opportunities where such information is material.	a. Disclose the metrics used by the organization to assess climate-related risks and opportunities in line with its strategy and risk management process.	2022 Sustainability Report: Environmental – Climate Change and GHG Emissions, pages 28-29 & 36-37
	b. Disclose Scope 1, Scope 2 and, if appropriate, Scope 3 greenhouse gas (GHG) emissions, and the related risks.	2022 Sustainability Report: Environmental – Climate Change and GHG Emissions, page 37
	c. Describe the targets used by the organization to manage climate-related risks and opportunities and performance against targets.	2022 Sustainability Report: Environmental – Climate Change and GHG Emissions, pages 28-29 & 36-37







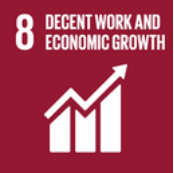
Alignment with United Nations Sustainable Development Goals



Our commitment to sustainability is ingrained in our operations and culture. Not only have we set meaningful and actionable goals for ourselves, but we hold our partners and suppliers to the same standards of equality, responsibility and accountability.




The United Nations (UN) Sustainable Development Goals (SDGs) are a guide to our sustainability efforts, and several of our initiatives and goals support the principles of the UN SDGs.



Using the SDGs as a guide further helps Green Plains to positively impact communities here and around the world.

GOAL	TARGETS AND INDICATORS	GREEN PLAINS ALIGNMENT
 <p>2 ZERO HUNGER End hunger, achieve food security and improved nutrition and promote sustainable agriculture</p>	<p>2.4 By 2030, ensure sustainable food production systems and implement resilient agricultural practices that increase productivity and production, that help maintain ecosystems, that strengthen capacity for adaptation to climate change, extreme weather, drought, flooding and other disasters and that progressively improve land and soil quality</p> <p>2.4.1 Proportion of agricultural area under productive and sustainable agriculture</p>	<p>100% sustainably-sourced primary feedstock by 2030</p>
 <p>4 QUALITY EDUCATION Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all</p>	<p>4.3 By 2030, ensure equal access for all women and men to affordable and quality technical, vocational and tertiary education, including university</p> <p>4.3.1 Participation rate of youth and adults in formal and non-formal education and training in the previous 12 months, by sex</p>	<p>Tracking average hours of training per year for men, women, production and corporate employees. Launched a Learning Management System in 2022 to increase participation.</p>
 <p>6 CLEAN WATER AND SANITATION Ensure availability and sustainable management of water and sanitation for all</p>	<p>6.4 By 2030, substantially increase water-use efficiency across all sectors and ensure sustainable withdrawals and supply of freshwater to address water scarcity and substantially reduce the number of people suffering from water scarcity</p> <p>6.4.1 Change in water-use efficiency over time</p>	<p>Reduce water intensity 10% by 2025 over 2021 baseline</p>

GOAL	TARGETS AND INDICATORS	GREEN PLAINS ALIGNMENT
 <p>7 AFFORDABLE AND CLEAN ENERGY</p>	<p>Ensure access to affordable, reliable, sustainable and modern energy for all</p> <p>7.2 By 2030, increase substantially the share of renewable energy in the global energy mix</p> <p>7.2.1 Renewable energy share in the total final energy consumption</p> <p>7.3 By 2030, double the global rate of improvement in energy efficiency</p> <p>7.3.1 Energy intensity measured in terms of primary energy and GDP</p> <p>7.a By 2030, enhance international cooperation to facilitate access to clean energy research and technology, including renewable energy, energy efficiency and advanced and cleaner fossil-fuel technology, and promote investment in energy infrastructure and clean energy technology</p>	<p>Contribute to the production of low carbon-intensity renewable diesel via a 50% increase in average renewable corn oil yield by 2025 over 2020 baseline</p> <p>Goal to reduce natural gas intensity (MMBtu/Raw Material MT) 2% per year through 2026</p> <p>Partnering with United Airlines and Tallgrass to develop ATJ SAF using advanced PNNL technology</p> <p>Partnering with Osaka Gas USA and Tallgrass to study the feasibility of synthetic methane production from low-carbon hydrogen and biogenic CO₂</p>
 <p>8 DECENT WORK AND ECONOMIC GROWTH</p>	<p>Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all</p> <p>8.4 Improve progressively, through 2030, global resource efficiency in consumption and production and endeavor to decouple economic growth from environmental degradation, in accordance with the 10-Year Framework of Programs on Sustainable Consumption and Production, with developed countries taking the lead</p> <p>8.4.1 Material footprint, material footprint per capita, and material footprint per GDP</p> <p>8.8 Protect labor rights and promote safe and secure working environments for all workers, including migrant workers, in particular women migrants, and those in precarious employment</p> <p>8.8.1 Fatal and non-fatal occupational injuries per 100,000 workers, by sex and migrant status</p> <p>8.8.2 Level of national compliance with labor rights (freedom of association and collective bargaining) based on International Labor Organization (ILO) textual sources and national legislation, by sex and migrant status</p>	<p>Products derived from renewable biomass and currently tracking carbon footprint of multiple products (biofuel, high-protein, renewable corn oil) with a carbon reduction strategy in place to work toward improved resource efficiency</p> <p>Goal to reduce OSHA TRIR by 35% by 2025 compared to 2020 baseline</p> <p>Enhanced Human and Labor Rights Policy adopted in May 2021 with goal to have, by 2022, 100% of Green Plains employees trained on Code of Ethics, Anti-Corruption and Human and Labor Rights policies</p>

GOAL	TARGETS AND INDICATORS	GREEN PLAINS ALIGNMENT	
	<p>Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation</p>	<p>9.2 Promote inclusive and sustainable industrialization and, by 2030, significantly raise industry's share of employment and gross domestic product, in line with national circumstances, and double its share in least developed countries</p> <p>9.2.1 Manufacturing value added as a proportion of GDP and per capita</p> <p>9.2.2 Manufacturing employment as a proportion of total employment</p> <p>9.4 By 2030, upgrade infrastructure and retrofit industries to make them sustainable, with increased resource-use efficiency and greater adoption of clean and environmentally sound technologies and industrial processes, with all countries taking action in accordance with their respective capabilities</p> <p>9.4.1 CO₂ emission per unit of value added</p>	<p>5 Sustainable Technology Installations (MSC high protein) with clean sugar (CST) construction underway in 2023</p> <p>Multiple goals to raise inclusive share of employment in manufacturing:</p> <ul style="list-style-type: none"> • Increase the number of female employees 25% from 2020 numbers by 2030 • Increased the number of employees who add diversity to our workforce by more than 15% from 2020 numbers, partially ACHIEVING our 2030 goal • 2022 short term target to increase culturally diverse hires by 2% and an increase in women hiring by 4% over 2021 <p>Carbon reduction strategy under development with goal to reduce our operational GHG emissions intensity 16.5% by 2026 compared to a 2020 baseline</p>
	<p>Ensure sustainable consumption and production patterns</p>	<p>12.2 By 2030, achieve the sustainable management and efficient use of natural resources</p> <p>12.2.1 Material footprint, material footprint per capita, and material footprint per GDP</p> <p>12.4 By 2020, achieve the environmentally sound management of chemicals and all wastes throughout their life cycle, in accordance with agreed international frameworks, and significantly reduce their release to air, water and soil in order to minimize their adverse impacts on human health and the environment</p> <p>12.4.2 (a) Hazardous waste generated per capita; and (b) proportion of hazardous waste treated, by type of treatment</p> <p>12.5 By 2030, substantially reduce waste generation through prevention, reduction, recycling and reuse</p> <p>12.5.1 National recycling rate, tons of material recycled</p> <p>12.6 Encourage companies, especially large and transnational companies, to adopt sustainable practices and to integrate sustainability information into their reporting cycle</p> <p>12.6.1 Number of companies publishing sustainability reports</p>	<p>Products derived from renewable biomass and currently tracking carbon footprint of multiple products (biofuel, high-protein, renewable corn oil) with a carbon reduction strategy in place to work toward improved resource efficiency</p> <p>Currently tracking and publishing all hazardous waste generated and developing active waste management plan in support of our zero waste goal.</p> <p>Finalized our corporate recycling program plan with planned initiation of phase I in 2023 and established new goal: Zero waste to landfill by 2030</p> <p>Published 3rd annual Sustainability Report with commitment to continue reporting on sustainability efforts</p>

GOAL	TARGETS AND INDICATORS	GREEN PLAINS ALIGNMENT
	<p>Take urgent action to combat climate change and its impacts</p> <p>13.2 Integrate climate change measures into national policies, strategies and planning</p> <p>13.2.2 Total greenhouse gas emissions per year</p>	<p>Climate disclosure aligned with TCFD framework, tracking and publishing of GHG emissions (Scopes 1, 2, 3 and biogenic) as well as science-based targets of 37.8% reduction in Scopes 1 & 2 and 22.5% reduction in Scope 3 GHG emissions from 2021 baseline by 2030 and a 100% reduction in operational GHG emissions by 2050 from a 2018 baseline</p>
	<p>Conserve and sustainably use the oceans, seas and marine resources for sustainable development</p> <p>14.4 By 2020, effectively regulate harvesting and end overfishing, illegal, unreported and unregulated fishing and destructive fishing practices and implement science-based management plans, in order to restore fish stocks in the shortest time feasible, at least to levels that can produce maximum sustainable yield as determined by their biological characteristics</p> <p>14.4.1 Proportion of fish stocks within biologically sustainable levels</p>	<p>Developing high-protein plant-based feed ingredients currently being tested in our aquafeed formulations and could potentially partially replace fishmeal in fish feed formulations. Fishmeal is a significant contributor to overfishing our oceans</p>
	<p>Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss</p> <p>15.1 By 2020, ensure the conservation, restoration and sustainable use of terrestrial and inland freshwater ecosystems and their services, in particular forests, wetlands, mountains and drylands, in line with obligations under international agreements</p> <p>15.3 By 2030, combat desertification, restore degraded land and soil, including land affected by desertification, drought and floods, and strive to achieve a land degradation-neutral world</p>	<p>We actively pursue opportunities to protect biodiversity and reduce deforestation while also partnering with our farmer customers to advance sustainable sourcing and farming</p> <p>100% of corn purchased from non-deforested, US-domestic sources via compliance with RFS regulations</p> <p>Established new goal of 100% sustainably-sourced primary feedstock by 2030 and began phase implementation of sustainable sourcing/farm carbon grain origination roadmap.</p>

GOAL	TARGETS AND INDICATORS	GREEN PLAINS ALIGNMENT
 <p>16 PEACE, JUSTICE AND STRONG INSTITUTIONS</p>	<p>Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels</p> <p>16.5 Substantially reduce corruption and bribery in all their forms</p> <p>16.6 Develop effective, accountable and transparent institutions at all levels</p> <p>16.7 Ensure responsive, inclusive, participatory and representative decision-making at all levels</p>	<p>The company made numerous governance enhancements in 2021, including but not limited to adopting new Board Governance Guidelines and Company Bylaw improvements concerning shareholder rights.</p> <p>Proposal to declassify Board included in 2022 Proxy Statement, with vote occurring at our 2022 Annual Meeting of Shareholders, resulting in passage</p> <p>Enhanced Anti-Corruption Policy and Human and Labor Rights Policy adopted in May 2021 with required training for 100% of workforce implemented in 2022.</p>
 <p>17 PARTNERSHIPS FOR THE GOALS</p>	<p>Strengthen the means of implementation and revitalize the Global Partnership for Sustainable Development</p> <p>17.6 Enhance North-South, South-South and triangular regional and international cooperation on and access to science, technology and innovation and enhance knowledge sharing on mutually agreed terms, including through improved coordination among existing mechanisms, in particular at the United Nations level, and through a global technology facilitation mechanism</p> <p>17.17 Encourage and promote effective public, public-private and civil society partnerships, building on the experience and resourcing strategies of partnerships</p>	<p>Partnering with Osaka Gas USA and Tallgrass to study the feasibility of synthetic methane production from low-carbon hydrogen and biogenic CO₂ to support Japan's climate goals</p> <p>Partnering with United Airlines and Tallgrass to develop ATJ SAF using advanced Pacific Northwest National Laboratory, a US Department of Energy research institution, technology</p>

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

Other Information

Index of Defined Terms

6S	Otherwise known as 5S (Sustain, Set in Order, Shine, Standardize, Sort) + Safety	EIPA	European Institute of Public Administration	KPI	Key Performance Indicators
AD&D	Accidental Death and Dismemberment	EPA	Environmental Protection Agency	KWh	Kilowatt Hours
ANSI	American National Standards Institute	ESG	Environmental, Social and Governance	LCFS	Low Carbon Fuel Standard
API	American Petroleum Institute	FAPRI	Food and Agricultural Policy Research Institute	LDAR	Leak Detection and Repair
CAPA	Corrective Action and Preventative Action	FDA	Food and Drug Administration	LMS	Learning Management System
CCS	Carbon Capture and Sequestration	FIFO	Fish In/Fish Out	LPG	Liquefied Petroleum Gas
CEMS	Continuous Emissions Monitoring System	FQTT	Fluid Quip Technologies	LTJ	Lost Time Injury
CFR	Code of Federal Regulations	FSMA	Food Safety Modernization Act	LUC	Land Use Change
CI	Carbon Intensity	GDP	Gross Domestic Product	MBE	Minority Owned Business Enterprise
CLAO	Chief Legal and Administration Officer	GHG	Greenhouse Gas	MDH	Minnesota Department of Health
CO ₂	Carbon Dioxide	GHS	Globally Harmonized System	MMBtu	Metric Million British Thermal Unit
CO ₂ e	Carbon Dioxide Equivalent	REET	Greenhouse Gases, Regulated Emissions, and Energy Use in Transportation	MNDNR	Minnesota Department of Natural Resources
COA	Certificate of Analysis	GRI	Global Reporting Initiative	MODIS	Moderate Resolution Imaging Spectroradiometer
CST™	Clean Sugar Technology	HAPs	Hazardous Air Pollutants	MPCA	Minnesota Pollution Control Agency
DAFW	Days Away From Work	HBCUs	Historically Black Colleges and Universities	MSCI™	Morgan Stanley Capital International
DEI/DE&I	Diversity, Equity and Inclusion	IDEM	Indiana Department of Environmental Management	MSC™	Maximized Stillage Co-Products
DHHS	Department of Health and Human Services	IDNR	Illinois Department of Natural Resources	MT	Metric Tons
EAP	Employee Assistance Plan	ISS	Information Security Standard	MTBE	Methyl Tertiary Butyl Ether
EHSS	Environment, Health, Safety and Security	IT	Information Technology	NDEE	Nebraska Department of Environment and Energy
		JSA	Job Safety Analysis	NFPA	National Fire Protection Association
				NO _x	Nitrogen Oxides

OSHA	Occupational Safety and Health Administration	TCFD	Task Force on Climate-Related Financial Disclosure
PAC	Political Action Committee	TDEC	Tennessee Department of Environment and Conservation
PEMS	Predictive Emissions Monitoring System	TO	Thermal Oxidizer
PM	Particulate Matter	TRIR	Total Recordable Incident Rate
PMS	Performance Management System	UN SDGs	United Nations Sustainable Development Goals
PPE	Personal Protective Equipment	USD	United States Dollar
PSM	Process Safety Management	USDA	United States Department of Agriculture
Q&A	Question and Answer	VFD	Variable Frequency Drives
QDR	Quality Deviation Report	VOCs	Volatile Organic Compounds
QMS	Quality Management System	VOSB	Veteran-Owned Small Business
RAS	Recirculating Aquaculture Systems	VP	Vice President
RD	Renewable Diesel	VSQGs	Very Small Quantity Generators
RFS	Renewable Fuel Standard	WBE	Women-Owned Business Enterprise
RO	Reverse Osmosis	WIA	Women in Agriculture
RTO	Regenerative Thermal Oxidizer		
S&P	Standard and Poor's		
SASB	Sustainability Accounting Standards Board		
SBTi	Science-Based Targets Initiative		
SCS	Summit Carbon Solutions		
SDS	Safety Data Sheets		
SLT	Senior Leadership Team		
SO2	Sulfur Dioxide		
SOX	Sulfur Oxide		
STEM	Science, Technology, Engineering, and Mathematics		
STI	Steel Tank Institute		
SVP	Senior Vice President		
SWA	Stop Work Authority		

Assurance Letter

INDEPENDENT LIMITED ASSURANCE STATEMENT



To: The Stakeholders of Green Plains Inc.

Introduction and Objectives of Work

Apex Companies, LLC (Apex) has been engaged by Green Plains Inc. to provide limited assurance of its Health and Safety, Production, Energy, Greenhouse Gas (GHG) emissions (Scope 1, Scope 2 [location-based], Scope 3 [Purchased Goods and Services, Capital Goods, Fuel and Energy-Related Activities, Upstream Transportation and Distribution, Employee Commuting, Downstream Transportation and Distribution, Use of Sold Products], Biogenic), Air Pollutants, Water Withdrawal, Water Discharge, and Social data for 2022. The Subject Matter of this assurance also includes Scope 3 GHG emissions (Capital Goods, Fuel and Energy-Related Activities, Use of Sold Products) for 2021. The Subject Matter subject to assurance is listed in the following tables. This assurance statement applies to the Subject Matter included within the scope of work described below.

This information and its presentation are the sole responsibility of the management of Green Plains Inc. Our sole responsibility was to provide independent assurance on the accuracy of the Subject Matter.

Scope of Work

The scope of our work was limited to assurance of the metrics listed above for the periods January 1, 2022 to December 31, 2022 and January 1, 2021 to December 31, 2021 as specified above (the 'Subject Matter'). The metrics assured by Apex are included in the attached table.

Data and information supporting Health and Safety, Production, Energy, GHG Emissions (Scope 1, Scope 2 [location-based], Scope 3, Biogenic), Air Pollutants, Water Withdrawals, Water Discharge, and Social data were mostly historical in nature.

Reporting Boundaries

The following are the boundaries used by Green Plains Inc. for reporting sustainability data:

- Operational Control
- United States
- Bioethanol production sites

Reporting Criteria

Reporting criteria include the following:

- 2016 GRI Standards
- World Resources Institute (WRI)/World Business Council for Sustainable Development (WBCSD) Greenhouse Gas (GHG) Protocol Corporate Accounting and Reporting Standard (Scope 1 and 2)
- World Resources Institute (WRI)/World Business Council for Sustainable Development (WBCSD) Greenhouse Gas (GHG) Protocol GHG Protocol Corporate Value Chain Accounting and Reporting Standard (Scope 3)
- OSHA definitions for injuries and reporting
- Company-specific criteria for reporting of Production and Production Systems

Limitations and Exclusions

Excluded from the scope of our work is any assurance of information relating to:

- Activities outside the defined assurance period;
- Material outside the scope of work;
- Fugitive GHG emissions from refrigerants (de minimis); and

- Optimal Fish Food, Bio-Process Algae, Fuel Stations (8), and Green Plains' Omaha, Nebraska Headquarters facility are excluded from the inventory

This limited assurance engagement relies on a risk-based selected sample of sustainability data and the associated limitations that this entails. The reliability of the reported data is dependent on the accuracy of metering and other production measurement arrangements employed at site level, not addressed as part of this assurance. This independent statement should not be relied upon to detect all errors, omissions or misstatements that may exist.

Responsibilities

The preparation and presentation of the Subject Matter are the sole responsibility of the management of Green Plains Inc.

Apex was not involved in the development of the Subject Matter or of the Reporting Criteria. Our responsibilities were to:

- obtain limited assurance about whether the Subject Matter has been prepared in accordance with the Reporting Criteria;
- form an independent conclusion based on the assurance procedures performed and evidence obtained; and
- report our conclusions to the Stakeholders of Green Plains Inc.

Assessment Standards

We performed our work in accordance with Apex's standard procedures and guidelines for external Assurance of Sustainability Reports and International Standard on Assurance Engagements (ISAE) 3000 Revised, Assurance Engagements Other than Audits or Reviews of Historical Financial Information (effective for assurance reports dated on or after Dec. 15, 2015), issued by the International Auditing and Assurance Standards Board. GHG emissions were verified in accordance with ISO 14064-3: Second edition 2019-04: Greenhouse gases -- Part 3: Specification with Guidance for the Verification and Validation of Greenhouse Gas Statements. A materiality threshold of ±5 percent was set for the assurance process.

Summary of Work Performed

As part of our independent assurance, our work included:

1. Assessing the appropriateness of the Reporting Criteria for the Subject Matter;
2. Querying information and data related to the Subject Matter from relevant personnel;
3. Reviewing the data collection and consolidation processes used to compile Subject Matter, including assessing assumptions made, and the data scope and reporting boundaries;
4. Reviewing documentary evidence provided by relevant personnel; and,
5. Agreeing a selection of the Subject Matter to the corresponding source documentation.

Conclusion

On the basis of our methodology and the activities described above:

- Nothing has come to our attention to indicate that the Subject Matter is not fairly stated in all material respects; and,
- It is our opinion that Green Plains Inc. has established appropriate systems for the collection, aggregation and analysis of quantitative data.

Statement of Independence, Integrity and Competence

Apex is an independent professional services company that specializes in Health, Safety, Social and Environmental management services including assurance with over 30 years history in providing these services.

Apex has implemented a Code of Ethics across the business to maintain high ethical standards among staff in their day-to-day business activities.

No member of the assurance team has a business relationship with Green Plains Inc., its Directors or Managers beyond that required of this assignment. We have conducted this verification independently, and there has been no conflict of interest.

The assurance team has extensive experience in conducting assurance over environmental, social, ethical and health and safety information, systems and processes, and has over 20 years combined experience in this field and an excellent understanding of Apex's standard methodology for the assurance of sustainability data.



Cody Lorentson, Lead Assuror
Project Manager
Apex Companies, LLC
Lakewood, CO



Mary E. Armstrong-Friberg, Technical Reviewer
Senior Project Manager
Apex Companies, LLC
Cleveland, OH

April 7, 2023

Data Subject to Assurance

Green Plains Inc.	Units	Value ⁽¹⁾
GHG Emissions⁽²⁾		
Scope 1	Thousand tCO ₂ e ⁽³⁾	1,252
Scope 2	Thousand tCO ₂ e	357
Biogenic	Thousand tCO ₂ e	2,441
Scope 3: Purchased Goods and Services ⁽⁴⁾	Thousand tCO ₂ e	2,128
Scope 3: Capital Goods (2021)	Thousand tCO ₂ e	45.4
Scope 3: Capital Goods (2022)	Thousand tCO ₂ e	47.6
Scope 3: Fuel and Energy-Related Activities (2021)	Thousand tCO ₂ e	345
Scope 3: Fuel and Energy-Related Activities (2022)	Thousand tCO ₂ e	463
Scope 3: Upstream Transportation and Distribution	Thousand tCO ₂ e	52.0
Scope 3: Employee Commuting	Thousand tCO ₂ e	2.35
Scope 3: Downstream Transportation and Distribution	Thousand tCO ₂ e	78.2
Scope 3: Use of Sold Products (2021)	Thousand tCO ₂ e	66.5
Scope 3: Use of Sold Products (2022)	Thousand tCO ₂ e	77.3
Total Operating GHG Emissions	Thousand tCO ₂ e	4,050
Total Operating GHG Emissions Intensity	tCO ₂ e/ton of raw material	0.528
Production		
Corn Bushels Consumed	Metric Tons	7,667,869
Corn Oil Yield	Lbs per bushel	0.933
Air Emissions		
Sulfur Dioxide	Thousand Metric Tons	0.089
Nitrogen Oxides	Thousand Metric Tons	0.551
Volatile Organic Compounds	Thousand Metric Tons	0.696
Carbon Monoxide	Thousand Metric Tons	0.375
Particulate Matter	Thousand Metric Tons	0.371
Electricity Usage⁽²⁾		
Electricity Usage	Thousand MWh	726
Electricity Use Intensity	kWh/ton of raw material	94.635
Natural Gas Usage⁽²⁾		
Natural Gas Usage	MMBTU	23,517,446
Natural Gas Use Intensity	MMBTU/ton of raw material	3.067
Water Usage		
Groundwater Withdrawals	Thousand m ³	9,187
Municipal Water Withdrawals	Thousand m ³	1,683
Reclaimed Water Withdrawals	Thousand m ³	257
Saltwater Withdrawals	Thousand m ³	0
Surface Water Withdrawals	Thousand m ³	0
Total Water Withdrawals	Thousand m ³	11,128
Total Water Discharged	Thousand m ³	3,596

Total Water Usage	Thousand m ³	7,532
Total Water Use Intensity	m ³ /ton of raw material	0.982
Environmental Compliance		
Number of Sites	Count	11
Number of Reportable Spills	Count	0
Volume of Reportable Spills	Liters	0
Number of Environmental Fines	Count	0
Amount of Environmental Fines	USD	\$0.00
Employee Retention		
Full-Time (Male)	Count	716
Part-Time (Male)	Count	3
Total (Male)	Count	719
Full-Time (Female)	Count	164
Part-Time (Female)	Count	6
Total (Female)	Count	170
Employee Turnover		
All	%	30
Male	%	80
Female	%	20
Under 30	%	32
30-50	%	41
Over 50	%	27
Employee Compensation		
Ratio of average entry-level wage to the federal minimum wage	Ratio	5.21
Diversity⁽²⁾		
Male	Total Number (%)	719 (80.9)
Female	Total Number (%)	170 (19.1)
Under 30	Total Number (%)	194 (21.8)
30-50	Total Number (%)	445 (50.1)
Over 50	Total Number (%)	250 (28.1)
Caucasian/White	Total Number (%)	811 (91.2)
Hispanic/Latin American	Total Number (%)	26 (2.9)
American Indian/Alaskan Native	Total Number (%)	4 (0.5)
Asian	Total Number (%)	12 (1.4)
Black or African American	Total Number (%)	24 (2.7)
Two or More Races	Total Number (%)	5 (0.6)
Unspecified	Total Number (%)	7 (0.8)
Training and Education		
Male	Average hours/employee	25.78
Female	Average hours/employee	25.98
Production	Average hours/employee	25.79
Corporate	Average hours/employee	1.067
Health and Safety		
Fatalities	Total Number	0

Lost Time Incidents	Total Number	1
Lost Time Incident Rate	Incidents per 200,000 hours worked	0.11
Recordable Incidents	Total Number	17
Recordable Incident Rate	Incidents per 200,000 hours worked	1.88
Hours Worked	Total Number	1,807,662
Production Systems		
Number of Maximized Stillage Co-products (MSC ⁽⁴⁾) systems in operation at production facilities	Count	5

⁽¹⁾Values are for period CY 2022 unless otherwise specified

⁽²⁾These values may be impacted by rounding

⁽³⁾tCO₂e is an abbreviation of metric tons of carbon dioxide equivalent

⁽⁴⁾Scope 3 – Purchased Goods and Services includes only purchased corn, estimated at 80% of total company spend

Forward-Looking Statements

This sustainability report 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 our 10-K 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: 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; disruption caused by health epidemics, such as the COVID-19 outbreak; 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 sustainability report 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" section 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 sustainability report. Any representation to the contrary is a criminal offense. Except as otherwise indicated, this sustainability report speaks as of the date hereof. The delivery of this sustainability report 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.



Green Plains

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