READY. SET. GO!

RFA
RENEWABLE FUELS ASSOCIATION

2023 ETHANOL INDUSTRY OUTLOOK





RFA OFFICERS

Chairman
Erik Huschitt
Badger State Ethanol LLC

Vice Chairman
Jeff Oestmann
Granite Falls Energy LLC
Heron Lake BioEnergy LLC

Treasurer
Mike Jerke
Southwest Iowa Renewable Energy LLC

Secretary
Rick Schwarck
Absolute Energy LLC

President
Geoff Cooper
Renewable Fuels Association

RFA BOARD OF DIRECTORS

Rick Schwarck	Absolute Energy LLC	absenergy.org
Neal Kemmet	Ace Ethanol LLC	aceethanol.com
	Fox River Valley Ethanol LLC	frvethanol.com
Bill Howell	Adkins Energy LLC	adkinsenergy.com
Eric McAfee	Aemetis Inc.	aemetis.com
Thomas Harwood	Al-Corn Clean Fuel LLC	al-corn.com
Erik Huschitt	Badger State Ethanol LLC	badgerstateethanol.com
David Zimmerman	Big River Resources LLC	bigriverresources.com
Lyle Schlyer	Calgren Renewable Fuels	calgren.com
Chad Friese	Chippewa Valley Ethanol Co.	cvec.com
Sean Broderick	CHS Inc.	chsinc.com
Ryan Drook	CIE LLC	cie.us
Mick Henderson	Commonwealth Agri-Energy LLC	commonwealthagrienergy.com
Scott Mundt	Dakota Ethanol LLC	dakotaethanol.com
Jon Cosby	E Energy Adams LLC	eenergyadams.com
Bill Pracht	East Kansas Agri-Energy LLC	ekaellc.com
Lindsay Fitzgerald	Gevo Inc.*	gevo.com
Dave Sovereign	Golden Grain Energy LLC	ggecorn.com
Mark Ricketts	Grain Processing Corp.	grainprocessing.com
Jeff Oestmann	Granite Falls Energy LLC	granitefallsenergy.com
	Heron Lake BioEnergy LLC	heronlakebioenergy.com
Eric Fobes	GreenAmerica Biofuels Ord LLC	pilotflyingj.com
Jeanne McCaherty	Guardian Energy LLC	guardiannrg.com
Gary Anderson	Heartland Corn Products	heartlandcorn.com
Brian Kletscher	Highwater Ethanol LLC	highwaterethanol.com
Seth Harder	Husker Ag LLC	huskerag.com
	Lincolnway Energy LLC	lincolnwayenergy.com
Dave VanderGriend	ICM Inc.	icminc.com
Chuck Woodside	KAAPA Ethanol Holdings LLC	kaapaethanolcommodities.com
Alex Menotti	LanzaJet Inc.*	lanzajet.com
Eric Mosbey	Lincolnland Agri-Energy LLC	lincolnlandagrienergy.com
Prestin Read	Mid America Bio Energy LLC	maapw.com
Chris Wilson	Mid-Missouri Energy LLC	midmissourienergy.com
Thomas Corle	New Energy Blue LLC*	newenergyblue.com
Delayne Johnson	Quad County Corn Processors	quad-county.com
Eric Baukol	Redfield Energy LLC	redfieldenergy.com
Walt Wendland	Ringneck Energy LLC	ringneckenergy.com
Brian Pasbrig	Show Me Ethanol LLC	smealcohol.com
Mike Jerke	Southwest Iowa Renewable Energy LLC	sireethanol.com
Tony Leiding	Trenton Agri Products LLC	trentonagriproducts.com
Tim Winters	Western New York Energy LLC	wnyenergy.com
Derek Peine	Western Plains Energy LLC	wpellc.com

**Prospective Producer Member*





READY. SET. GO!

RFA
RENEWABLE FUELS ASSOCIATION

One of baseball's most entertaining managers, Earl Weaver, once said that "momentum is the next day's starting pitcher." Indeed. Just as momentum is crucial in sports, it is similarly critical to success in both business and politics.

In 2022, the U.S. ethanol industry regained the same sort of momentum that fueled its remarkable growth following passage of the Renewable Fuel Standard 17 years ago. Just look at what we were able to accomplish last year: In December, the Environmental Protection Agency proposed RFS volumes through 2025 that provide certainty and an opportunity for growth. The agency also put an end to abusive small refiner exemptions that had decimated RFS demand for years and established a pathway for ethanol to serve as a "biointermediate" feedstock for new applications like sustainable aviation fuel. At the direction of President Biden, EPA also provided emergency waivers allowing the summertime use of E15 and committed to make E15 more broadly available to consumers across the country by the summer of 2023. At the same time, USDA finalized rules enabling ethanol producers to access $700 million in COVID relief funding and expanded the HBIIP program, providing resources for gasoline marketers wanting to provide E15 and flex fuels like E85 to consumers.

On Capitol Hill, the Inflation Reduction Act adopted in August heralded new tax incentives for sustainable aviation fuels, established a Clean Fuel Production Credit, enhanced the 45Q carbon capture credit, and appropriated another $500 million for higher ethanol blend infrastructure. Other bills that would establish a growing role for high-octane, low-carbon fuels—including the Next Generation Fuels Act—attracted growing support in both parties and both chambers of Congress. In an important development, we also gained a crucial new ally in our work toward making E15 available year-round, the American Petroleum Institute.

That's momentum! And that momentum has driven the industry to new heights as production, demand and exports continue to rebound from the malaise of the pandemic.

While some might be tempted to rest on those laurels, we at the Renewable Fuels Association intend to keep the momentum and build upon that success in 2023. In the short term, we continue to look for legislative or regulatory solutions providing RVP parity for E15 that will allow year-round accessibility for consumers and reduce costs at the pump. In the longer term, we still believe the secret to sustained success for ethanol lies in its ability to reduce carbon, and we'll pursue policies promoting and incentivizing low-carbon fuels and increasing ethanol's share of the gas tank, including E15, E20/E30, and E85. RFA members WILL meet their commitment to achieve net-zero carbon emissions by 2050 and we WILL lead the effort here and abroad to expand ethanol's market opportunities.

So, as exciting as the successes of 2022 clearly are, RFA and the ethanol industry are poised for even greater success in 2023. Join us on the mound as we pitch this year's win. **Ready. Set. Go!**

Geoff Cooper

Geoff Cooper, President and CEO

SET UP FOR SUCCESS

In many ways, 2022 was a banner year for the U.S. ethanol industry. Recovery from the COVID-19 pandemic continued, even as war in Ukraine and historic inflation created challenging economic conditions. As consumers around the globe faced record-high gas prices, U.S. ethanol provided relief at the pump and bolstered energy security. At 10.4 percent, ethanol comprised a record share of U.S. gasoline, and ethanol exports surged to their second-highest level ever.

Most significantly, major policy victories in 2022 laid the groundwork for an even better year in 2023. The Inflation Reduction Act adopted in August is the most important piece of federal legislation for the ethanol industry since the Renewable Fuel Standard was expanded in 2007. The new IRA law provides $500 million in grants for higher-blend biofuels infrastructure; extensions of several current biofuel tax credits; new tax credits for clean fuel production and sustainable aviation fuel; and enhanced support for carbon capture, utilization and storage projects.

And in December, EPA released strong Renewable Fuel Standard proposed requirements for 2023-2025, creating a sustainable path for growth and stability in renewable fuels production and use.

In addition, 2022 saw many producers make progress toward RFA's pledge to achieve net-zero carbon emissions for ethanol, on average, by 2050 or sooner. Major investments in new uses and markets for ethanol—like sustainable aviation fuel—also took flight in 2022.

With adoption of the IRA bill and strong RFS volumes, 2023 promises to be a transformative year for the ethanol industry.

Moving into 2023, the association will be focused on:

- Building positive and successful relationships with new members of Congress, helping them understand the important role ethanol and other renewable fuels play across America.
- Helping American drivers understand the value of renewable fuels like ethanol for saving money, bolstering the rural American economy, and providing a greener, low-carbon option.
- Working to ensure the Inflation Reduction Act is implemented as intended and brings maximum benefit to renewable fuel producers, the communities they serve, and the tens of millions of American drivers who want lower-cost, lower-carbon fuel.
- Ensuring EPA finalizes the strong RFS volumes proposed for 2023-2025, which will help the renewable fuels industry accelerate its efforts to decarbonize the transportation sector.
- Continuing the fight for year-round E15 and ensuring its availability at more retail locations so that consumers nationwide may have a clear option for more affordable fuel at the pump.
- Seeking opportunities to develop clean fuel policies that would acknowledge the low-carbon and environmental benefits of higher ethanol blends like E15 and flex fuels like E85, while fairly assessing the carbon lifecycle for all transportation fuel sources or technologies.

HISTORICAL ETHANOL BIOREFINERY COUNT & PRODUCTION CAPACITY

Year	Installed Ethanol Biorefineries	Total Installed Production Capacity (mgy)	Average Capacity per Biorefinery (mgy)
2002	66	3,190	48
2007	136	7,888	58
2012	211	14,838	70
2017	211	16,241	77
2022	199	17,946	90

Source: RFA **As of December for each year specified*

12-MONTH MOVING AVG. BLEND RATE OF ETHANOL IN GASOLINE

Source: RFA based on U.S. Energy Information Administration data

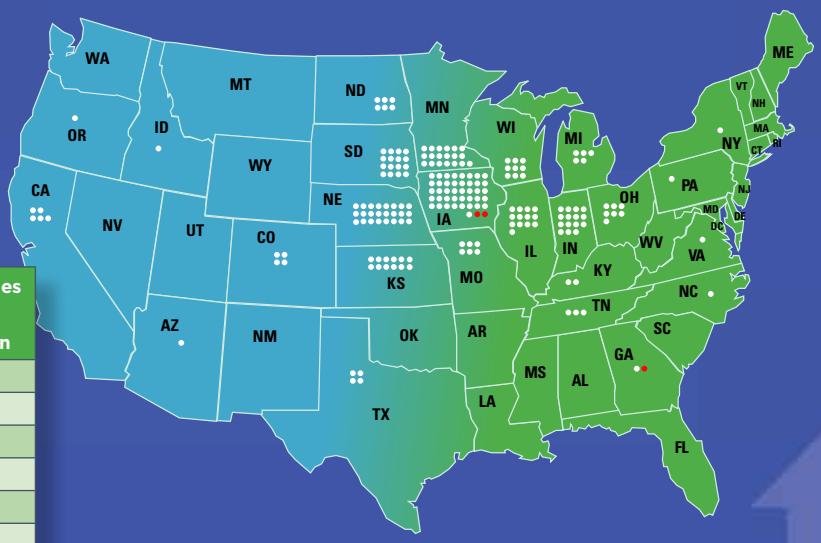
U.S. ETHANOL PRODUCTION CAPACITY BY STATE

(Million Gallons per Year)

	Existing Production Capacity	Capacity Under Constr./ Expansion	Installed Ethanol Biorefineries	Biorefineries Under Constr./ Expansion
Iowa	4,759	80	41	2
Nebraska	2,280	-	24	-
Illinois	1,856	-	13	-
South Dakota	1,442	-	16	-
Indiana	1,423	-	15	-
Minnesota	1,414	-	19	-
Ohio	732	25	7	1
Kansas	602	-	12	-
Wisconsin	596	-	9	-
North Dakota	555	-	6	-
Texas	420	-	4	-
Michigan	382	-	5	-
Missouri	316	-	6	-
Tennessee	232	-	3	-
California	227	-	5	-
Colorado	143	-	4	-
Georgia	120	9	1	1
Pennsylvania	120	-	1	-
Idaho	60	-	1	-
New York	60	-	1	-
North Carolina	60	-	1	-
Arizona	55	-	1	-
Kentucky	50	-	2	-
Oregon	40	-	1	-
Virginia	2	-	1	-
TOTAL U.S.	17,946	114	199	4

Source: RFA, as of Dec. 2022

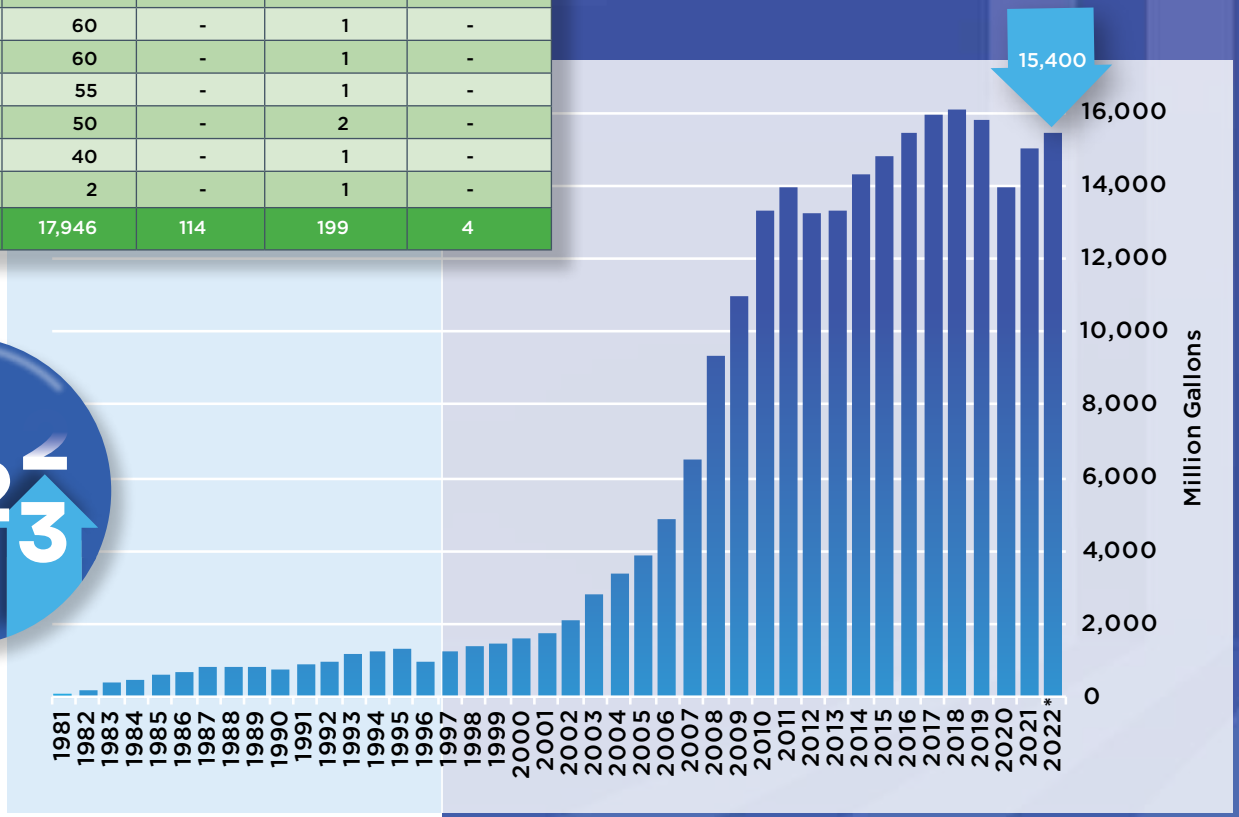
U.S. FUEL ETHANOL BIOREFINERIES BY STATE



● Installed Ethanol Biorefinery ● New Biorefinery under Construction

Source: RFA, as of Dec. 2022

HISTORICAL U.S. ETHANOL PRODUCTION



2023

Sources: RFA and U.S. Energy Information Administration
**Forecast*

FUELING THE ECONOMY

While the U.S. economy experienced turbulence in 2022, the ethanol industry's financial performance was strong and biorefineries continued to stimulate crucial economic activity in communities across the country. Consumer price inflation was the highest in decades, spurred in part by record gasoline prices that put a damper on fuel demand. However, the ethanol content of gasoline (i.e., the ethanol "blend rate") continued to increase due to its cost-competitiveness and the expanded availability of E15 and flex fuels. And, as international markets also faced high fuel prices and tight supplies, ethanol exports rose sharply. As a result, ethanol production increased to more than 15.4 billion gallons and has now almost rebounded to pre-pandemic levels.

Ethanol industry gross profits remained solid in 2022, as production increased and ethanol prices were roughly 8 percent higher than 2021. Notably, ethanol's wholesale discount to gasoline reached more than $1 per gallon at times, creating very favorable blending economics for fuel marketers. Prices of distillers grains and corn oil increased even more sharply amid elevated commodity prices. U.S. ethanol producers processed more than 5.3 billion bushels of corn worth a record $38 billion, deepening ethanol's role as the most important value-added market for farmers.

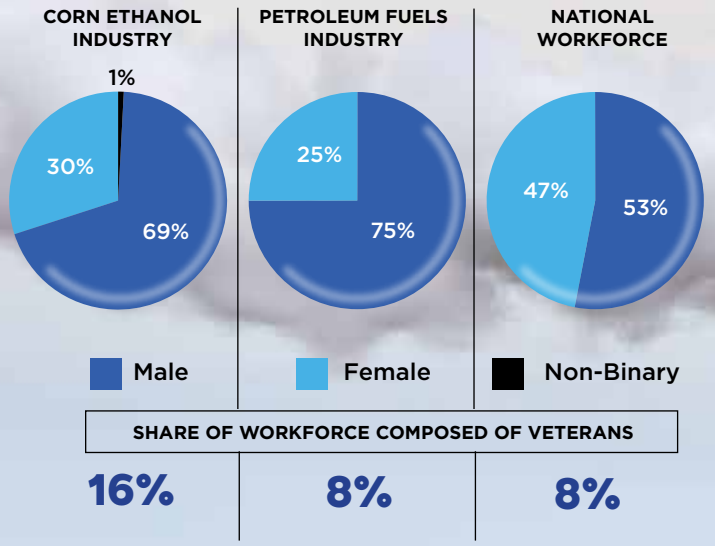
The impact on the national economy went well beyond the direct effects within the ethanol industry and agriculture sector. Ethanol production added over $57 billion to gross domestic product; supported more than 420,000 direct, indirect and induced jobs; and generated nearly $35 billion in income for American households. This economic activity resulted in more than $12 billion in federal, state and local taxes.

Ethanol and the 2022 Economy

Direct Jobs	78,802
Indirect/Induced Jobs	342,876
Household Income	$34.8 billion
GDP Contribution	$57 billion

Source: ABF Economics LLP

WORKFORCE DEMOGRAPHICS



Source: U.S. Dept. of Energy data

Going forward, the industry is poised to contribute even more to the economy, given the robust Renewable Fuel Standard volume requirements proposed for 2023-2025, the implementation of the Inflation Reduction Act, plans by more retailers to offer E15, and the emergence of promising new uses such as sustainable aviation fuel and green chemicals.

Ethanol's Value-Added Proposition

Based on average prices and product yields in 2022, a typical dry-mill ethanol plant was adding approximately **$2.44** of additional value—or **34%**—to every bushel of corn processed.

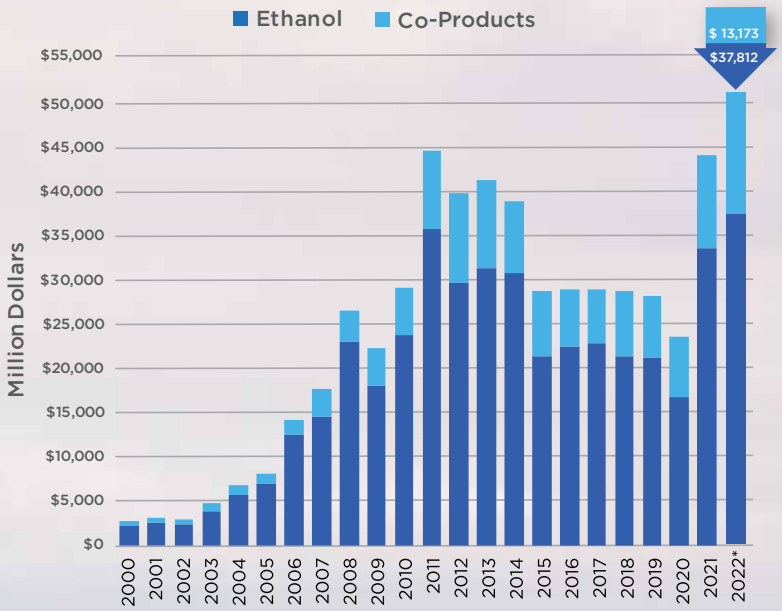
Corn Cost per Bushel

$ 7.15

Value of Outputs per Bushel		
Ethanol	$	7.10
Distillers Grains	$	1.85
Corn Distillers Oil	$	0.64
TOTAL	**$**	**9.59**

Estimate based on Jan.-Oct. 2022 data

GROSS VALUE OF U.S. ETHANOL INDUSTRY OUTPUT



*Source: RFA based on U.S. Energy Information Admin. and U.S. Dept. of Agriculture *Forecast*

A GLOBAL MARKET

The demand picture for U.S. ethanol was brightened by a strong rebound in exports. Shipments hit 1.4 billion gallons, making 2022 one of the top years for exports, as international fuel supplies were tight and prices were elevated following the Russian invasion of Ukraine. The U.S. share of global output remained at 55 percent, more than double that of Brazil.

Growth in Brazilian ethanol production was subdued by a slow start to the season and a lack of competitiveness of hydrous ethanol during parts of the year. In March, Brazil suspended its 18 percent tariff on imported ethanol through the end of the year, a move that was intended to combat rising fuel prices. The United States exported sizable volumes of ethanol to Brazil during the first half of the year, including a surge to 30 million gallons in April, but shipments then dwindled as Brazil's domestic production ramped up.

Canada was by far the largest destination for U.S. ethanol exports, accounting for roughly one-third of the 2022 total. Meanwhile, sales to South Korea continued to rise. It remained the second-largest market for U.S. exports.

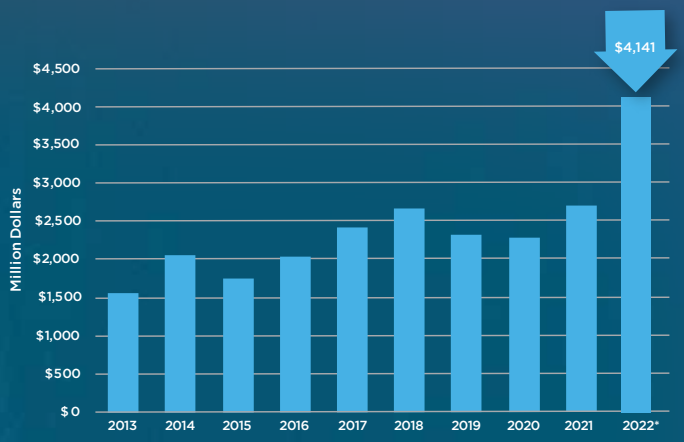
In 2022, more than 99% of the ethanol consumed in the U.S. was produced domestically. Imports accounted for less than 0.5% of U.S. ethanol consumption.

Elsewhere, the European Union ranked third in ethanol production, but output was constrained by a lack of cost-competitiveness as process energy prices moved sharply higher. As a result, the EU imported larger volumes of ethanol, including some from the United States. Separately, American shipments to the U.K. surged after E10 became the standard grade of gasoline there in late 2021.

As India moved toward a national E10 standard, domestic production experienced strong growth. While India imported significant volumes from the United States in the first half of the year, shipments tapered off in the second half.

On the import side, ethanol shipments into the United States held steady at very modest levels of 80 million gallons. As in recent years, almost all imports came from Brazil.

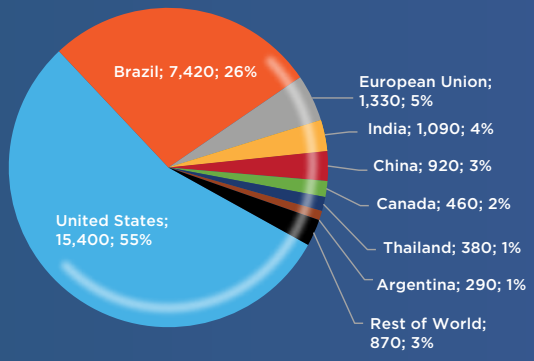
VALUE OF U.S. ETHANOL EXPORTS



Sources: U.S. Dept. of Commerce, U.S. Census Bureau, Foreign Trade Statistics **Forecast based on Jan.-Sep. 2022 data*

2022 GLOBAL FUEL ETHANOL PRODUCTION BY COUNTRY

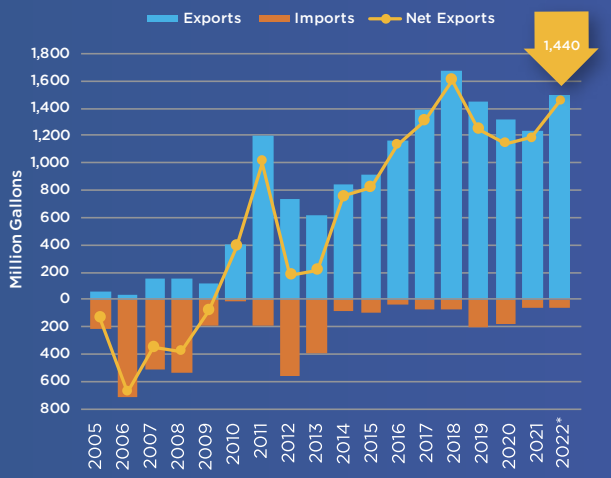
Country; million gallons; share of global production



Global fuel ethanol production rebounded further to 28 billion gallons in 2022. The United States remained the largest producer, accounting for over half of global output.

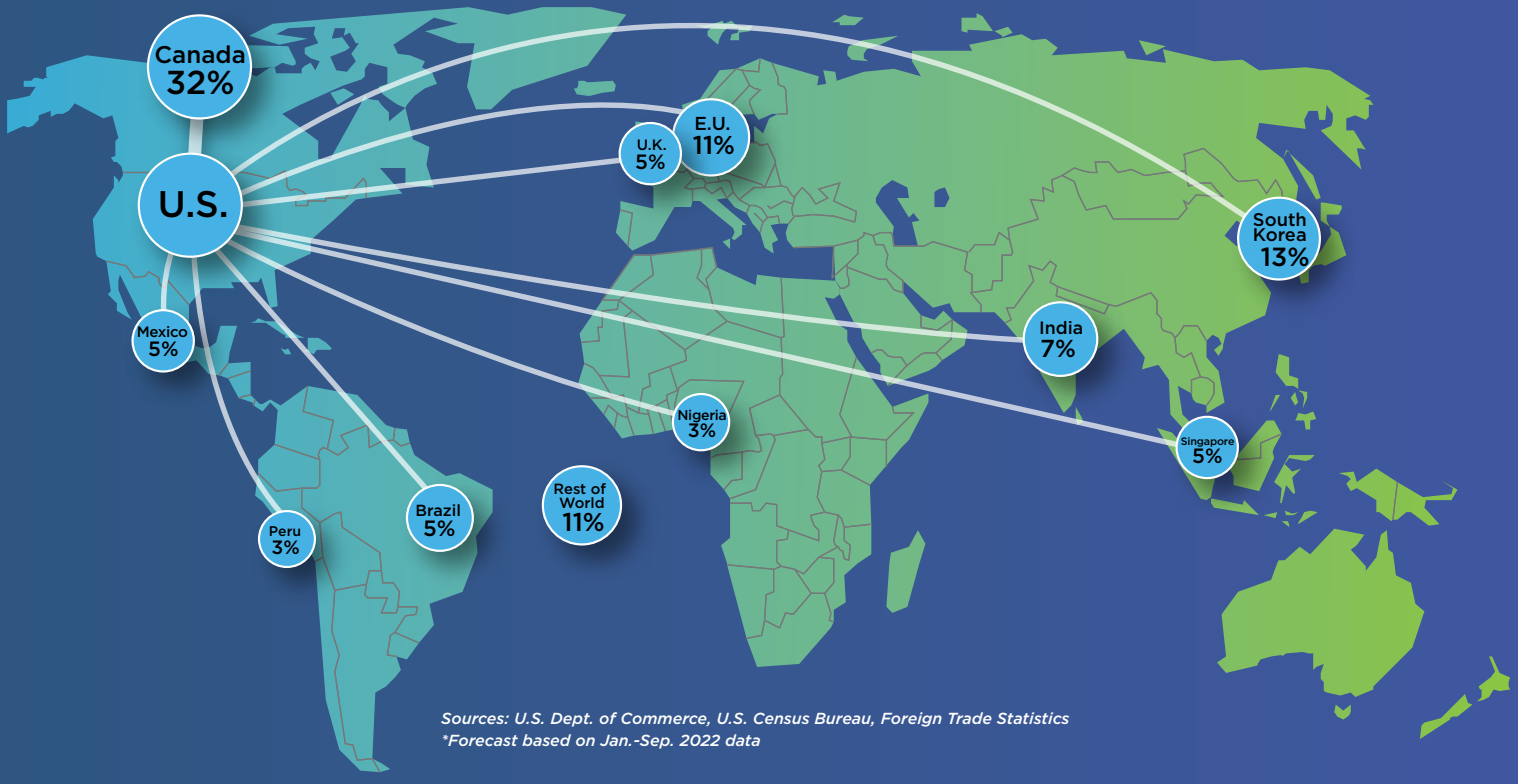
Source: RFA analysis of public and private data sources

U.S. ETHANOL EXPORTS AND IMPORTS



Sources: U.S. Dept. of Commerce, U.S. Census Bureau, Foreign Trade Statistics **Forecast based on Jan.-Sep. 2022 data*

TOP DESTINATIONS FOR U.S. ETHANOL EXPORTS IN 2022



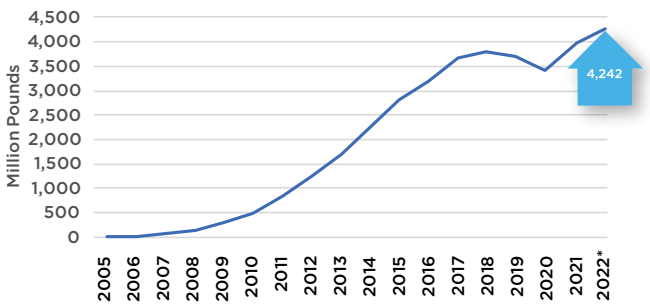
Sources: U.S. Dept. of Commerce, U.S. Census Bureau, Foreign Trade Statistics
**Forecast based on Jan.-Sep. 2022 data*

BEYOND MOTOR FUEL

America's ethanol biorefineries continue to provide the world with high-protein, low-cost animal feed for livestock, poultry, and aquaculture. In 2022, U.S. ethanol producers generated 36.4 million metric tons (mmt) of distillers grains, gluten feed, and gluten meal. In addition, biorefineries extracted over 4.2 billion pounds of corn distillers oil, a poultry feed ingredient and major feedstock for biodiesel and renewable diesel.

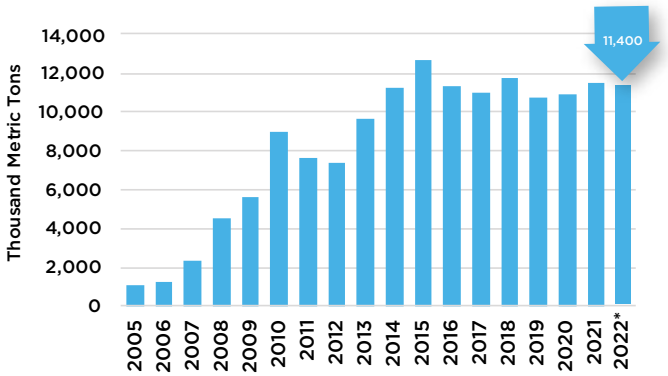
U.S. biorefineries not only satisfy domestic animal feed needs, but they also export about one-third of the distillers grains they produce to customers around the world. In 2022, more than 50 countries purchased a cumulative 11.4 mmt of U.S. distillers grains. Half of these exports landed in Southeast and East Asia. Meanwhile about 20 percent of total U.S. distillers grains exports were shipped to Mexico, as the country extended its reign as the top DDGS importer for a sixth consecutive year.

CORN DISTILLERS OIL PRODUCTION



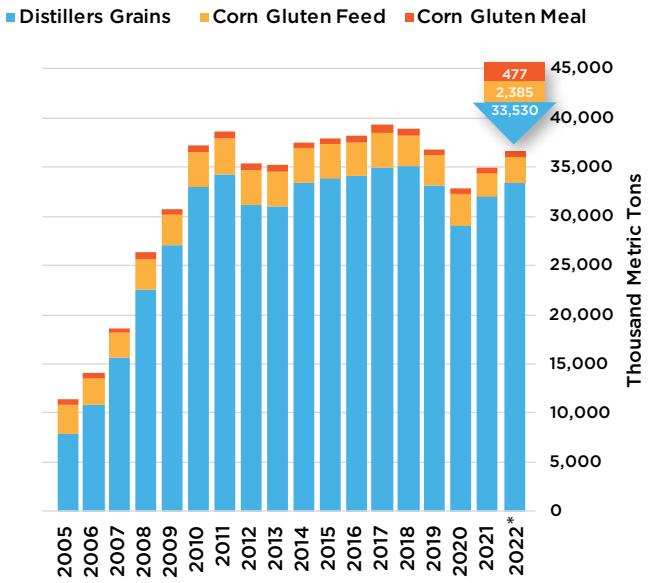
Source: U.S. Dept. of Agriculture and RFA
**Forecast*

U.S. DISTILLERS GRAINS EXPORTS



*Sources: U.S. Dept. of Commerce, U.S. Census Bureau, Foreign Trade Statistics. *Forecast based on Jan.-Sep. 2022 data*

U.S. ETHANOL INDUSTRY CO-PRODUCT ANIMAL FEED

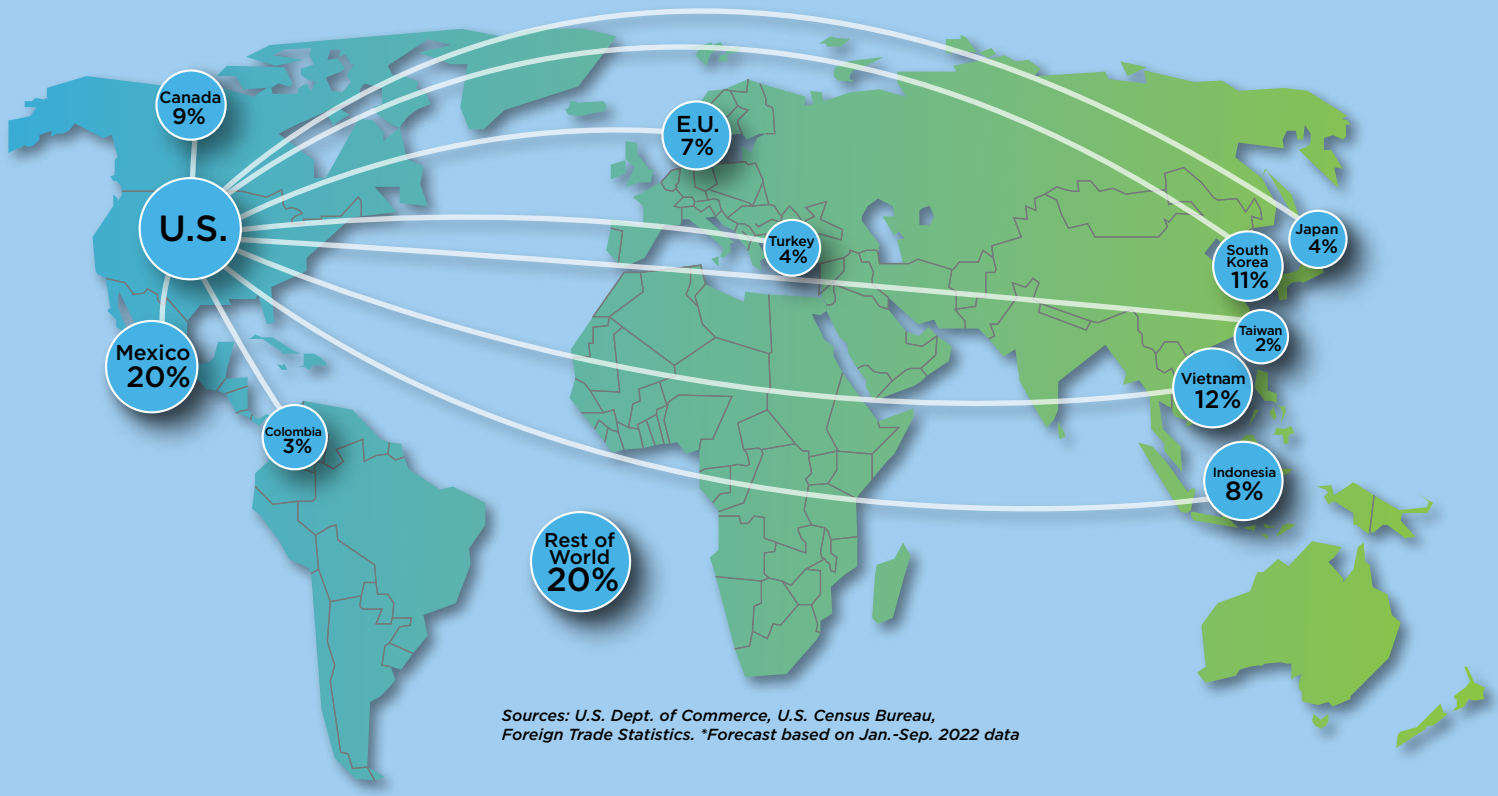


Source: RFA and U.S. Dept. of Agriculture.
Note: All co-products converted to 10% moisture basis.
**Forecast*

One Chemical, Many Uses

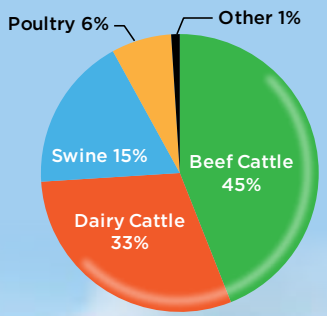
Beyond fuel use, ethanol also is one of the oldest organic chemicals known. Aside from its use in beverages, ethanol is involved in the manufacture of many significant everyday products. Ethanol's solvent power is particularly useful for the extraction of beneficial ingredients from plants. It is also used in processing vaccines and is essential to the manufacture of pharmaceuticals such as antibiotics. As an industrial raw material, ethanol is also involved in the manufacture of products like adhesives, cosmetics, detergents, explosives, inks, hand creams, plastics, paints, textiles, vinegar, and more.

TOP DESTINATIONS FOR U.S. DISTILLERS GRAINS EXPORTS IN 2022



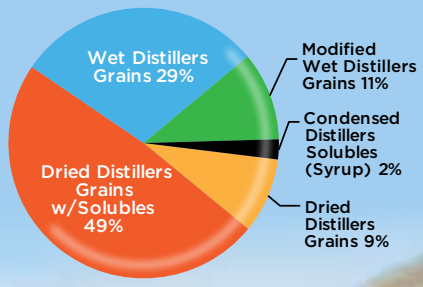
*Sources: U.S. Dept. of Commerce, U.S. Census Bureau, Foreign Trade Statistics. *Forecast based on Jan.-Sep. 2022 data*

2022 DISTILLERS GRAINS CONSUMPTION BY SPECIES



Source: Distillers grains marketing companies

2022 DISTILLERS GRAINS PRODUCTION BY TYPE, AS-IS BASIS



Sources: U.S. Dept. of Agriculture and RFA
**Forecast based on Jan.-Sep. 2022 data*

SETTING THE STANDARD

The Renewable Fuel Standard came to an important crossroads in 2022, and as 2023 begins, the program is embarking on a bold new path forward. When the RFS was expanded in 2007, Congress included specific volume requirements for only the first 15 years. For years after 2022, EPA was given much more discretion to "set" RFS volumes, leaving the industry to anxiously await the agency's roadmap for the future of the program.

In June 2022, EPA finalized volumes for 2020 through 2022. This included a 2022 conventional renewable fuel volume of 15 billion gallons, complete denial of all pending small refinery exemption (SRE) petitions, restoration of half of the renewable fuel volume illegally waived in 2016, biointermediate provisions, and the addition of transparency measures to the SRE process.

In December 2022, EPA proposed the first RFS "set" rule for 2023 and beyond. Covering multiple years, this proposed rule represents a new chapter for the RFS. In dozens of meetings with EPA, the White House, and Congress throughout 2022, RFA advocated for reasonable and rational growth in all RFS volumes in 2023 and beyond. Indeed, when the proposed rule was released in December 2022, the conventional renewable fuel volumes began at 15 billion gallons for 2023 and grew to 15.25 billion gallons for both 2024 and 2025. Additionally, the proposal for 2023 also restored the remaining 250 million gallons illegally waived in 2016. EPA proposed growth in the required volumes for biomass-based diesel, as well as other advanced and cellulosic biofuels.

RFA President and CEO Geoff Cooper met with U.S, EPA Administrator Michael Regan as EPA prepared to announce final volume obligations for 2020-2022 and the denial of all pending small refinery exemption petitions.

RFS!

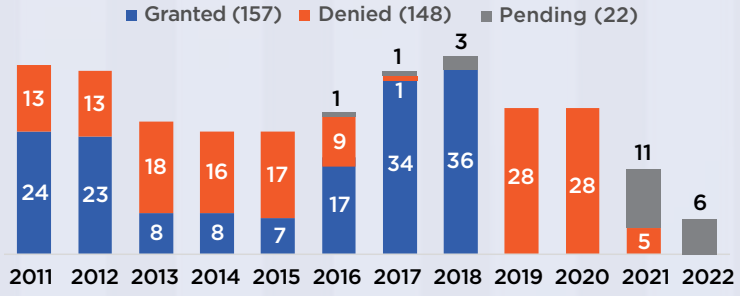
RFA views the proposed volumes as a clear pathway for sustainable growth in the production and use of low-carbon renewable fuels, solidifying the role of the RFS in future efforts to reduce carbon emissions and enhance national security. While encouraged by the top-line volumes, much work remains ahead in the implementation of new rules in the proposed "set." The addition of biomass-generated electricity in electric vehicles to the RFS, for example, will require ongoing engagement with EPA.

EPA RVO Proposal (Million RINs)	2023	2024	2025
Cellulosic Biofuel (D3/D7)	720	1,420	2,130
Biomass-Based Diesel (D4)	4,427	4,537	4,632
Undifferentiated Advanced Biofuel (D5)	673	663	668
TOTAL ADVANCED BIOFUEL (D3/D4/D5/D7)	5,820	6,620	7,430
Implied Conventional Biofuel (D6)	15,000	15,250	15,250
TOTAL RENEWABLE FUEL (All D-codes)	20,820	21,870	22,680
Supplemental Standard (Conventional) (D6)	250	-	-

"The Renewable Fuel Standard program is critical to helping incorporate more homegrown biofuels into the market... We're eager to continue the dialogue on how biofuels can bolster U.S. energy security, protect consumers from high fuel costs, strengthen the rural economy, and help reduce greenhouse gas emissions."

- EPA Administrator Michael S. Regan

RFS SMALL REFINERY EXEMPTIONS



Source: U.S. Environmental Protection Agency data, as of 1/19/2023

READY TO GROW

For the first time in more than a decade, 2022 saw the passage of landmark legislation that will spark growth and stimulate transformative change in the renewable fuels industry.

The Inflation Reduction Act (IRA) was signed into law in August 2022, representing the most significant federal commitment to low-carbon renewable fuels since the Renewable Fuel Standard was expanded in 2007. Several measures in the bill grew out of stand-alone legislation that had been previously developed with substantial RFA input and advocacy. These include:

- $500 million in grants for higher-blend infrastructure
- Extensions of several current biofuel tax credits
- Creation of a new tax credit for clean fuel production
- Establishment of a sustainable aviation fuel tax credit
- Enhanced support for carbon capture, utilization, and storage.

RFA sees enormous potential in the IRA. However, the "devil is in the details," and RFA will remain highly engaged as federal agencies write the rules and regulations that will implement these provisions. In particular, the life-cycle greenhouse gas modeling used to determine credit values will be of utmost importance.

President Biden signed the Inflation Reduction Act in August 2022, the most significant federal commitment to low-carbon renewable fuels since the Renewable Fuel Standard was expanded in 2007. White House photo.

New Congress, New Push

RFA strongly supported several ethanol-related bills introduced in the last congressional session, but unfortunately the session ended without their passage. RFA will advocate for the reintroduction of these important bills in the new Congress.

Consumer and Fuel Retailer Choice Act. In late November 2022, Sens. Deb Fischer (R-NE), Amy Klobuchar (D-MN), and 13 colleagues introduced a bill that would allow the year-round, nationwide sale of E15. This federal legislation would end years of regulatory uncertainty and prevent a patchwork of uneven state regulations. Importantly, in addition to RFA and other biofuel and farm organizations, the bill had support from the American Petroleum Institute and several fuel retailer groups. A companion bill was introduced in the House by Reps. Angie Craig (D-MN) and Adrian Smith (R-NE) and 22 co-sponsors.

Next Generation Fuels Act. Another important legislative initiative for RFA passed an important milestone with introduction in the Senate in 2022. The Next Generation Fuels Act would create a national high-octane, low-carbon fuel standard and remove roadblocks that have prevented higher ethanol blends from entering the market. Originally introduced in the House in 2021 by Rep. Cheri Bustos (D-IL), it was introduced in the Senate by Sens. Chuck Grassley (R-IA), Joni Ernst (R-IA), Tammy Duckworth (D-IL), and Amy Klobuchar (D-MN). RFA has been advocating for the creation of a national high-octane, low-carbon fuel standard since 2018 and will remain engaged with lawmakers and coalition partners to find opportunities in the new Congress to advance the Next Generation Fuels Act.

Clean Fuel Standard Legislation

Complementing other low-carbon legislative strategies, a nationwide Clean Fuel Standard (CFS) would empower ethanol's role in reducing carbon emissions from transportation. RFA continues working with broad coalitions, including automakers, farmers, utilities, environmentalists, non-profit clean energy organizations, and others to support legislation creating a federal, technology-neutral CFS. Similar to state-level low-carbon/clean fuel standards, a federal CFS offers the potential to clean up the transportation sector by utilizing a suite of different low-carbon technologies. As a low-carbon fuel driving toward net-zero emissions, ethanol has great potential in a nationwide CFS.

"The Next Generation Fuels Act would gradually ramp up the use of home-grown ethanol at gas stations across the country, making Americans less reliant on foreign oil and less vulnerable to the anti-competitive tactics of OPEC. As we look to the future of liquid fuels, this legislation can play a critical role in restoring energy independence, saving consumers money, lowering carbon emissions and expanding the market for farmers and ethanol producers."

- Sen. Chuck Grassley (R-IA), introducing the Next Generation Fuels Act in the Senate in July 2022

THE NET-ZERO SOLUTION

In 2021, RFA's member producers unanimously pledged to produce ethanol with net-zero carbon emissions, on average, by 2050 or sooner. Along the way to net-zero, RFA's members also committed to achieving an average carbon reduction of 70 percent compared to gasoline by 2030. In 2022, RFA began laying the first flagstones on the road to net-zero, releasing a study that identified five distinct technology pathways to this goal.

The report, *Pathways to Net-Zero Ethanol: Scenarios for Ethanol Producers to Achieve Carbon Neutrality by 2050*, identified five actions that would constitute a "core pathway" to net-zero emissions.

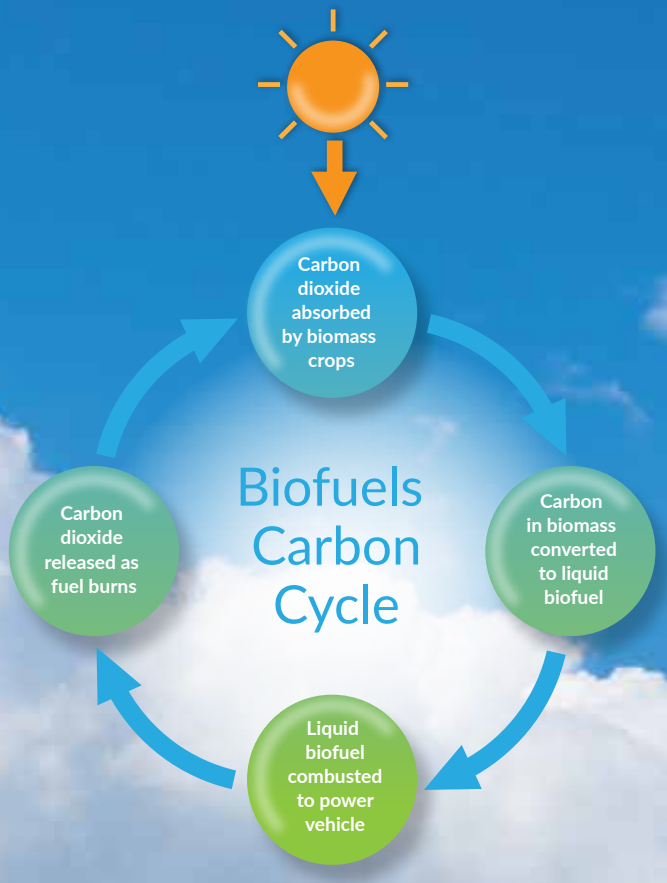
- Renewable energy use by corn and ethanol producers;
- Expanded adoption of corn kernel fiber fermentation at dry mills;
- 'Better-than-business-as-usual' industry-wide efficiency improvements and ethanol yields;
- Carbon capture and sequestration by ethanol facilities; and
- Expansion of conservation tillage and other low-carbon practices by corn growers.

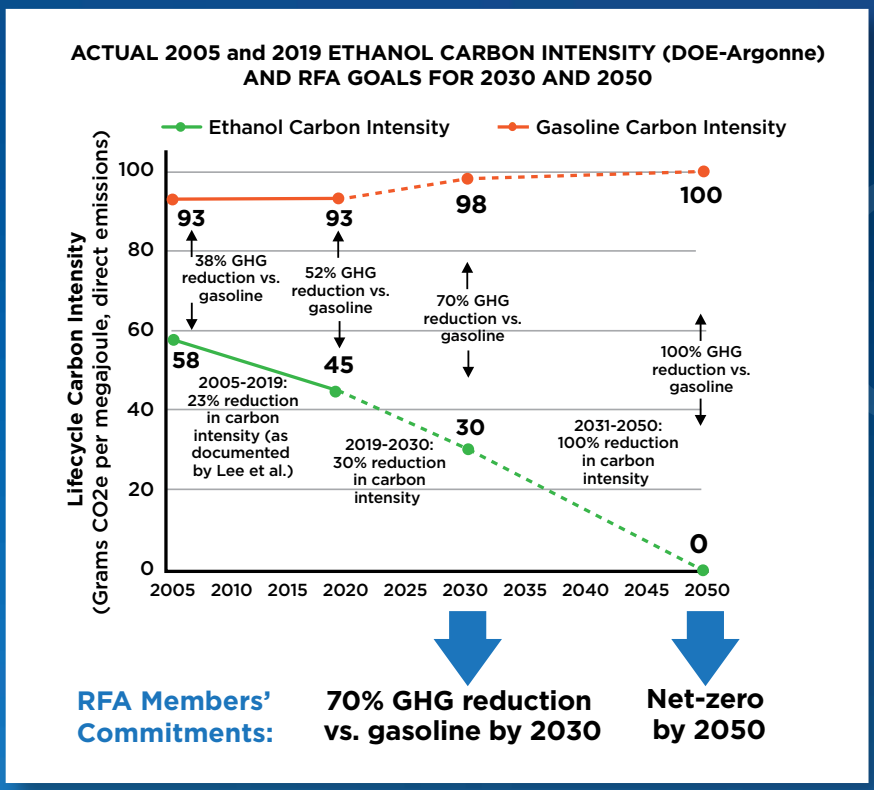
Two of these five actions in particular will have the most impact, by far, on reaching net-zero: Carbon capture and sequestration, and expanded renewable energy use at farms and biorefineries.

Flying High with Low-Carbon Ethanol

The low-carbon benefits of ethanol are reaching new markets as ethanol producers realize the sky's the limit; RFA sees sustainable aviation fuel, or SAF, as an enormous opportunity. Significant investments are already being made in ethanol-to-jet facilities, and we can expect the first commercial-scale production to begin within the next year or two. RFA is laser-focused on ensuring proper implementation of the SAF tax credit in the Inflation Reduction Act and making sure that ethanol-based SAF can fully participate in the Renewable Fuel Standard and Low Carbon Fuel Standard programs.

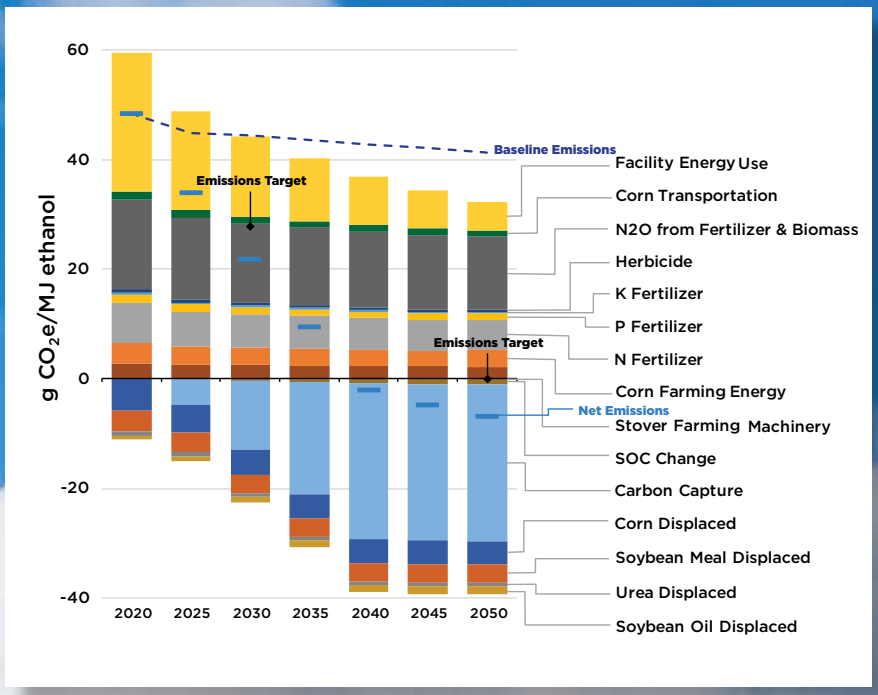
As questions continue to arise around the supply adequacy of other SAF feedstocks, RFA sees ethanol's broad availability, low carbon intensity, and low price as key advantages that will make ethanol-to-jet a very attractive pathway to sustainable aviation fuel.





Source: RFA based on data provided in Lee, U., Kwon, H., Wu, M. and Wang, M. (2021), Retrospective analysis of the U.S. corn ethanol industry for 2005-2019: implications for greenhouse gas emission reductions. Biofuels, Bioproducts & Biorefining.

CORE PATHWAY TO NET-ZERO EMISSIONS



By 2050, the ethanol industry can reach net-zero carbon emissions, on average, with workable improvements both on the farm and at the biorefinery, especially with renewable energy use and carbon capture and sequestration.

Source: "Pathways to Net-Zero Ethanol: Scenarios for Ethanol Producers to Achieve Carbon Neutrality by 2050," Isaac Emery, Ph.D., of Informed Sustainability Consulting LLC, February 14, 2022.

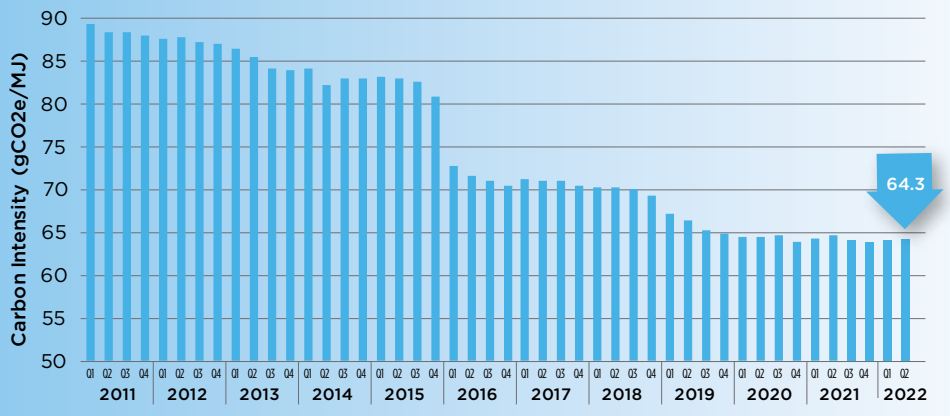
STATES SET THE EXAMPLE

New legislation at the federal level always goes hand in hand with coordinating rules and initiatives at the state level. While federal lawmakers look to improve transportation fuel policy, state lawmakers will certainly continue to take their own actions. RFA seeks to influence policies at both the state and federal level and ensure as much synergy and harmony as possible.

In 2022, as uncertainty around year-round E15 continued at the federal level, a group of Midwest states banded together to petition EPA for the removal of the barrier to the year-round sales of E15 in their states.

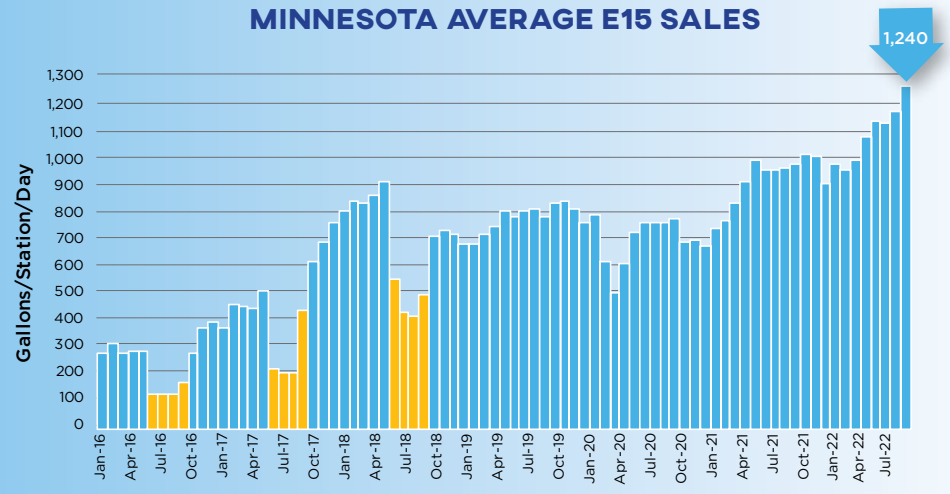
The governors of Iowa, Illinois, Kansas, Minnesota, Nebraska, North Dakota, South Dakota, and Wisconsin sent a letter to EPA in April 2022 expressing their desire to eliminate the 1-psi Reid Vapor Pressure (RVP) waiver for E10 in their states. They were joined by Ohio in June and by Missouri in December. This action would put higher ethanol blends on the same regulatory footing as E10 and enable these states to offer E15 year-round. In petitioning EPA, these states underscored the environmental and consumer benefits of E15 and pointed out that the volatility of E15 is in fact lower than for E10. As 2023 began, the ethanol industry joined these governors in anxiously awaiting implementation of the petition by EPA.

CARBON INTENSITY OF STARCH-BASED ETHANOL IN CALIFORNIA GASOLINE



Source: RFA based on California Air Resources Board data

MINNESOTA AVERAGE E15 SALES



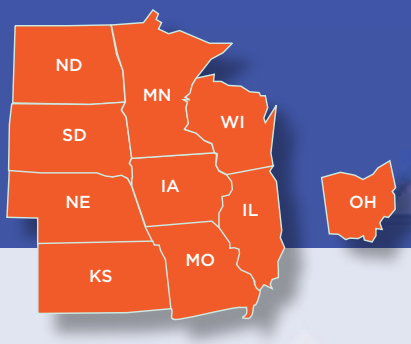
Yellow columns indicate summer months when E15 sales were limited by RVP regulation

Source: RFA based on Minnesota Dept. of Commerce data

In May 2022, Gov. Kim Reynolds signed legislation making Iowa the first state to adopt an E15 standard. Most fuel retailers are required to carry the blend beginning in 2026. The bill also expands tax credits for fuel with higher blends of ethanol and biodiesel and phases out tax credits for lower blends.

RFA remained heavily engaged in Washington, Oregon, and California throughout 2022, where existing and emerging state low carbon fuel programs continue to create valuable demand opportunities for America's ethanol industry.

Working with state partner organizations in 2023, RFA will continue to assist and empower state initiatives to unlock more of the benefits of renewable fuels.



In 2022, these 10 states sought approval for year-round E15. The states account for 16% of U.S. gasoline consumption and are home to:

- **69%** of the 2,800+ stations selling E15
- **78%** of the 200 ethanol biorefineries
- **74%** of the 420,000+ ethanol-related jobs
- **70%** of the 305,000 farms that grow corn
- **77%** of the nation's corn production

Source: RFA based on California Test Program Exemption data, as of 3/24/2022

State-Level Fuel Standards

Several states have taken action to reap the cost and greenhouse gas benefits of renewable fuels with state-level standards. Below is an update on some of their actions.

California

- The California Air Resources Board (CARB) is considering more stringent carbon intensity reduction targets by 2030 with a goal of carbon neutrality by 2045.
- Following a surge in E85 sales in California amid the price surge associated with Russia's invasion of Ukraine, RFA continues to actively advocate for a policy to require that all internal combustion engines sold from 2026 forward include FFV capability.
- E15 approval is being considered with final action by CARB expected in 2024.

Washington

- Washington finalized its Clean Fuel Standard in November 2022. The program begins in 2023 and requires a 20 percent carbon intensity reduction by 2034.

Oregon

- Oregon expanded its Clean Fuels Program in 2022 to a 20 percent carbon intensity reduction by 2030 and a 37 percent carbon intensity reduction by 2035.

New York

- Support is growing in New York for implementation of a clean fuel standard.
- Current efforts support CFS inclusion in New York's final Climate Action Plan, This will facilitate a potential administrative rulemaking or momentum towards legislation to be reintroduced.

Minnesota, Nebraska, Ohio, Michigan, Illinois

- Coalitions have formed in these states to advocate for clean fuel standards/programs.
- Current program proposals are designed to coordinate with existing state climate initiatives.

ADVANCING HIGHER BLENDS

The Renewable Fuels Association continues its work to expand the availability of E15 and flex fuels like E85 at the pump, while simultaneously advocating for more flex fuel vehicles on the road. The successes seen in 2022 provide an impetus for more action in 2023.

RFA's efforts helped secure emergency waivers from the Biden administration for year-round E15 in 2022, as gas prices rocketed to record levels. The result was record sales volumes of lower-cost E15 and rapid growth in the number of customers seeking out the fuel.

When it comes to E15, RFA won the support of the American Petroleum Institute and key fuel retailer groups for the bipartisan Consumer and Fuel Retailer Choice Act to ensure E15 is available as a lower-cost year-round option for drivers. The permanent, nationwide year-round availability of E15 is a top priority for our organization.

RFA also continued its work on the U.S. Department of Agriculture's Higher Blends Infrastructure Incentive Program (HBIIP), which provides matching grants for higher blend infrastructure projects around the country. 2022's Inflation Reduction Act provides $500 million for higher blend infrastructure matching grants and RFA actively helps retailers apply successfully for grants.

And while flex fuels like E85 continue to gain in popularity—its use in the bellwether state of California continues to rise—automakers continue to backtrack on their production of FFVs. For model year 2023, the only FFVs available to consumers are select Ford F-150 and Transit models, with a few other Ford and GM models available for fleet purchases only. This is a marked difference from the more than 80 different models from eight manufacturers that were available to consumers as recently as the 2015 model year. RFA continues to strongly advocate for the production of more FFVs and fairness in how alternative fuel vehicles are incentivized under fuel economy and greenhouse gas regulations.

While the number of flex fuel models has been decreasing in the United States, other countries are encouraging more options as they strive to reach their own net-zero-carbon goals. Toyota has introduced a flex fuel Corolla model for the India market, as shown at January's Auto Expo 2023 show in New Delhi. This major event featured a large pavilion dedicated to ethanol.

CAN YOU FLEX FUEL ?

THE FOLLOWING 2023 MODELS ARE AVAILABLE AS FLEX FUEL VEHICLES (FFVs):

- **Ford F-150 (3.3L & 5.0L engines)**
- **Ford Transit (3.5L engine)**

Fleet only:

- **Ford Police Interceptor – Utility (3.3L engine)**
- **Chevrolet Silverado (5.3L engine)**
- **Chevrolet Silverado HD (6.6L engine)**
- **GMC Sierra (5.3L engine)**
- **GMC Sierra HD (6.6L engine)**

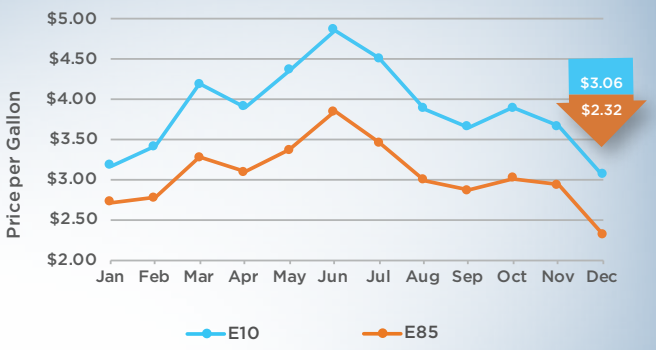
EXPANSION OF U.S. RETAIL STATIONS OFFERING E15 AND E85

Source: RFA **Estimated*

100% HBIIP Grant Success Rate

Since 2020, RFA-supported grants led to infrastructure projects by **35 companies**, totaling **$74 million** and covering **260 retail operations** spanning **21 states**. In 2022, RFA helped retailers apply for **$200 million** in infrastructure funding that could lead to **1,000 more dispensers** at more than **220 new E15 locations** across **19 states**.

2022 NATIONAL AVERAGE RETAIL PRICES FOR E10 & E85



Source: RFA based on data from E85prices.com

"To reduce gas prices ... I announced an emergency waiver to allow E15 gasoline to be sold across America during the summer. It's an extraordinary effort, but it had to be done for this summer. E15 uses more ethanol from crops grown here in Illinois and elsewhere around the country. And it can reduce the cost of a gallon of gasoline at the pump by 10 cents per gallon. Every little bit matters. I know it's a big deal."

- President Joe Biden at a May 2022 event in Illinois

E15 APPROVAL STATUS FOR U.S. LIGHT-DUTY VEHICLES

E15 approved by automaker in ALL models

E15 approved by automaker in SOME models

E15 approved by EPA only; NOT approved by automaker

AUTOMAKERS / MODELS	MODEL YEAR												MARKET SHARE *
	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	
BMW Group **													
BMW													2.5%
Mini													0.3%
Daimler Group (Mercedes-Benz)													2.6%
Ford Motor Co. (Ford & Lincoln)													14.5%
GM (Buick, Cadillac, Chevrolet & GMC)													16.2%
Honda Motor Co. (Honda & Acura)													7.8%
Hyundai Motor Co. (Hyundai, Genesis & Kia)													10.6%
Mazda													2.1%
Mitsubishi Motors Corp.†													0.7%
Nissan Motor Co.‡													
Infiniti													0.3%
Nissan													5.3%
Stellantis (Alfa Romeo, Chrysler, Dodge, Fiat, Jeep, Maserati & RAM)													12.5%
Subaru §													4.1%
Tata Motors (Jaguar & Land Rover)													0.7%
Toyota Motor Corp.													
Lexus													2.1%
Toyota ¥													12.8%
Volkswagen Group #													
Audi													1.2%
Porsche													0.5%
Volkswagen													2.4%
Volvo Car Group													0.8%

* Internal combustion engine models only.
** Approves the use of up to 25% ethanol blends.
† Approves the use of E15 in Outlander.
‡ Approves the use of E15 except in Titan, Kicks & QX80.
§ Approves the use of E15 except in 2.5L engines.
¥ Approves the use of up to 25% ethanol blends in Supra.
Approves the use of E15 except in Golf.

Sources: Auto manufacturers' owner's manuals, GoodCarBadCar.net

SECURING U.S. ENERGY

The February 2022 Russian invasion of Ukraine made energy security a "front burner" issue again and exacerbated inflation pressures that were already percolating. Crude oil and gasoline prices spiked, and by June retail gasoline prices hit a record $5 per gallon.

The United States quickly moved to ban the import of Russian crude oil and certain petroleum products, which had amounted to nearly 250 million barrels in 2021, accounting for 8 percent of total U.S. imports. Sanctions and bans on Russian crude oil by the European Union and United Kingdom also squeezed the global oil market, while flows of natural gas to Europe also were disrupted. As a result, U.S. shipments of crude oil and liquefied natural gas to Europe increased sharply.

Overall, in an environment of tight global supplies and high prices, U.S. petroleum exports rose significantly—as did shipments of ethanol. Still, the United States imported nearly 200 million barrels of crude oil per month, an increase over 2021. More than one-third of U.S. crude supplies came from foreign sources, and 40 percent of the oil processed by refineries was imported.

Given the increase in crude oil prices, the value of oil imported into the U.S. rose sharply in 2022. Americans transferred over $30 billion specifically to OPEC nations for oil, with approximately half that amount going to Saudi Arabia. The experience of 2022 served as a sharp reminder that the U.S. remains part of an interconnected global petroleum market rather than an island unto itself.

Against this backdrop, ethanol contributed significantly to U.S. energy security. The use of ethanol—almost all of which is produced domestically—displaced the equivalent of more than 600 million barrels of crude oil on an energy-equivalent basis. Given this and the fact that only roughly half the volume of crude oil that is refined ends up as gasoline, U.S. imports of crude oil and products would have been substantially higher without the presence of ethanol.

Additionally, ethanol saved consumers money at the pump. Ethanol was priced at a significant discount to gasoline blendstock in the wholesale market almost all year, and the differential stood at more than $1 per gallon for much of May and June, helping to hold down gasoline prices at the time when upward pressure was at its most intense.

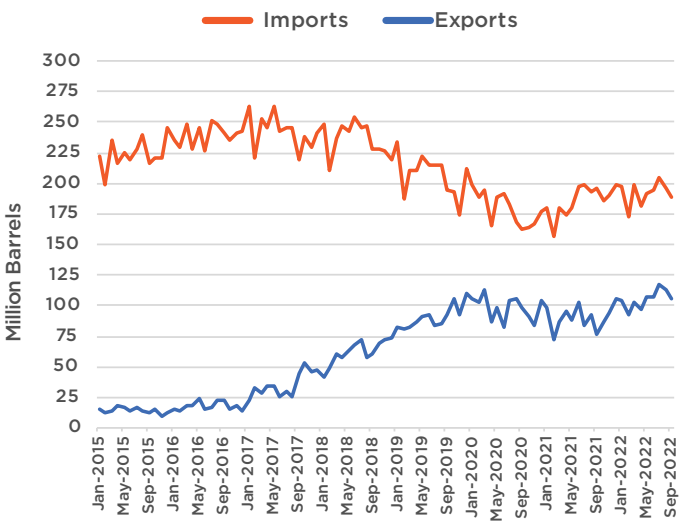
TRANSFERRING AMERICAN WEALTH TO OPEC

Our nation still transfers billions of dollars every year to the OPEC cartel. In 2022 alone, the U.S. sent some $31 billion—or $240 per American household—to OPEC nations to pay for crude oil imports.

OPEC Nation	U.S. Spending on Crude Oil Imports (Billion $)*
Saudi Arabia	$14.7
Iraq	$7.8
Nigeria	$3.0
Libya	$2.3
Angola	$1.5
Kuwait	$0.7
United Arab Emirates	$0.5
Other	$0.6
TOTAL OPEC	$31.0

Sources: RFA based on U.S. Dept. of Energy and U.S. Census Bureau data
**Estimated based on Jan.-Sep. 2022 data*

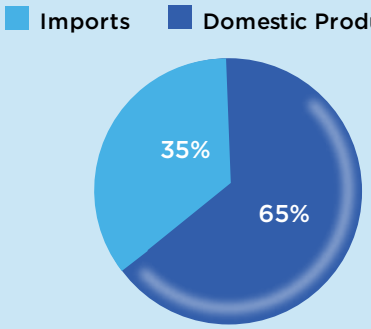
U.S. CRUDE OIL TRADE



While U.S. crude oil production and exports have increased, our nation still imports nearly 200 million barrels per month.

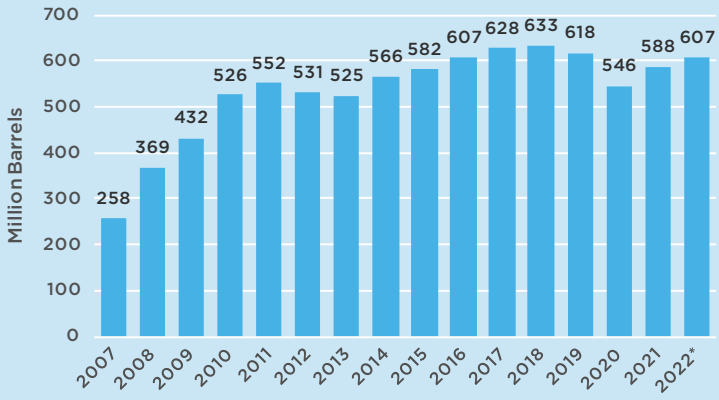
Source: RFA based on U.S. Dept. of Energy data

SOURCES OF U.S. CRUDE OIL SUPPLY



Source: RFA based on U.S. Dept. of Energy data and forecasts

HISTORICAL OIL IMPORT DISPLACEMENT BY ETHANOL



Source: RFA based on U.S. Dept. of Energy data **Estimated*

E15 Waivers Save Money

An RFA analysis showed that a series of emergency waivers by the Biden administration allowing E15 to be sold during the summer driving season saved drivers that chose E15 an average of $0.30 per gallon, which in aggregate totaled $57 million for American consumers.

ALL IN ON OCTANE

Automakers and consumers alike want more octane, with automakers continuing to favor turbocharged, higher-compression engines in which the use of high-octane gasoline is recommended or required. And this is the sort of marketplace that demands ethanol as a clean, affordable source of octane—a need that will only intensify as automakers contend with more stringent fuel economy requirements moving forward.

Ethanol's blending octane rating of 114 is significantly higher than the ratings of the main petroleum-based octane components. Moreover, aromatic hydrocarbons such as benzene and toluene may raise octane, but they worsen air pollution and are highly toxic.

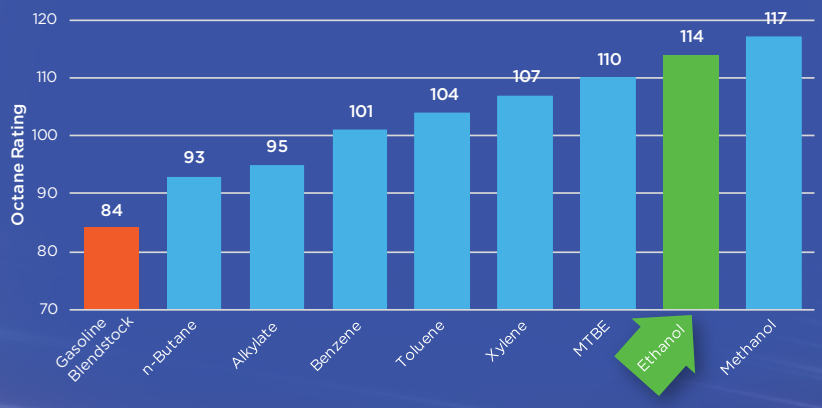
Refiners have largely optimized their processes to take advantage of ethanol's properties. Today, most regular gasoline in the United States is produced using blendstock with an octane rating of 84, which is then upgraded to a rating of 87 by adding 10 percent ethanol. Refiners may continue to reduce the octane rating of the gasoline blendstock to 82 or 83 as E15 becomes more ubiquitous. This allows refiners to increase throughput of hydrocarbon blendstock at a lower cost.

Demand for sources of octane is expected to continue to grow, driven by the utilization of advanced vehicle engines, tighter gasoline specifications, and the expansion of E15. It could be propelled further by policies that compel the use of midlevel ethanol blends such as E25 or E30 to meet future fuel economy and emissions standards. RFA continues to push for an expanded future role for high-octane, low-carbon ethanol and educate policymakers about the benefits of such fuels—especially as ethanol moves toward net-zero emissions.

WHAT IS OCTANE?

A fuel's OCTANE RATING is the measure of its ability to resist "knocking" in the engine, which is caused when the air/fuel mixture detonates prematurely during combustion. According to the U.S. Department of Energy, "Using a lower octane fuel than required can cause the engine to run poorly and can damage the engine and emissions control system over time. It may also void your warranty."

BLENDING OCTANE RATINGS OF VARIOUS GASOLINE BOOSTERS

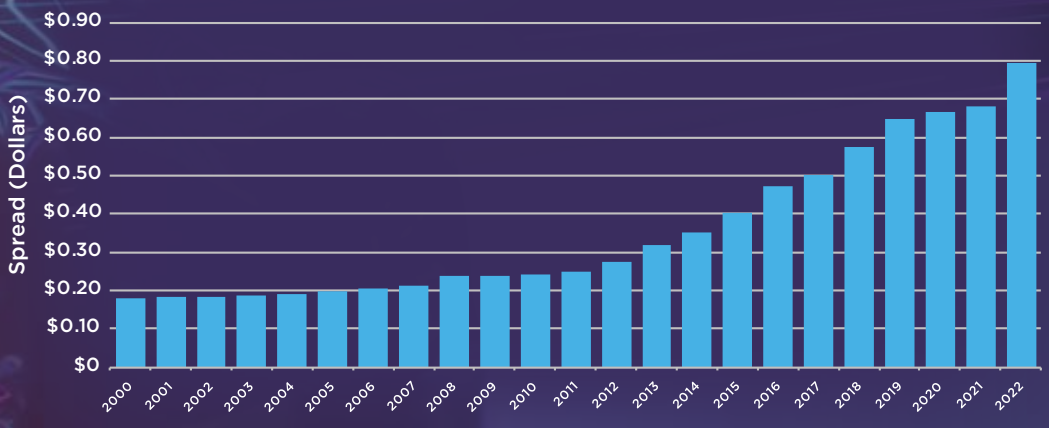


Source: U.S. Dept. of Energy

High-Octane Legislation

Introduced in the last congressional session and expected to be reintroduced this year, the Next Generation Fuels Act would establish a certification test fuel with a research octane number (RON) of 98, along with a requirement that the source of the octane boost reduces lifecycle greenhouse gas emissions by an average of at least 30% compared to a 2018 gasoline baseline. RFA first began advocating for the creation of a national high-octane low carbon fuel standard in late 2018.

REGULAR-TO-PREMIUM FUEL PRICE SPREAD



Source: U.S. Dept. of Energy

FROM FARM TO FUEL

Ethanol's potential to change the world for the better was recognized long ago. In fact, Henry Ford and Alexander Graham Bell were among the first to realize that the sugars found in plants could easily and inexpensively be converted into clean-burning renewable fuel. Bell himself referred to ethanol as a "clean, beautiful, and efficient fuel" more than a century ago.

Today, roughly 200 ethanol biorefineries across the United States are living up to the potential first identified by some of our nation's foremost inventors. Modern-day facilities use state-of-the-art technologies to produce ethanol and valuable co-products from the starches and sugars found in grains. While corn is by far the predominant feedstock for ethanol, sorghum also is used, and biorefineries typically use about one-third of the nation's sorghum crop for ethanol production.

More than 92 percent of U.S. fuel ethanol is produced using the dry mill process, with the remaining amount coming from wet mills. The main difference between the two processes is in the initial treatment of the grain.

In **DRY MILLING**, the entire grain kernel is first ground into meal, then slurried with water to form a mash. Enzymes are added to the mash to convert starch to sugar. The mash is first cooked, then cooled and transferred to fermenters. Yeast is added and the conversion of sugar to alcohol begins. After fermentation, the resulting "beer" (not the kind you might drink) is separated from the remaining stillage. The ethanol is distilled and dehydrated, then blended with about 2 percent denaturant (such as gasoline) to render it undrinkable. It is then ready for shipment. The stillage is sent through a centrifuge that separates the solids from the solubles. These co-products eventually become distillers grains and corn distillers oil.

In **WET MILLING**, the grain is first separated into its basic components through soaking. After steeping, the slurry is processed through grinders to separate the corn germ. The remaining fiber, gluten and starch components are further segregated. The gluten component (protein) is filtered and dried to produce animal feed. The remaining starch can then be fermented into ethanol, using a process like the dry mill process.

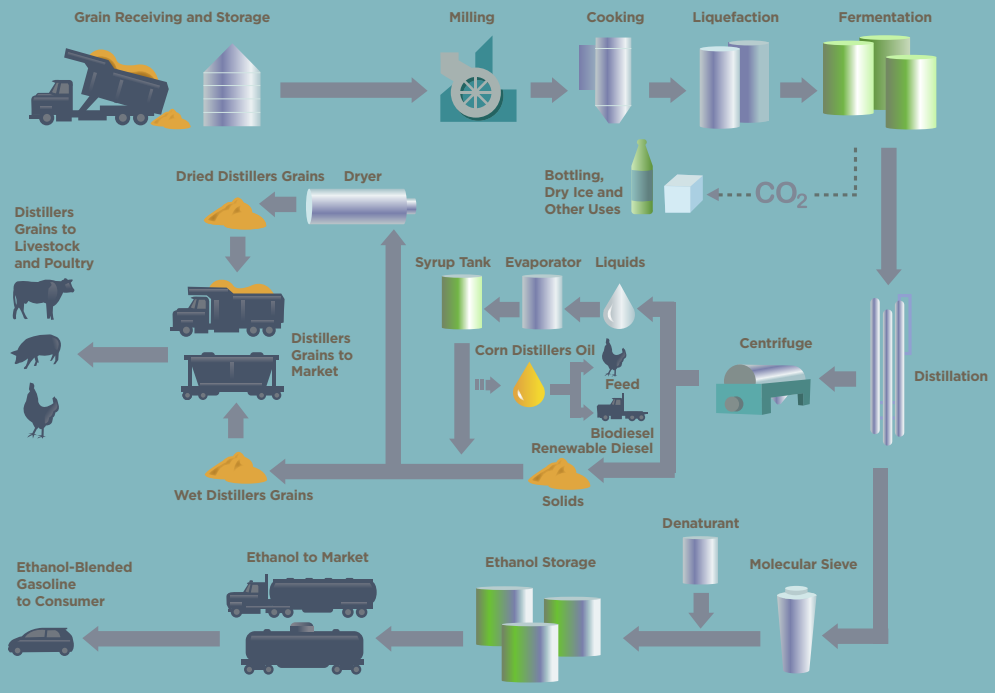
On average, 1 bushel of corn (56 pounds) processed by a dry mill ethanol biorefinery produces:

- **2.9 gallons of denatured fuel ethanol**
- **15.1 pounds of distillers grains animal feed (10 percent moisture)**
- **0.9 pounds of corn distillers oil**
- **16 pounds of captured biogenic carbon dioxide***

In 2022, ethanol biorefineries captured roughly 2.8 million tons of CO_2, which was used for dry ice production, bottling, food processing, and other uses.

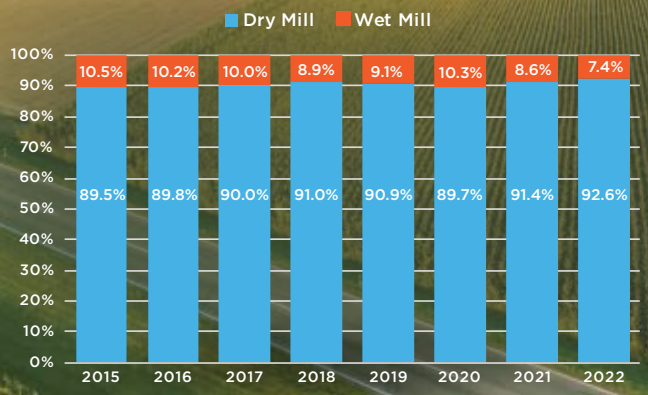
Source: RFA based on U.S. Dept. of Agriculture data
**Approximately 30 percent of U.S. dry mills capture CO_2 from fermentation.*

DRY MILL ETHANOL PROCESS



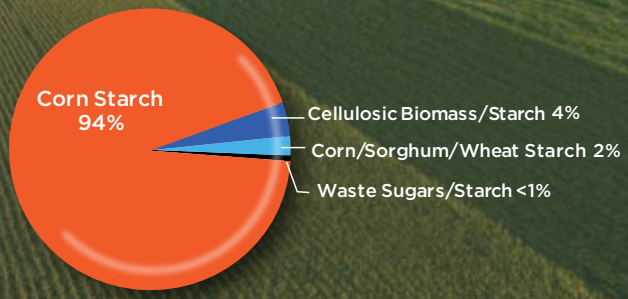
Source: RFA

U.S. ETHANOL PRODUCTION BY TECHNOLOGY TYPE



Source: RFA based on U.S. Dept. of Agriculture data

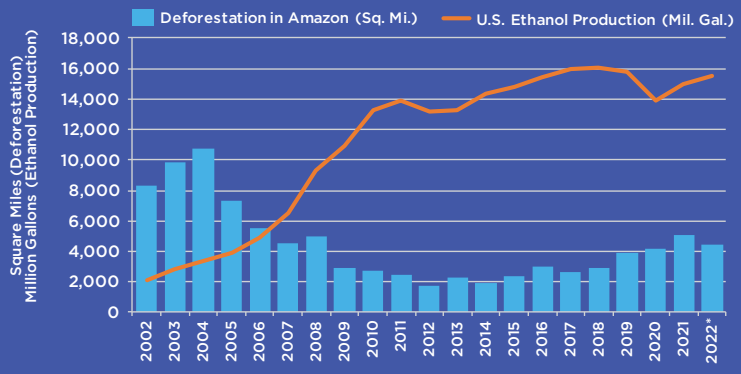
U.S. ETHANOL PRODUCTION BY FEEDSTOCK TYPE



SETTING THE RECORD STRAIGHT

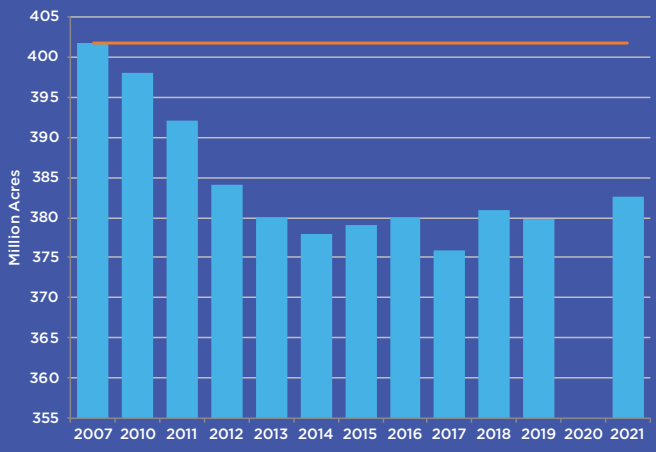
Because they threaten the status quo, renewable fuels like ethanol have been under attack for years. As much as these falsehoods have been disproven time and again, opponents continue their attempts to halt the ethanol industry's progress, and several myths, such as those tied to ethanol's emissions, have been treated elsewhere in this Outlook. A study on land use change, led by Tyler Lark from the University of Wisconsin, got a lot of media attention in 2022 and will no doubt resurface in 2023—despite being thoroughly debunked by researchers at Harvard, Tufts and Purdue universities, as well as Argonne National Laboratory and the U.S. Department of Agriculture. Here's a review of some key points that prove ill-informed biofuels critics are wrong and out-of-touch when it comes to ethanol's benefits.

AMAZON DEFORESTATION RATES VS. U.S. ETHANOL PRODUCTION



Source: RFA using Brazil National Institute for Space Research & U.S. Energy Information Administration data
**Estimated*

U.S. EPA DETERMINATION OF AGRICULTURAL LAND USE VS. 2007 BASELINE



ETHANOL HAS NOT CAUSED CROPLAND EXPANSION

Ethanol critics often assume that increased ethanol production can only be accomplished with a big increase in cropland, and that forestland and other natural habitat will be converted to corn acres. In reality, there has been little increase in corn acres planted during the "ethanol era," because farmers are growing so much more corn per acre. And additional corn acres haven't come from forest or grassland, they have come from "crop switching" (e.g., replacing wheat or cotton) or acres expiring from the federal Conservation Reserve Program. What's more, since the Renewable Fuel Standard was expanded in 2007, total U.S. cropland has actually trended lower, according to EPA.

Likewise over the years, ethanol has been falsely accused of causing another form of land use change—Amazon deforestation. But the data show reductions in deforestation during the "ethanol era."

ETHANOL DOES NOT RAISE FOOD PRICES

One of the longest running attacks on ethanol is also one of the most incorrect, as America's family farmers grow more than enough corn for all uses and field corn remains extremely inexpensive as a food ingredient. The total percentage, or "farm share," of every dollar spent on food has remained below 15 cents, meaning the value of raw agricultural ingredients in our grocery items account for just 15 percent of the retail price on average. In addition, as the ethanol industry has grown over the years, overall food inflation has decreased. Other factors, like oil prices, play a far more significant role in food prices. And let's not forget that ethanol biorefineries make both fuel and feed—returning one-third of every bushel processed to the animal feed market in the form of highly nutritious distillers grains.

2021 FOOD DOLLAR: MARKETING BILL (NOMINAL)

14.5¢ — **85.5¢**

The ***farm share*** is the portion of the food dollar that goes to farm establishments for the sales of raw food commodities.

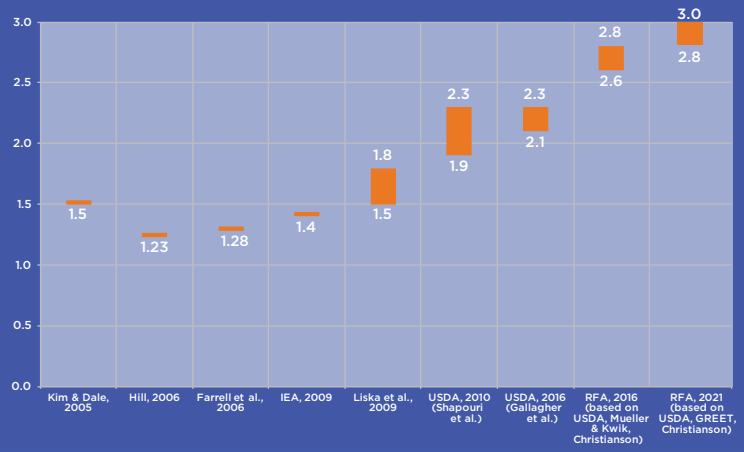
The ***marketing share*** is the portion of the food dollar that goes to food supply chain establishments for post-farm activities that transform raw food into finished food products.

Source: U.S. Dept. of Agriculture

ETHANOL'S ENERGY BALANCE IS UNEQUIVOCALLY POSITIVE

For every unit of energy invested into the production of ethanol, the fuel itself provides 2.6 to 2.8 units of energy to the user, on average. The top quartile of dry mill biorefineries are averaging an energy balance of 3.2 to 3.4, with some plants very likely achieving 4.0. As far back as 2007, experts from Michigan State University and the Department of Energy pointed out that ethanol's net energy balance is more favorable than that of gasoline or coal.

DRY MILL CORN ETHANOL AVERAGE ENERGY BALANCE RATIO ESTIMATES, 2005-2021



Source: RFA based on separate data sources listed in chart

SET FOR ACTION IN WASHINGTON

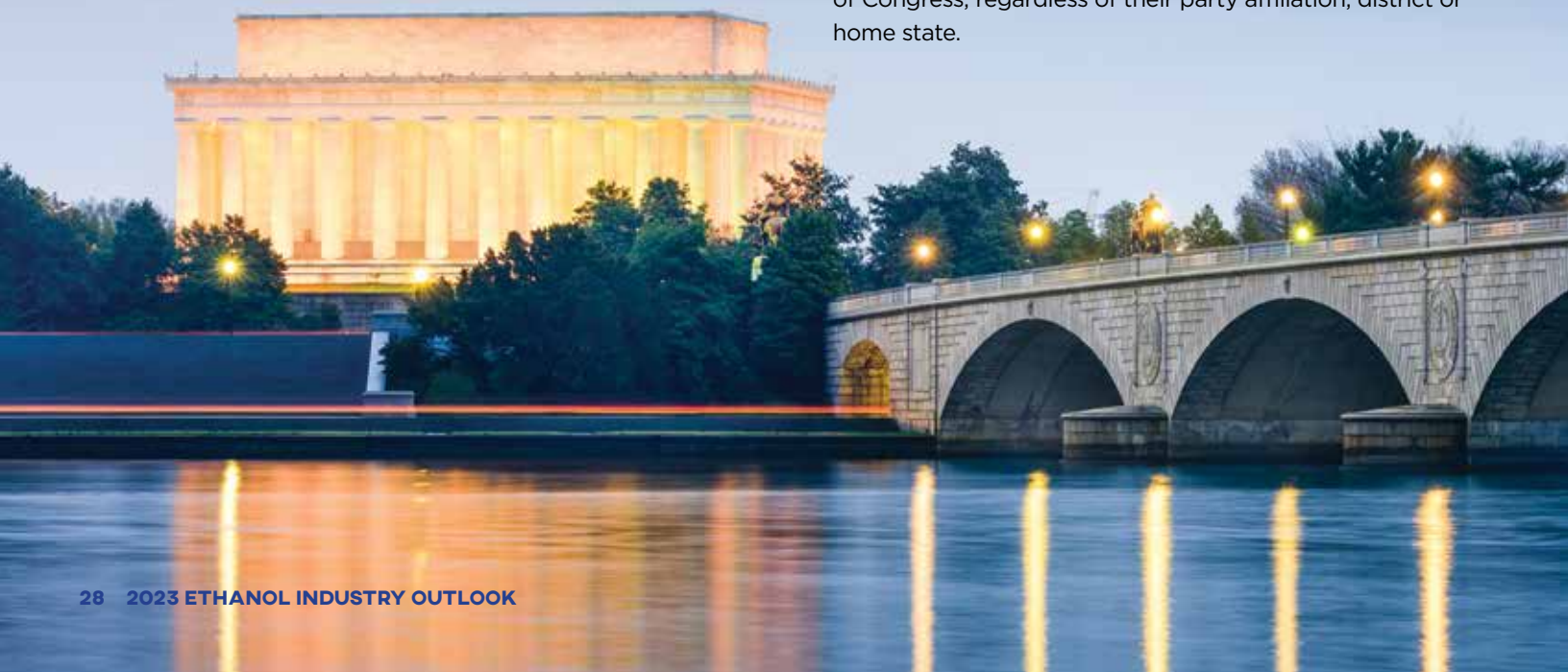
As 2023 began, the 118th Congress was sworn in, bringing new faces and new political dynamics to the Capitol. In the House, Republicans have a slim majority, while Democrats hold a razor-thin majority in the Senate. Fortunately, ethanol remains a bipartisan issue in Washington, with strong supporters on both sides of the aisle who realize the importance of renewable fuels to America's rural economy, the environment, and U.S. consumers.

As always, RFA's presence in the nation's capital is an important part of the ethanol industry's success. RFA was there on Day One of the new Congress, strengthening connections with returning members and new members alike—relationships that will build upon past legislative achievements and pave the way for future policy successes. With split party control in Congress, leadership dynamics will certainly be different than the last Congress, and RFA's approach to our legislative and regulatory agenda will adjust to the new reality. Even with the changes in this Congress, RFA will move forward with a robust and forward-thinking list of priorities in 2023.

At the top of RFA's list is the continued support and preservation of the Renewable Fuel Standard. In particular, we will advocate for proper and timely implementation of robust renewable volume obligations for 2023 through 2025. Another priority will be to secure nationwide access to year-round E15. In the waning days of the 117th Congress, RFA was successful in working with the American Petroleum Institute and others to build support for year-round E15 legislation. Unfortunately, the language was not included in the final year-end omnibus package for 2022. But legislative efforts have been renewed in 2023 and will remain a focus of RFA until year-round E15 is secured. Implementation of the Inflation Reduction Act's tax incentive and grant programs will also be a high regulatory priority in 2023.

RFA will also be engaged in exploring legislative opportunities that leverage ethanol's low carbon intensity and high octane value. Several legislative concepts in this area are expected to be considered, including the likely re-introduction of the Next Generation Fuels Act, as well as technology-neutral clean fuels legislation that fully accounts for the carbon lifecycle of all transportation fuel options and rewards the lowest-carbon fuels.

RFA is set for action in Washington and these priorities and others will drive the RFA legislative and regulatory agenda in 2023. We will continue to be the go-to resource on renewable fuels for the Biden administration and all members of Congress, regardless of their party affiliation, district or home state.



MEMBER LEADERSHIP

TECHNICAL COMMITTEE

The RFA Technical Committee focuses heavily on fuel specifications and standards under ASTM International, National Conference of Weights and Measures, International Organization for Standardization, Canadian General Standards Board, and other international standards organizations. This committee relies upon RFA's sought-after technical expertise and our prolonged leadership within these organizations.

CO-PRODUCTS COMMITTEE

The renewable fuels industry produces more than just ethanol. Renewable fuel facilities across the country also produce distillers grains, corn distillers oil, corn gluten, CO_2, and other products. The RFA Co-Products Committee focuses on issues relevant to all ethanol co-products, from research and educational programs to regulatory issues and trade. Members are involved daily in the production and marketing of co-products, making this committee an excellent forum for exchanging ideas and information.

NEW USES COMMITTEE

The RFA New Uses Committee focuses on the exploration of innovative and expanded uses for ethanol, co-products, and CO_2 as well as the application of novel production processes. Actions include identifying promising collaborators and providing them a broader forum for discovery and discussion. The committee also identifies and addresses associated research and development, technical, and regulatory issues that might arise from implementation.

ENVIRONMENT, HEALTH & SAFETY COMMITTEE

The goal of the RFA EH&S Committee is to ensure the U.S. ethanol industry and its supply chain employ a high standard of excellence in protecting our environment and the health and safety of its employees and citizens at large. Detailed technical discussions familiarize stakeholders on the variable and complex requirements of environmental regulatory compliance and standards adherence. This committee also identifies the need for research, guidance, and training to address worker safety and public health concerns. RFA's expertise and leadership in forums that address national transportation safety, emergency response, and health effects remains a key component.

POLITICAL ACTION COMMITTEE

The Renewable Fuels PAC builds a stronger voice for American-made renewable fuels on Capitol Hill. Organized and operated by RFA members and staff, this Political Action Committee promotes consistent and forward-looking public policy essential to the growth and evolution of the industry by focusing on federal election activity.

YOUNG PROFESSIONALS NETWORK

RFA's Young Professionals Network engages the ethanol industry's under-40 workforce through professional development activities. Regular collaboration with peers and seasoned leadership and a range of learning, training, and networking opportunities intends to sharpen the skills of these future leaders and bolster talent retention.

LET'S GO! SPREADING THE WORD

The Renewable Fuels Association continues to explore innovative ways to reach important audiences.

At its popular display area at the **2022 Commodity Classic in New Orleans**, RFA received more than 1,000 signatures from farmers, workers in the ethanol industry, and other biofuel supporters who sent a message to President Biden that the solution to record-high gas prices is to immediately allow broader use of lower-cost ethanol blends like E15. RFA plans to continue to be a part of the event, which takes place in Orlando in March 2023.

RFA had an active presence during the **38th annual Fuel Ethanol Workshop & Expo**, held in Minneapolis in June 2022. Three staff were featured Workshop speakers, while RFA's Expo booth showcased our new flex fuel Can-Am Utility Terrain Vehicle.

In late summer 2022, RFA exhibited at the **Farm Progress Show**. The nation's largest outdoor farm event returned to Boone, Iowa for the first time since 2018 and attracted more than 200,000 attendees. RFA's large exhibit area, which displayed our flex fuel Jeep Wrangler and Can-Am UTV, drew crowds expressing gratitude for both our presence at the event and support of the agriculture industry. We will continue our presence when the Farm Progress Show pivots to Decatur, Illinois in summer 2023.

RFA's "Ethanol Days of Summer Free Fuel Contest" rewarded drivers who reported prices of E15 and E85 to our revamped E85prices.com website and mobile app from Memorial Day to Labor Day 2022. We piggybacked our "Pump Up the Savings" consumer sweepstakes to prompt social media posts on savings at the pump with the use of higher ethanol blends.

RFA sponsored the university student organization **Husker Motorsports**, which built a formula-style racecar from the ground up. The team competed in the Formula SAE Competition at the Michigan International Speedway, earning top-ten finishes in acceleration, autocross, and design. Our sponsorship provided a cost-effective way to educate automotive engineers regarding the low-carbon, high-performance value of renewable fuels like ethanol.

RFA fosters industry stewardship through our multiple award-winning ethanol safety initiatives. Since program inception in 2010, we have provided over 400 in-person and online ethanol emergency response training events to more than 16,000 attendees. RFA's ongoing safety efforts are supported by federal grants and managed under a cooperative partnership with TRANSCAER.

At key events like the Farm Progress Show, the Iowa Biofuels Science and Sustainability Tour or via dozens of media interviews over the course of a year, RFA has earned the respect and the attention of many.

RENEWABLE FUELS ASSOCIATION

MISSION: Drive expanded demand for American-made renewable fuels and bioproducts worldwide.

VISION: Help the world breathe easier with the power of renewable fuels.

STAFF:

MIDWEST

Geoff Cooper, *President and CEO*
Ken Colombini, *Communications Director*
Kelly Davis, *Vice President, Technical & Regulatory Affairs*
Marylou Hoffman, *Office Manager/HR*
Ann Lewis, *Senior Analyst*
Mikayla McKenna, *Communications Manager*
Cassie Mullen, *Director of Market Development*
Scott Richman, *Chief Economist*
Missy Ruff, *Director, Safety & Technical Programs*
Robert White, *Vice President, Industry Relations*

WASHINGTON, DC

Troy Bredenkamp, *Senior Vice President, Government & Public Affairs*

Mary Giglio, *Director of Special Projects & Events*

Edward S. Hubbard, Jr., *General Counsel & Vice President, Government Affairs*

Jared Mullendore, *Policy Counsel & Director, Government Affairs*

View profiles: ethanolrfa.org/about/our-staff

RENEWABLE FUELS FOUNDATION

MISSION: Meet the future education, research, and strategic planning needs of the U.S. ethanol industry.

FOCUS: Collaboration with academia, industry, and public policymakers on new uses, feedstocks, and technologies that will impact the future of ethanol.

BOARD OF DIRECTORS:

Chairman

Tony Leiding
Trenton Agri Products LLC
trentonagriproducts.com

Vice Chairman

Chris Wilson
Mid-Missouri Energy LLC
midmissourienergy.com

Treasurer

Delayne Johnson
Quad County Corn Processors
quad-county.com

View profiles: ethanolrfa.org/about/foundation

RFA ASSOCIATE MEMBERS

Advanced Fuel Dynamics
advancedfueldynamics.com

AgMotion Inc.
agmotion.com

Antea Group USA
anteagroup.com

Applied Material Solutions Inc.
appliedmaterialsolutions.com

ArrowUp LLC
arrowupglobal.com

Ascensus Specialties
ascensusspecialties.com

Barchart
barchart.com/cmdty

BASF Enzymes LLC
basf.com

BetaTec Hop Products Inc.
betatec.com

BIOFerm
biofermepc.com

Bion Companies
bionsciences.com

BK-H2Energy LLC
bkh2energy.com

Booster Fuels Inc.
trybooster.com

Braskem America Inc.
braskem.com.br/usa

Buckman
buckman.com

Chase Nedrow Companies
chasenedrow.com

Christianson PLLP
christiansoncpa.com

CIBO Technologies Inc.
cibotechnologies.com

Clariant
clariant.com

ClearFlame Engine Technologies
clearflame.com

CoBank
cobank.com

Compeer Financial
compeer.com

Corn Marketing Program of Michigan
micorn.org

CTE Global Inc.
cte-global.com

D3MAX LLC
d3maxllc.com

Eco-Energy Inc.
eco-energy.com

EcoEngineers
ecoengineers.us

Fagen Inc.
fageninc.com

Farm Credit Services of America
fcsamerica.com

Farmers Business Network®/ Gradable
fbn.com

Fluid Quip Technologies LLC
fluidquiptechnologies.com

GROWMARK Inc.
growmark.com

Hawkeye Gold LLC – subsidiary of J.D. Heiskell & Co.
heiskell.com

Honeywell UOP
uop.honeywell.com

H20 Innovation
h20innovation.com

IFF
xcelis.com

Illinois Corn Marketing Board
ilcorn.org

IMA Corp.
imacorp.com

Indiana Corn Marketing Council
incorn.org

Iowa Corn Growers Association
iowacorn.org

Iowa Renewable Fuels Association
iowarfa.org

Kansas Corn Commission
kscorn.com

Kansas Corn Growers Association
kscorn.com

KATZEN International Inc.
katzen.com

Kentucky Corn Growers Association
kycorn.org

Kentucky Corn Promotion Council
kycorn.org

Kurita America Inc.
kuritaamerica.com

Lallemand Biofuels & Distilled Spirits
lallemandbds.com

Leaf – Lesaffre Advanced Fermentations
lesaffreadvancedfermentations.com

Merjent Inc.
merjent.com

Michael Best & Friedrich LLP
michaelbest.com

Minnesota Bio-Fuels Association
mnbiofuels.org

Minnesota Corn Growers Association
mncorn.org

Minnesota Corn Research & Promotion Council
mncorn.org

Missouri Corn Growers Association
mocorn.org

Missouri Corn Merchandising Council
mocorn.org

Mole•Master Services Corp.
molemaster.com

Murex LLC
murexltd.com

National Corn Growers Association
ncga.com

National Corn-to-Ethanol Research Center
ethanolresearch.com

Navigator CO2
navigatorco2.com

Nebraska Corn Board
nebraskacorn.gov

Nebraska Corn Growers Association
necga.org

Nebraska Ethanol Board
ethanol.nebraska.gov

Next Wave Energy Partners
nextwavenergy.com

Novozymes
novozymes.com

Ohio Corn Marketing Program
ohiocornandwheat.org

Pearson Fuels
pearsonfuels.com

P&E Solutions
peconstruct.com

PCC Hydrogen Inc.
pyrochemcatalyst.com

Phibro Ethanol
phibroethanol.com

Pinion
pinionglobal.com

Pinnacle Engineering Inc.
pineng.com

Predictive Search
predictivesearch.net

The ProExporter Network
proexporter.com

Protec Fuel Management LLC
protecfuel.com

PROtect LLC
protect.llc

Renew Kansas
renewkansas.com

Renewable Fuels Nebraska
renewablefuelsne.com

Richard
richardepc.com

RPMG LLC
rpmgllc.com

RSM US LLP
rsmus.com

Sorghum Checkoff
sorghumcheckoff.com

StepOne Tech America Inc.
eflexfuel.com

StoneX Group Inc.
stonex.com

Summit Carbon Solutions
summitcarbonsolutions.com

Syngenta
syngenta.com

Tennessee Corn Promotion Council
tncorn.org

Terracon Consultants Inc.
terracon.com

Texas International Terminals Ltd.
titerminals.com

The Greenbrier Companies
gbrx.com

TrinityRail
trinityrail.com

Trucent
trucent.com

UGI International LLC
ugicorp.com

Unison Energy LLC
unisonenergy.com

USD Group LLC
usdg.com

Veolia Water Technologies & Solutions
watertechnologies.com

Whitefox Technologies Ltd.
whitefox.com

Wisconsin BioFuels Association
wibiofuels.org

Wolf Carbon Solutions US
wolfcarbonsolutions.com

RFA SUPPORTING MEMBERS

Agricultural Retailers Association
aradc.org

Colorado Corn Administrative Committee
coloradocorn.com

Colorado Corn Growers Association
coloradocorn.com

Distillers Grains Technology Council
distillersgrains.org

Iowa Central Fuel Testing Laboratory
iowafuellab.com

Maryland Grain Producers Association
marylandgrain.org

National Sorghum Producers
sorghumgrowers.com

New York Corn & Soybean Growers Association
nycornsoy.org

North Dakota Corn Council
ndcorn.org/corncouncil

South Dakota Corn Growers Association
sdcorn.org

RFA
RENEWABLE FUELS ASSOCIATION

ST. LOUIS

16024 Manchester Road
Suite 101
Ellisville, MO 63011
636-594-2284

WASHINGTON, DC

601 Pennsylvania Ave. NW
North Building – Suite 200
Washington, DC 20004
202-289-3835

ethanolrfa.org
info@ethanolrfa.org
facebook.com/ethanolrfa
twitter.com/ethanolrfa
instagram.com/ethanolrfa
flickr.com/photos/ethanolrfa
linkedin.com/company/ethanolrfa
youtube.com/@ethanolrfa

2023 U.S. ETHANOL PRODUCTION CAPACITY BY PLANT

Company	City	State	Feedstock	Production Capacity (mgy)
Absolute Energy LLC	St. Ansgar	IA	Corn	127
Ace Ethanol LLC	Stanley	WI	Corn/Cellulosic Biomass	54
Adkins Energy LLC	Lena	IL	Corn	60
ADM	Clinton	IA	Corn	237
ADM	Decatur	IL	Corn	375
ADM	Marshall	MN	Corn	48
ADM (Dry Mill)	Cedar Rapids	IA	Corn	300
ADM (Dry Mill)	Columbus	NE	Corn	313
ADM (Wet Mill)	Cedar Rapids	IA	Corn	240
ADM (Wet Mill)	Columbus	NE	Corn	100
Aemetis Inc.	Keyes	CA	Corn/Sorghum	70
Al-Corn Clean Fuel LLC	Claremont	MN	Corn	130
Alto Ingredients Columbia Inc.	Boardman	OR	Corn	40
Alto Ingredients Magic Valley Inc.	Burley	ID	Corn	60
Alto Ingredients Pekin ICP Inc.	Pekin	IL	Corn	90
Alto Ingredients Pekin Inc. (Dry Mill)	Pekin	IL	Corn	60
Alto Ingredients Pekin Inc. (Wet Mill)	Pekin	IL	Corn	100
Amber Wave	Phillipsburg	KS	Corn/Sorghum/Wheat	40
Arkalon Energy LLC	Liberal	KS	Corn	115
Aurora Cooperative Ethanol LLC - West	Aurora	NE	Corn	100
Badger State Ethanol LLC	Monroe	WI	Corn	81
Benchmark Renewable Energy LLC	Raeford	NC	Corn	60
Big River Resources Boyceville LLC	Boyceville	WI	Corn	64
Big River Resources Galva LLC	Galva	IL	Corn	123
Big River Resources West Burlington LLC	West Burlington	IA	Corn	113
Big River United Energy LLC	Dyersville	IA	Corn	130
BioUrja Renewables LLC	Peoria	IL	Corn	135
Blue Flint Ethanol LLC	Underwood	ND	Corn	73
Bonanza BioEnergy LLC	Garden City	KS	Corn/Sorghum	62
Bridgeport Ethanol LLC	Bridgeport	NE	Corn	54
Bushmills Ethanol Inc.	Atwater	MN	Corn	90
Butamax Advanced Biofuels LLC	Scandia	KS	Corn	12
Calgren Renewable Fuels LLC	Pixley	CA	Corn	55
Carbon Green BioEnergy LLC	Lake Odessa	MI	Corn	55
Cardinal Ethanol LLC	Union City	IN	Corn	135
Cargill Inc.	Blair	NE	Corn	210
Cargill Inc.	Eddyville	IA	Corn	71
Cargill Inc.	Fort Dodge	IA	Corn	130
Chief Ethanol Fuels Inc.	Hastings	NE	Corn	70
Chief Ethanol Fuels Inc.	Lexington	NE	Corn	55
Chippewa Valley Ethanol Co.	Benson	MN	Corn	50
CHS Inc.	Annawan	IL	Corn	130
CHS Inc.	Rochelle	IL	Corn	130
CIE	Marion	IN	Corn	55
CIE	Norfolk	NE	Corn	50
Commonwealth Agri-Energy LLC	Hopkinsville	KY	Corn	45
Corn LP	Goldfield	IA	Corn	75
Dakota Ethanol LLC	Wentworth	SD	Corn	90
Dakota Spirit AgEnergy LLC	Spiritwood	ND	Corn	75
DENCO II LLC	Morris	MN	Corn	36
Diamond Ethanol LLC	Levelland	TX	Corn	40
Didion Ethanol LLC	Cambria	WI	Corn	50
Dynamic Recycling LLC	Bristol	TN	Waste Sugars/Alcohol	2

Company	City	State	Feedstock	Production Capacity (mgy)
E Energy Adams LLC	Adams	NE	Corn	100
East Kansas Agri-Energy LLC	Garnett	KS	Corn	45
ELEMENT LLC	Colwich	KS	Corn/Sorghum/Cellulosic Biomass	70
Elite Octane LLC	Atlantic	IA	Corn	150
Fox River Valley Ethanol LLC	Oshkosh	WI	Corn	65
Front Range Energy LLC	Windsor	CO	Corn	40
Gevo Inc.	Luverne	MN	Corn	22
Glacial Lakes Energy LLC	Aberdeen	SD	Corn	61
Glacial Lakes Energy LLC	Huron	SD	Corn	38
Glacial Lakes Energy LLC	Mina	SD	Corn	162
Glacial Lakes Energy LLC	Watertown	SD	Corn	148
Golden Grain Energy LLC	Mason City	IA	Corn	115
Golden Triangle Energy LLC	Craig	MO	Corn	20
Grain Processing Corp.	Muscatine	IA	Corn	83
Grain Processing Corp.	Washington	IN	Corn	37
Granite Falls Energy LLC	Granite Falls	MN	Corn	60
Green Plains Atkinson LLC	Atkinson	NE	Corn	55
Green Plains Central City LLC	Central City	NE	Corn	116
Green Plains Fairmont LLC	Fairmont	MN	Corn	119
Green Plains Madison LLC	Madison	IL	Corn	90
Green Plains Mount Vernon LLC	Mount Vernon	IN	Corn	90
Green Plains Obion LLC	Rives	TN	Corn	120
Green Plains Otter Tail LLC	Fergus Falls	MN	Corn	55
Green Plains Shenandoah LLC	Shenandoah	IA	Corn	82
Green Plains Superior LLC	Superior	IA	Corn	60
Green Plains Wood River LLC	Wood River	NE	Corn	121
Green Plains York LLC	York	NE	Corn	50
GreenAmerica Biofuels Ord LLC	Ord	NE	Corn	63
Greenfield Global Inc.	Winnebago	MN	Corn	48
Guardian Energy LLC	Janesville	MN	Corn	150
Guardian Hankinson LLC	Hankinson	ND	Corn	150
Guardian Lima LLC	Lima	OH	Corn	73
Heartland Corn Products	Winthrop	MN	Corn	131
Hereford Ethanol Partners LP	Hereford	TX	Corn	120
Heron Lake BioEnergy LLC	Heron Lake	MN	Corn	65
Highwater Ethanol LLC	Lamberton	MN	Corn	64
Homeland Energy Solutions LLC	Lawler	IA	Corn	190
Husker Ag LLC	Plainview	NE	Corn	80
ICM Biofuels LLC	St. Joseph	MO	Corn	50
Iroquois Bio-Energy Co. LLC	Rensselaer	IN	Corn	55
KAAPA Ethanol LLC	Minden	NE	Corn	83
KAAPA Ethanol Ravenna LLC	Ravenna	NE	Corn	135
Kansas Ethanol LLC	Lyons	KS	Corn	80
Lincolnland Agri-Energy LLC	Palestine	IL	Corn	48
Lincolnway Energy LLC	Nevada	IA	Corn	80
Little Sioux Corn Processors LLC	Marcus	IA	Corn	165
Louis Dreyfus Grand Junction LLC	Grand Junction	IA	Corn/Cellulosic Biomass	125
Marquis Energy LLC	Hennepin	IL	Corn	365
Marquis Energy-Wisconsin LLC	Necedah	WI	Corn	50
Marysville Ethanol LLC	Marysville	MI	Corn	50
MGPI Processing Inc.	Atchison	KS	Corn	3
Mid America Agri Products/Wheatland LLC	Madrid	NE	Corn	45
Mid-Missouri Energy Inc.	Malta Bend	MO	Corn	60

Company	City	State	Feedstock	Production Capacity (mgy)
Midwest Renewable Energy LLC	Sutherland	NE	Corn	26
MMI/EtOH Inc.	Aurora	CO	Waste Alcohol	3
MXI Environmental Services LLC	Abingdon	VA	Waste Alcohol	2
Nebraska Corn Processing LLC	Cambridge	NE	Corn	50
NuGen Energy LLC	Marion	SD	Corn	150
One Earth Energy LLC	Gibson City	IL	Corn	150
Parallel Products	Louisville	KY	Waste Sugars/Alcohol	5
Parallel Products	Ontario	CA	Waste Sugars/Alcohol	2
Pelican Acquisition LLC	Stockton	CA	Corn/Sorghum/Cellulosic Biomass	60
Pennsylvania Grain Processing LLC	Clearfield	PA	Corn	120
Pinal Energy LLC	Maricopa	AZ	Corn	55
Pine Lake Corn Processors LLC	Steamboat Rock	IA	Corn	80
Plymouth Energy LLC	Merrill	IA	Corn	55
POET Biorefining - Alexandria LLC	Alexandria	IN	Corn	90
POET Biorefining - Arthur LLC	Arthur	IA	Corn	132
POET Biorefining - Ashton LLC	Ashton	IA	Corn	68
POET Biorefining - Big Stone LLC	Big Stone City	SD	Corn	105
POET Biorefining - Bingham Lake LLC	Bingham Lake	MN	Corn	35
POET Biorefining - Camilla LLC	Camilla	GA	Corn	120
POET Biorefining - Caro LLC	Caro	MI	Corn	80
POET Biorefining - Chancellor LLC	Chancellor	SD	Corn	125
POET Biorefining - Cloverdale LLC	Cloverdale	IN	Corn	80
POET Biorefining - Coon Rapids LLC	Coon Rapids	IA	Corn	65
POET Biorefining - Corning LLC	Corning	IA	Corn	90
POET Biorefining - Emmetsburg LLC	Emmetsburg	IA	Corn	68
POET Biorefining - Fairbank LLC	Fairbank	IA	Corn	132
POET Biorefining - Fairmont LLC	Fairmont	NE	Corn	128
POET Biorefining - Fostoria LLC	Fostoria	OH	Corn	90
POET Biorefining - Glenville LLC	Albert Lea	MN	Corn	48
POET Biorefining - Gowrie LLC	Gowrie	IA	Corn	90
POET Biorefining - Groton LLC	Groton	SD	Corn	68
POET Biorefining - Hanlontown LLC	Hanlontown	IA	Corn	80
POET Biorefining - Hudson LLC	Hudson	SD	Corn	80
POET Biorefining - Iowa Falls LLC	Iowa Falls	IA	Corn/Cellulosic Biomass	112
POET Biorefining - Jewell LLC	Jewell	IA	Corn	90
POET Biorefining - Laddonia LLC	Laddonia	MO	Corn	80
POET Biorefining - Lake Crystal LLC	Lake Crystal	MN	Corn	68
POET Biorefining - Leipsic LLC	Leipsic	OH	Corn	90
POET Biorefining - Macon LLC	Macon	MO	Corn	55
POET Biorefining - Marion LLC	Marion	OH	Corn	154
POET Biorefining - Menlo LLC	Menlo	IA	Corn	132
POET Biorefining - Mitchell LLC	Mitchell	SD	Corn	86
POET Biorefining - North Manchester LLC	North Manchester	IN	Corn	90
POET Biorefining - Portland LLC	Portland	IN	Corn	90
POET Biorefining - Preston LLC	Preston	MN	Corn	55
POET Biorefining - Shelbyville LLC	Shelbyville	IN	Corn	94
POET Biorefining - Shell Rock LLC	Shell Rock	IA	Corn/Cellulosic Biomass	128
POET Research Center Inc.	Scotland	SD	Corn	12
Pratt Energy LLC	Pratt	KS	Corn	55
PureField Ingredients LLC	Russell	KS	Corn/Sorghum/Cellulosic Biomass	55
Quad County Corn Processors	Galva	IA	Corn/Cellulosic Biomass	34
Red River BioRefinery LLC	Grand Forks	ND	Waste Sugars/Starch	17
Red River Energy LLC	Rosholt	SD	Corn	35

Company	City	State	Feedstock	Production Capacity (mgy)
Red Trail Energy LLC	Richardton	ND	Corn	65
Redfield Energy LLC	Redfield	SD	Corn	62
Reeve Agri-Energy Inc.	Garden City	KS	Corn/Sorghum	13
Ringneck Energy LLC	Onida	SD	Corn	80
Seaboard Energy California LLC	Madera	CA	Corn/Sorghum	40
Show Me Ethanol LLC	Carrollton	MO	Corn	51
Siouxland Energy Cooperative	Sioux Center	IA	Corn	70
Siouxland Ethanol LLC	Jackson	NE	Corn	95
South Bend Ethanol LLC	South Bend	IN	Corn	102
Southwest Iowa Renewable Energy LLC	Council Bluffs	IA	Corn	130
Sterling Ethanol LLC	Sterling	CO	Corn	50
Tate & Lyle PLC	Loudon	TN	Corn	110
Tharaldson Ethanol LLC	Casselton	ND	Corn	175
The Andersons Albion Ethanol LLC	Albion	MI	Corn	140
The Andersons Clymers Ethanol LLC	Clymers	IN	Corn	135
The Andersons Denison Ethanol LLC	Denison	IA	Corn	65
The Andersons Marathon Ethanol LLC	Greenville	OH	Corn	135
Three Rivers Energy LLC	Coshocton	OH	Corn	55
Trenton Agri Products LLC	Trenton	NE	Corn	46
United Ethanol LLC	Milton	WI	Corn	62
United Wisconsin Grain Producers LLC	Friesland	WI	Corn	60
Valero Renewable Fuels Co. LLC	Albert City	IA	Corn	135
Valero Renewable Fuels Co. LLC	Albion	NE	Corn	135
Valero Renewable Fuels Co. LLC	Aurora	SD	Corn	140
Valero Renewable Fuels Co. LLC	Bloomingburg	OH	Corn	135
Valero Renewable Fuels Co. LLC	Bluffton	IN	Corn	135
Valero Renewable Fuels Co. LLC	Charles City	IA	Corn	140
Valero Renewable Fuels Co. LLC	Fort Dodge	IA	Corn	140
Valero Renewable Fuels Co. LLC	Hartley	IA	Corn	140
Valero Renewable Fuels Co. LLC	Jefferson	WI	Corn	110
Valero Renewable Fuels Co. LLC	Lakota	IA	Corn	110
Valero Renewable Fuels Co. LLC	Linden	IN	Corn	135
Valero Renewable Fuels Co. LLC	Mount Vernon	IN	Corn	100
Valero Renewable Fuels Co. LLC	Riga	MI	Corn	57
Valero Renewable Fuels Co. LLC	Welcome	MN	Corn	140
Western New York Energy LLC	Medina	NY	Corn	60
Western Plains Energy LLC	Campus	KS	Corn/Sorghum	52
White Energy Inc.	Hereford	TX	Corn/Sorghum	130
White Energy Inc.	Plainview	TX	Corn	130
Yuma Ethanol LLC	Yuma	CO	Corn	50
U.S. TOTAL				**17,946**

CAPACITY UNDER CONSTRUCTION OR EXPANSION

LanzaTech Freedom Pines Fuels LLC (new)	Soperton	GA	Industrial Off-Gases/Biomass/Biogas	9
New Energy Blue LLC (new)	Mason City	IA	Cellulosic Biomass	20
Three Rivers Energy LLC (expansion)	Coshocton	OH	Corn	25
VERBIO North America Corp. (new)	Nevada	IA	Corn	60

Source: RFA, as of January 2023