Ethanol Industry Update and Outlook

Jared Mullendore

Policy Counsel and Director of Government Affairs

Renewable Fuels Association

March 2026

About the Renewable Fuels Association (RFA)

- Founded in 1981.
- Trade association representing U.S. ethanol producers, vendors, services providers, etc.
- Mission: “Drive growth in sustainable renewable fuels and bioproducts for a better future”
- Offices in St. Louis, MO and Washington, DC
- Member producers include large bioenergy companies and agribusinesses, as well as small farmer-owned co-ops and LLCs
- *“The Voice of the US Ethanol Industry”*

RFA
RENEWABLE FUELS ASSOCIATION

Ethanol Production

16.1 Billion Gallons

Animal Feed Output

33.1 Million Metric Tons

Distillers Oil Output

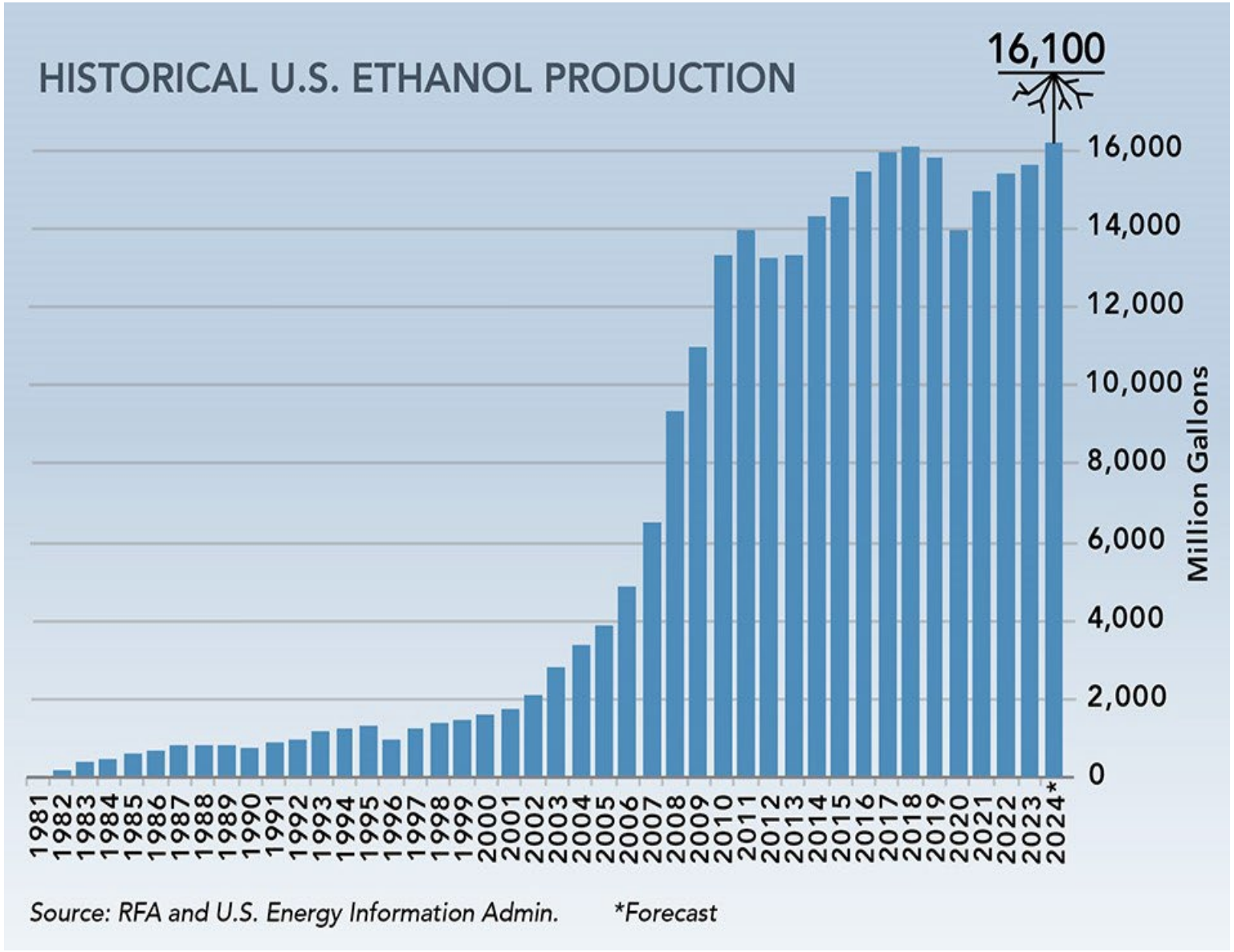
4.5 Billion Pounds

Ethanol Inclusion Rate

10.4%

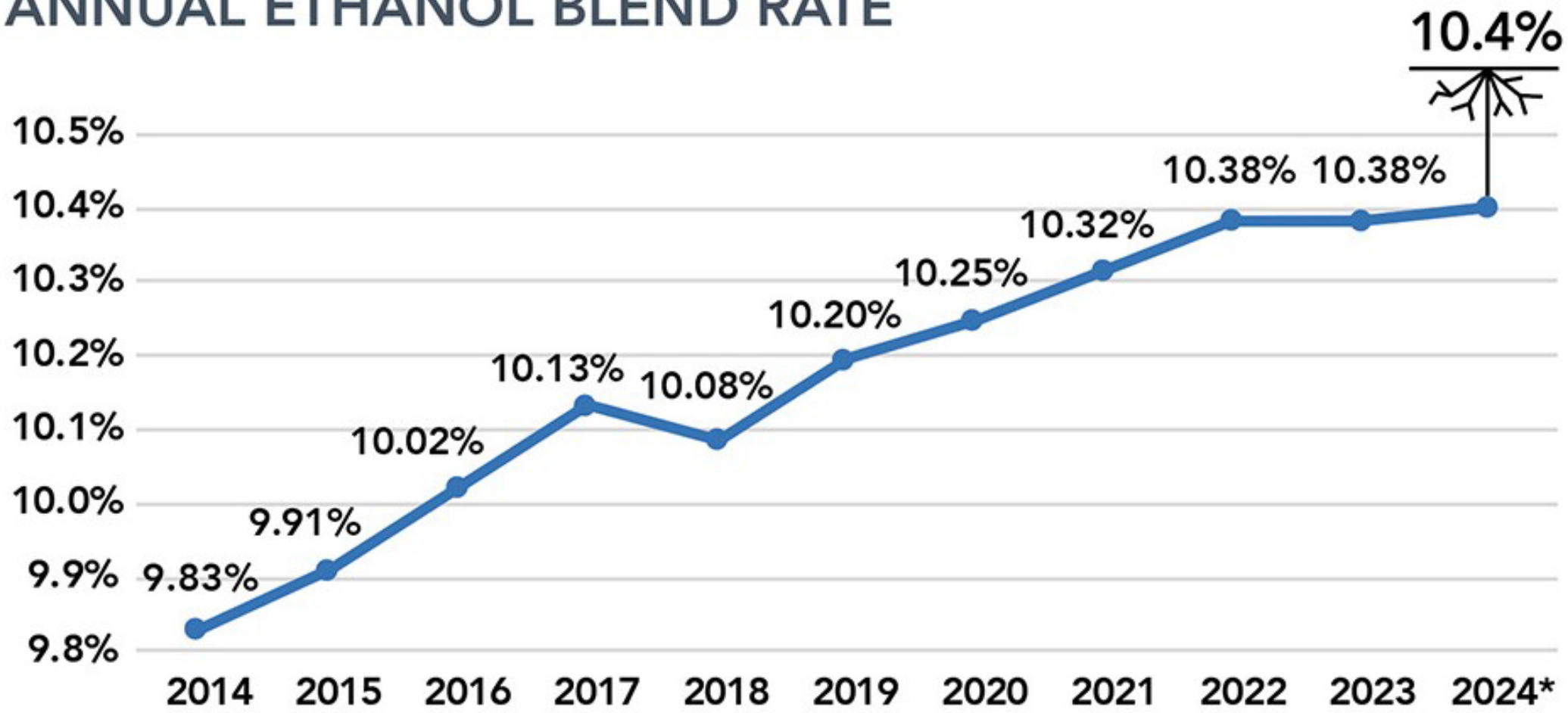
Ethanol Exports

1.90 Billion Gallons



RFA
RENEWABLE FUELS ASSOCIATION

ANNUAL ETHANOL BLEND RATE



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

**Forecast*

RFA
RENEWABLE FUELS ASSOCIATION

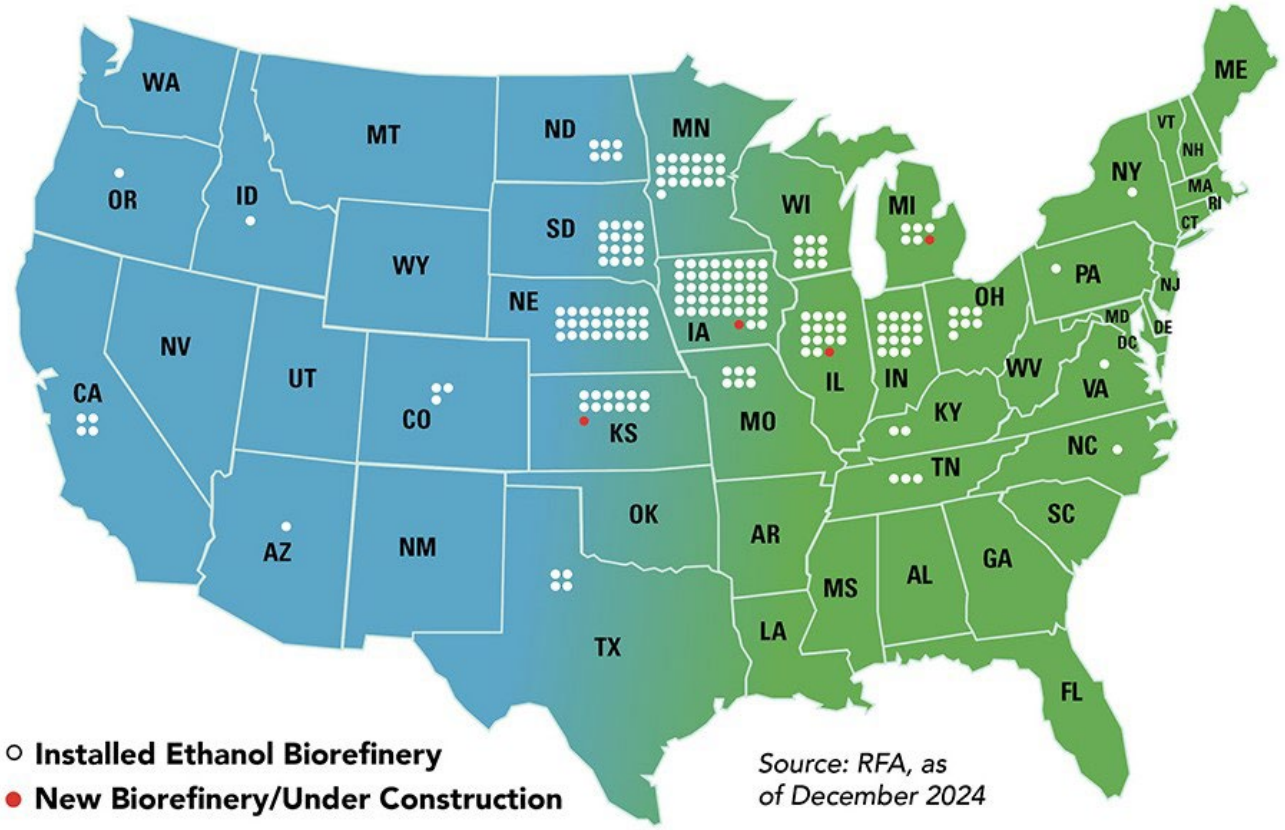
Ethanol Plants & Production by State

U.S. ETHANOL PRODUCTION CAPACITY BY STATE

	Existing Production Capacity (mgy)	Capacity Under Constr./ Expansion (mgy)	Installed Ethanol Biorefineries	Biorefineries Under Constr./ Expansion
Iowa	4,881	21	42	1
Nebraska	2,371	0	24	0
Illinois	1,967	25	14	1
Minnesota	1,455	0	19	0
South Dakota	1,452	0	16	0
Indiana	1,445	0	15	0
Ohio	734	0	7	0
Wisconsin	644	0	9	0
Kansas	610	1	12	1
North Dakota	555	0	6	0
Texas	420	0	4	0
Michigan	382	2	5	1
Missouri	335	0	6	0
Tennessee	235	0	3	0
California	187	0	4	0
Colorado	140	0	3	0
Pennsylvania	120	0	1	0
New York	63	0	1	0
Idaho	60	0	1	0
North Carolina	60	0	1	0
Arizona	55	0	1	0
Kentucky	55	0	2	0
Oregon	40	0	1	0
Virginia	2	0	1	0
TOTAL U.S.	18,268	49	198	4

Source: RFA, as of December 2024

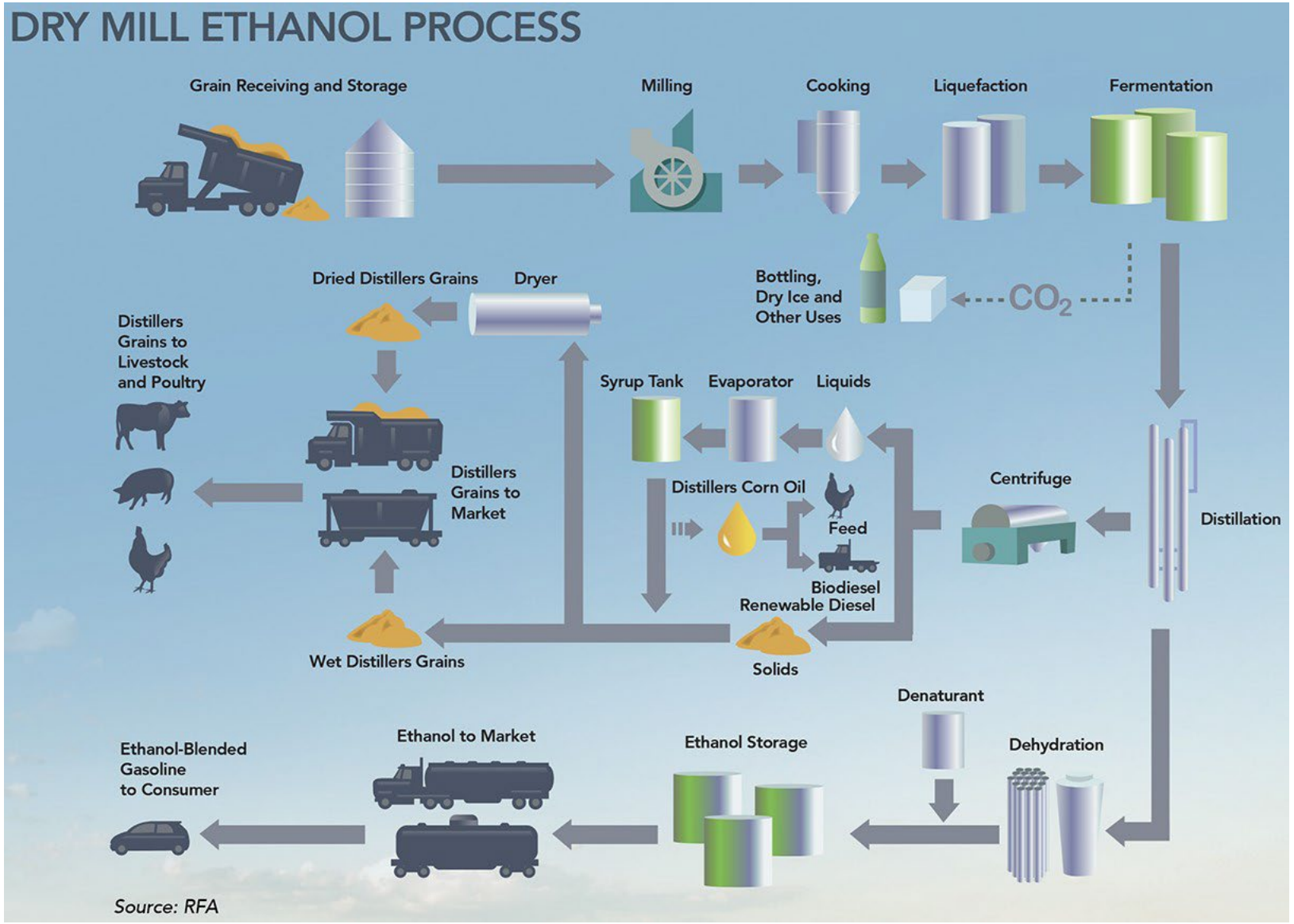
U.S. FUEL ETHANOL BIOREFINERIES BY STATE



The top five states account for 66% of total U.S. ethanol capacity

RFA
RENEWABLE FUELS ASSOCIATION

The Process



What Comes from Corn

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

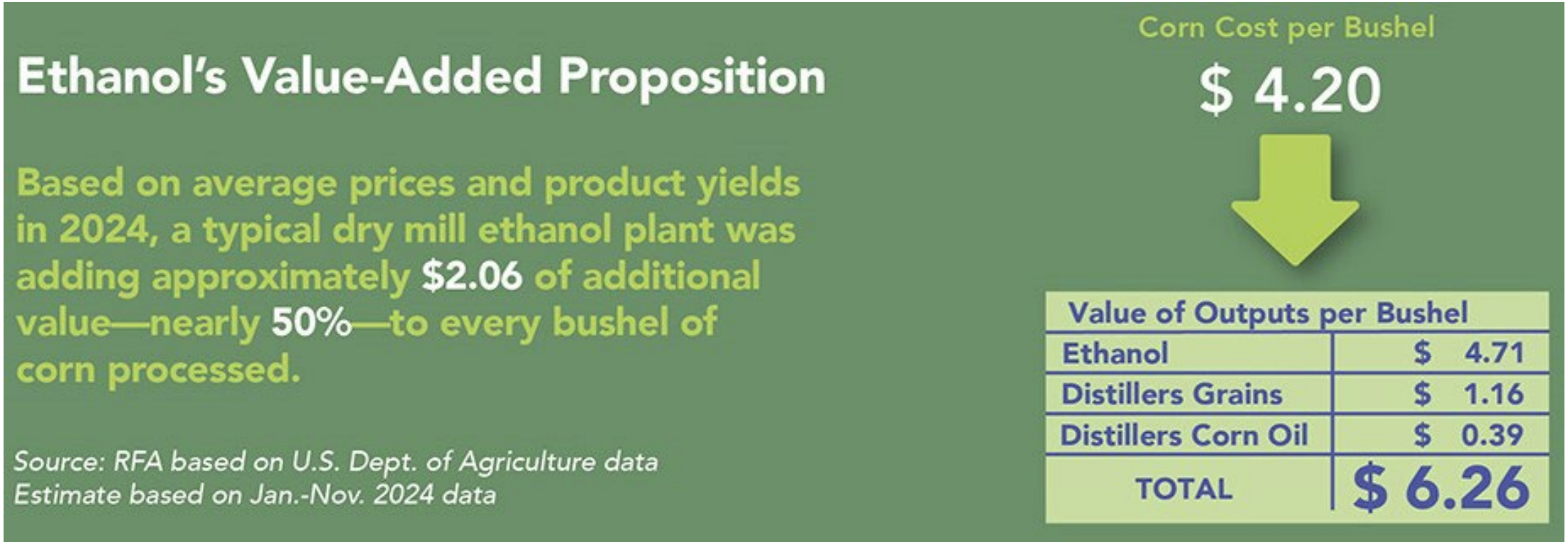
2.9 gallons	Denatured fuel ethanol
14.5 pounds	Distillers grains animal feed (10% moisture)
0.9 pounds	Distillers corn oil
16 pounds	Captured biogenic carbon dioxide (CO_2)*

In 2024, ethanol biorefineries captured roughly 2.7 million tons of CO_2 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*

RFA
RENEWABLE FUELS ASSOCIATION

The Value-Added Proposition



RFA
RENEWABLE FUELS ASSOCIATION

Ethanol's Economic Impact in 2024

- Generated **$53** Billion in Gross Domestic Product (GDP)
- Supported **55,810** Direct Jobs
- Supported **258,089** Indirect and Induced Jobs
- Boosted Household Income by **$28.3** Billion
- Contributed **$10.3** Billion in Tax Revenue
- Veterans are **16%** of the workforce!

RFA
RENEWABLE FUELS ASSOCIATION

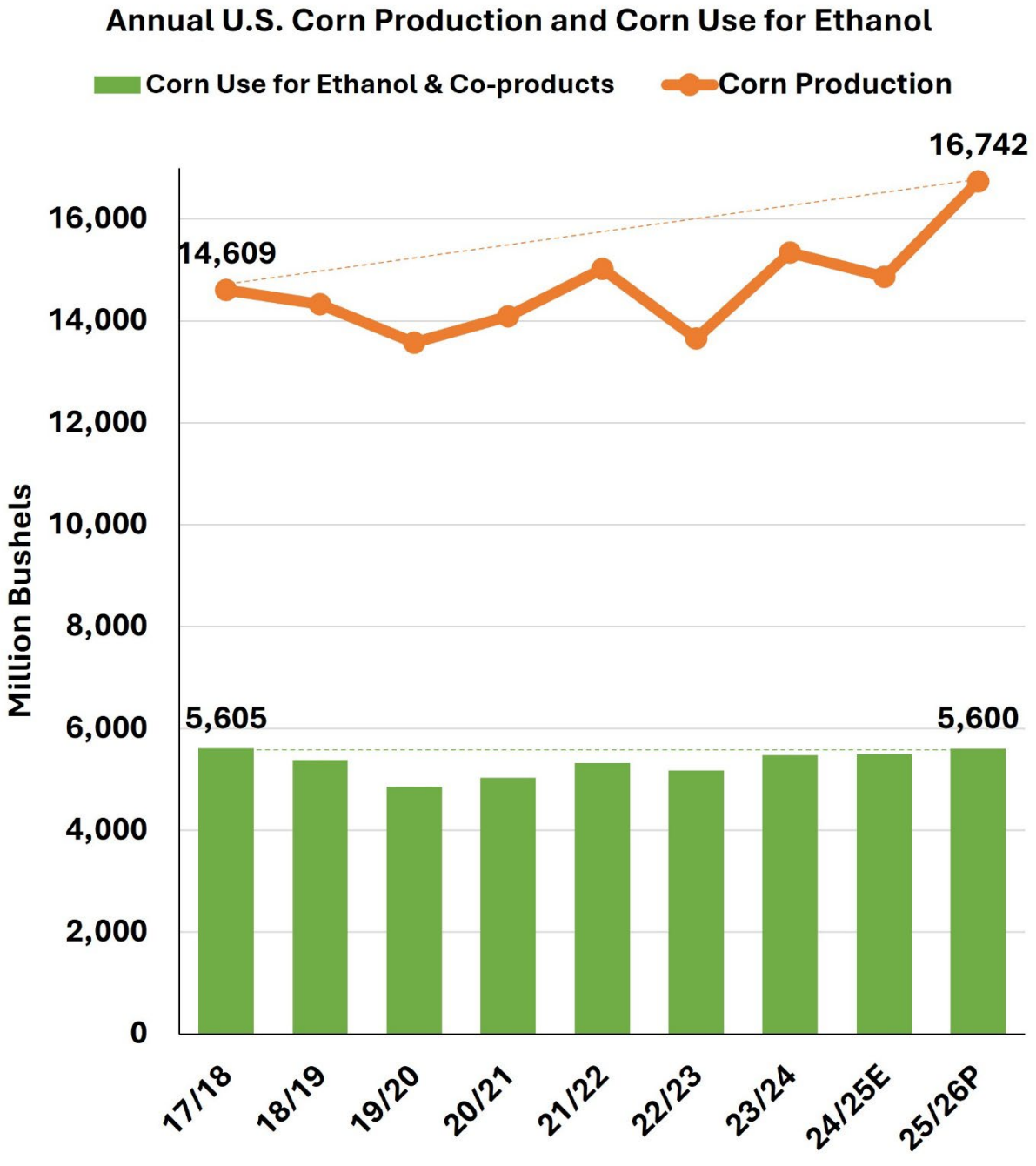
Ethanol's GHG Credentials

- Argonne National Laboratory: **44-52%** GHG reduction
- Harvard, MIT, Tufts (EH&E): **46%** GHG reduction
- California Air Resources Board: **41%** GHG reduction
- Oregon Dept. of Environ. Quality: **45%** GHG reduction
- Life Cycle Assoc.: **1.2** BMT GHG reduction since 2008

RFA
RENEWABLE FUELS ASSOCIATION

The reality.

- Because of artificial regulatory & policy barriers, we're using the same amount of corn for ethanol as we did 10 years ago… but corn production is 2+ billion bushels (15%) higher.
- It's time to unleash American ethanol and E15 to help rebalance corn supply/demand and avert an impending crisis in farm country.



DC Priorities…

- A legislative solution for **year-round E15…thee top priority.**
  - S. 593; H. 1346: *Nationwide Consumer & Fuel Retailer Choice Act*
- Maintaining RFS Integrity
  - Strong RVO's for 2026-2027, minimize SRE's.
- OBBBA passes, now what?
  - 45Q & 45Z tax credit implementation, RD/RE immediate expensing, etc.
- Fair Trade for US ethanol
  - Brazil 301 case, minimize tariff fallout, UK/EU & India opportunities
- Expand use of US ethanol through higher blends and new uses.

RFA
RENEWABLE FUELS ASSOCIATION

Year-Round E15 Legislation

A legislative solution for year-round E15 remains elusive.

- S. 593; H. 1346: Nationwide Consumer & Fuel Retailer Choice Act:
  - Extend 1-psi RVP waiver to E15.
  - Nullify the Midwest states petition to eliminate the 1-psi RVP waiver for E10.
  - Would give a one-time “alternative compliance” option for the 5 refineries who were not included in the original 2018 “alternative compliance” decision. Would grant alternative compliance for one pending SRE from each 2016 & 2017.
  - The bill has the support of ag, biofuels, refiners, and retailers.

RFA
RENEWABLE FUELS ASSOCIATION

Year-Round E15 Legislation

- Current status:
  - Support of congressional leadership (Leader Thune, Speaker Johnson, numerous chairs of committees of jurisdiction, bi-partisan support of congressional members.
  - **E15 Rural Domestic Energy Council** hard at work.
  - Trump Administration has indicated support of E15 and their desire to see the issue resolved legislatively.
  - New CBO score for E15 provision is said to be a $4 to $6 billion savings to federal budget.
  - Seeking to attach the E15 provision to a **legislative vehicle** before summer.
- New Study! If unrestricted, E15 would add $25.8 billion to GDP ($7.3B in ethanol production, $13.8B in higher corn demand), boost income by $10.3B by adding 128,000 new jobs.

RFA
RENEWABLE FUELS ASSOCIATION

45Z Clean Fuel Production Credit — Rulemaking

- **45Z replaced the 40B SAF credit in 2025.**
- Treasury issued **initial guidance and modeling framework (45ZCF-GREET)**.
- **Proposed regulations expected**, followed by **notice-and-comment rulemaking**.
- **Final rules likely months away**, creating investment uncertainty.
- Developers and producers **waiting for regulatory clarity**.

RFA
RENEWABLE FUELS ASSOCIATION

2025: OBBBA Becomes Law

- **45Z Extension:** Extended 2 years, now expiring end of 2029 (shortened from House's 4-year extension to 2031 to reduce cost).
- **Feedstock Eligibility:** Limited **to U.S., Canada, and Mexico.**
- **Credit Transferability:** Fully retained through entire credit term.
- **SAF Credit:** Capped at $1.00/gal, down from $1.75/gal.
- **Emissions Rules:**
  - No negative emissions rates, except for manure-derived fuels.
  - ILUC emissions excluded.
  - Manure-based fuel pathways added.
  - "No double credit" rule retained.

RFA
RENEWABLE FUELS ASSOCIATION

Other Highlights of OBBBA

- 45Q Carbon Capture Credit:
  - Retains IRA enhancements.
  - Restores inflation adjustment to 2027 (2025 base year).
  - Maintains transferability and creates credit parity for utilization methods like EOR.
- R&D/R&E Immediate Expensing:
  - Repeals TCJA's amortization rule.
  - Allows immediate expensing of domestic R&D/R&E.
  - Effective for tax years starting after Dec 31, 2024.

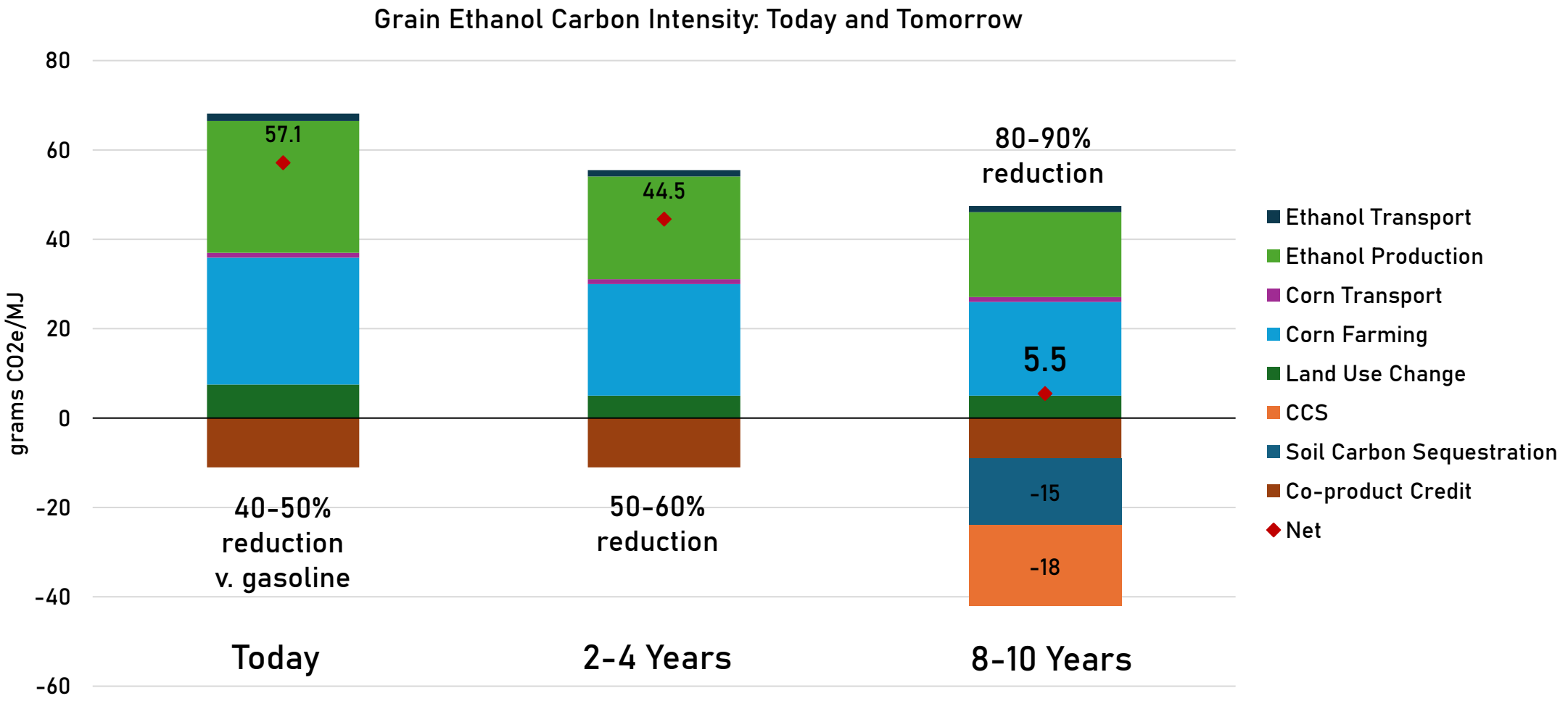
RFA
RENEWABLE FUELS ASSOCIATION

Key Issues Highlighted by RFA

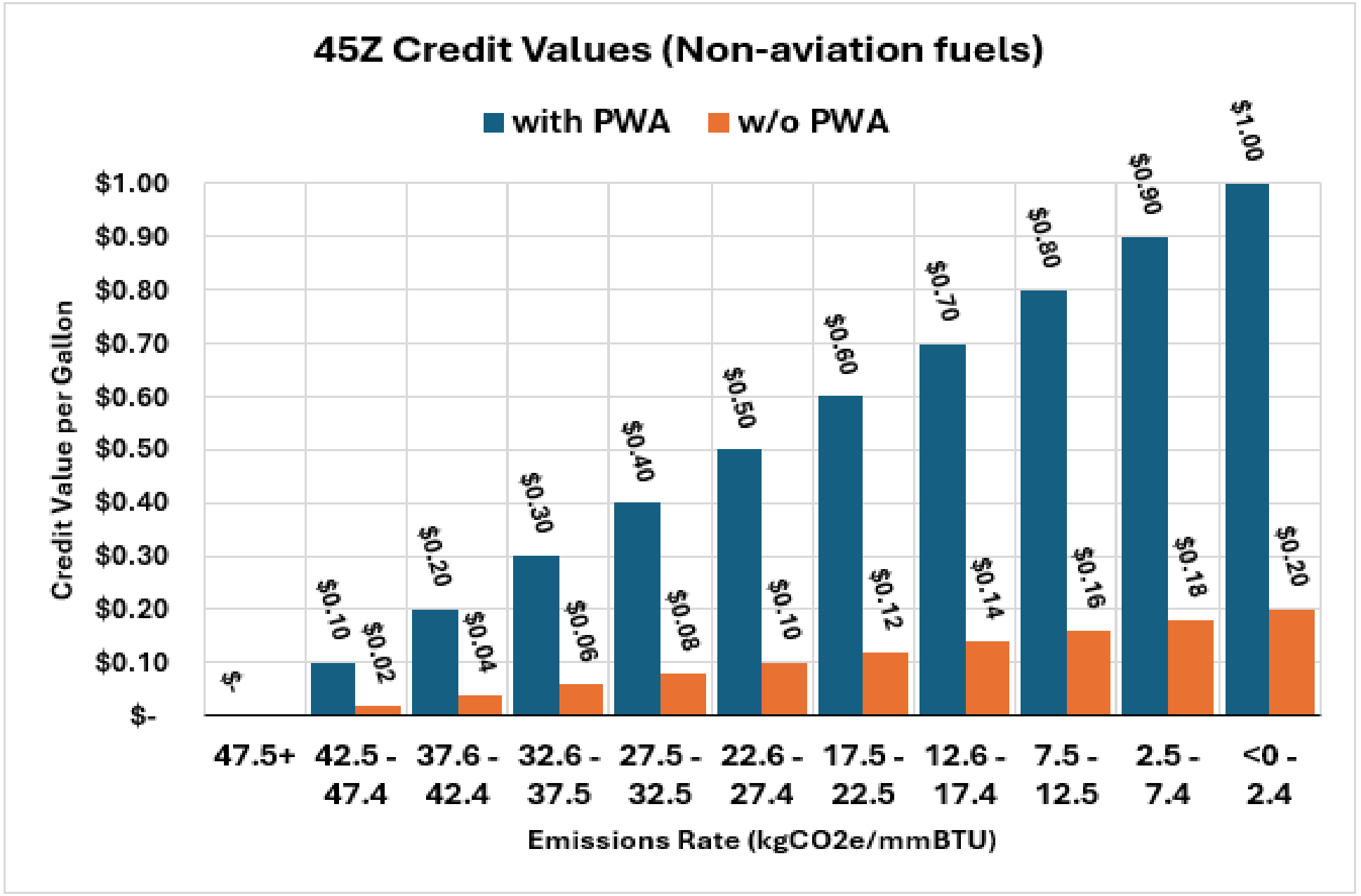
- **Recognition of on-farm practices** in lifecycle scoring.
- **Book-and-claim supply chain accounting** for feedstocks.
- **Lifecycle modeling assumptions** affecting ethanol pathways.
- **Avoiding supply chain distortions** from rigid feedstock tracking.
- **Program durability and timeline** to support investment.

RFA
RENEWABLE FUELS ASSOCIATION

Net-zero carbon corn ethanol is coming

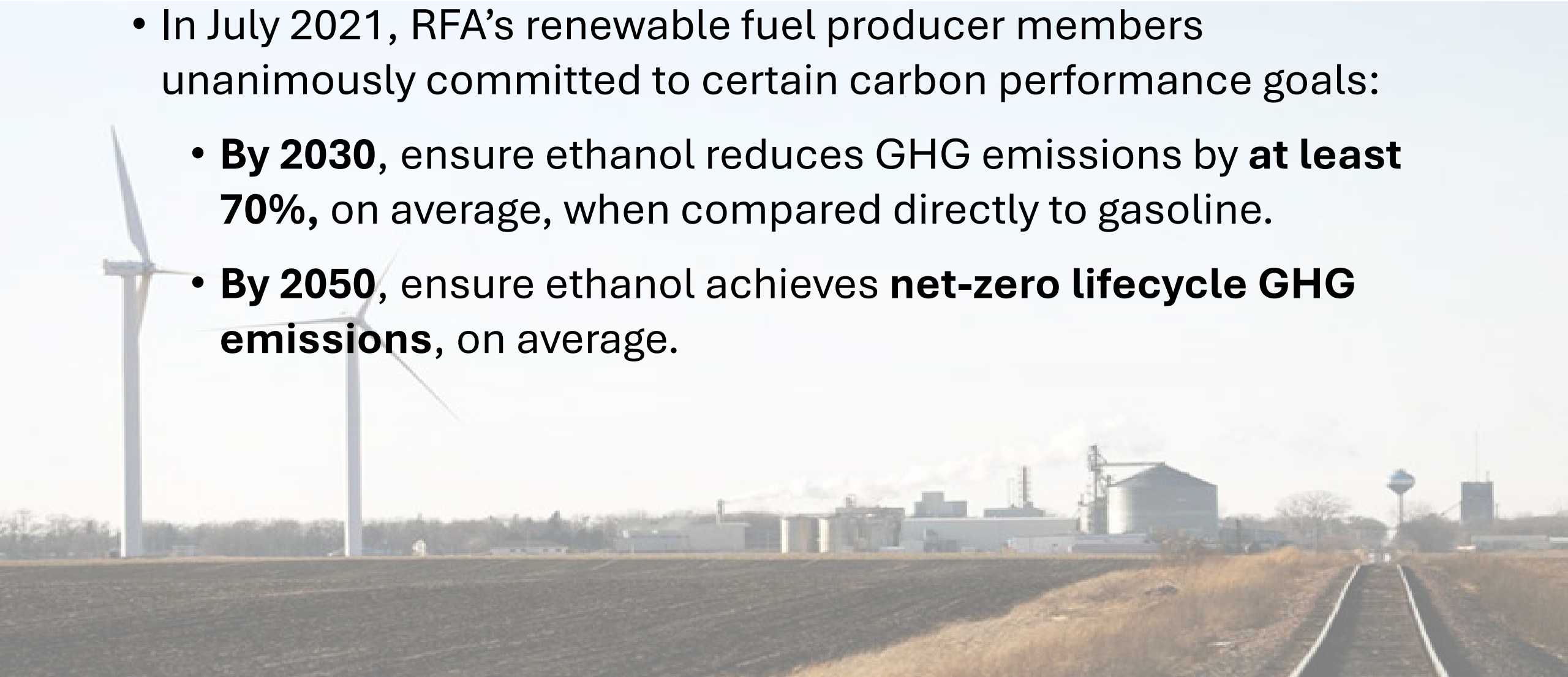


Source: RFA analysis using GREET1_2019 and user-defined assumptions/projections


45Z Credit Values (Non-aviation fuels)
with PWA
w/o PWA
Credit Value per Gallon
$1.00
$0.90
$0.80
$0.70
$0.60
$0.50
$0.40
$0.30
$0.20
$0.10
$-
$-
$0.10
$0.02
$0.20
$0.04
$0.30
$0.06
$0.40
$0.08
$0.50
$0.10
$0.60
$0.12
$0.70
$0.14
$0.80
$0.16
$0.90
$0.18
$1.00
$0.20
47.5+
42.5 - 47.4
37.6 - 42.4
32.6 - 37.5
27.5 - 32.5
22.6 - 27.4
17.5 - 22.5
12.6 - 17.4
7.5 - 12.5
2.5 - 7.4
<0 - 2.4
Emissions Rate (kgCO2e/mmBTU)

RFA's Net Zero Pledge

- In July 2021, RFA's renewable fuel producer members unanimously committed to certain carbon performance goals:
  - **By 2030**, ensure ethanol reduces GHG emissions by **at least 70%,** on average, when compared directly to gasoline.
  - **By 2050**, ensure ethanol achieves **net-zero lifecycle GHG emissions**, on average.



Other Opportunities for Ethanol…

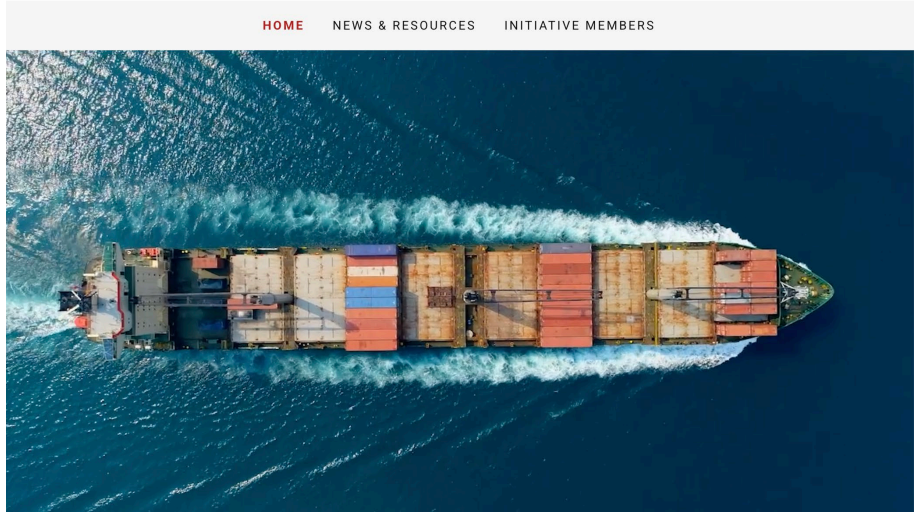
- **Sustainable Aviation Fuel**
  - Large potential for demand; tax credit impacts need attention.
- **Diesel replacement:**
  - Research has found ethanol (E98) is capable of diesel-like combustion with lower NOx, near-zero soot, and improved thermal efficiency.
  - Several research projects are on-going (RFA/John Deere/Purdue University)
- **Maritime Fuels:**
  - 90-billion-gallon market globally.
  - US submitted DOE analysis to IMO, estimating corn ethanol's (dry mill) Carbon Intensity at 36g CO2e/MJ!
- **Renewable Chemicals & Products:**
  - Growing demand for renewable, low/net zero carbon feedstocks used for chemicals and other products.
  - Any product made at a petrochemical facility can be made at a biochemical facility using ethanol as the base feedstock.

© 2025 Renewable Fuels Association. All rights reserved.

American Biofuels Maritime Initiative

- **Co-chaired by RFA and American Biogas Council**
- **Key Coalition Objectives**
  - Convince the Trump Administration to constructively re-engage in the IMO process in a way that would support U.S. produced biofuels.
    - Accelerate biofuel adoption through Administration maritime initiatives
    - Communicate rural economic impacts to DOE and USDA leadership
    - Leverage U.S. technical expertise and data in international policy forums
    - Maximize EPA authority to establish marine fuel pathways under the RFS
  - Explore expanding Congressional incentives for maritime biofuels (RFS & tax credits)
  - Protect U.S. biofuel access to EU maritime markets

American Biofuels Maritime Initiative



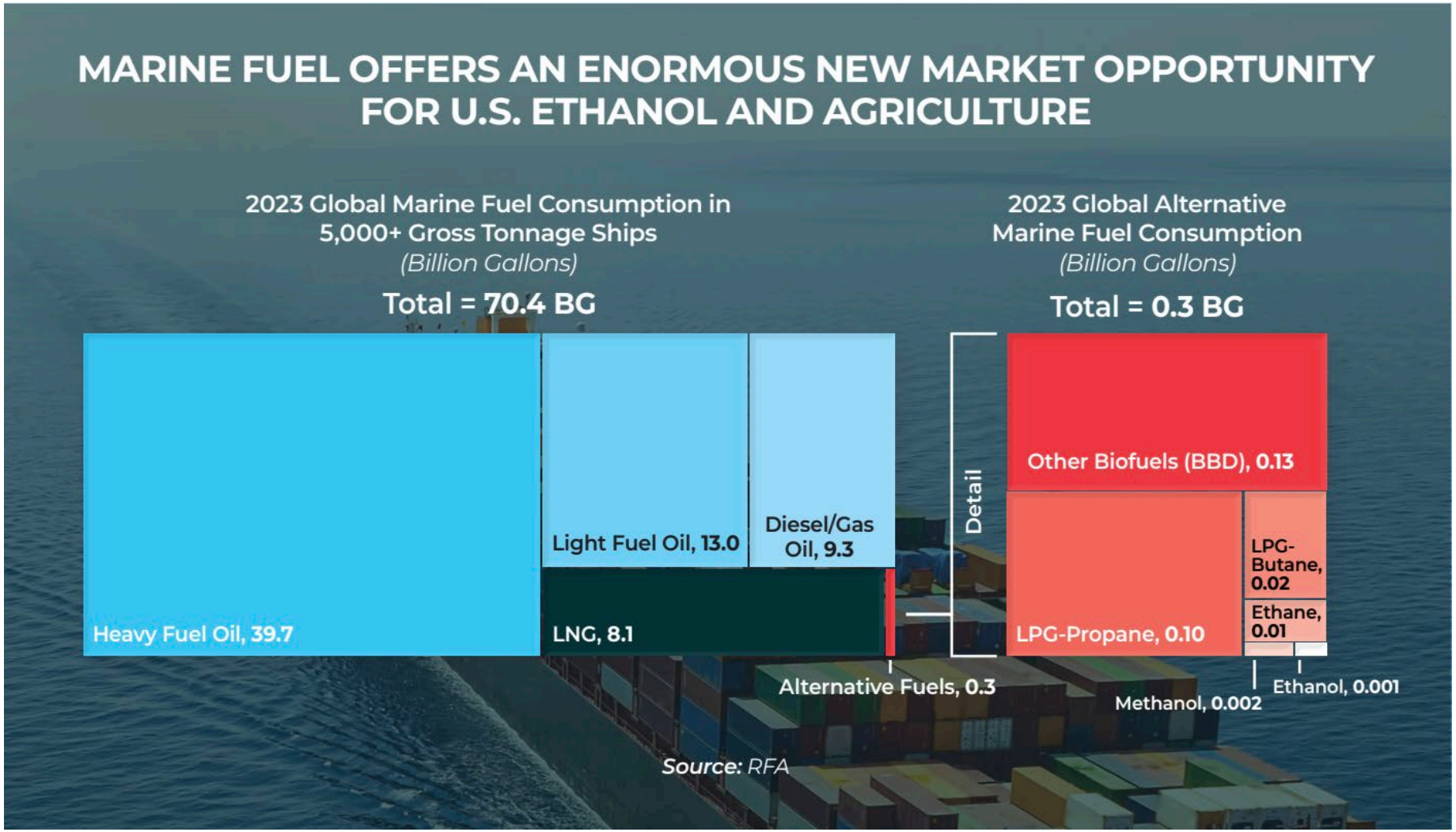
https://biofuelsformaritime.org/

Argonne: Study of U.S. Ethanol as Marine Fuel

- U.S. submitted working paper to IMO on **corn ethanol** carbon intensity in January for review
  - **Estimated CI at ~36 gCO2e/MJ!**
  - No ILUC
  - IMO committee has tentatively accepted the value, but subject to additional review
- **Argonne proposed studies** that lay groundwork for usage
  - Identify and address issues needed before a sea trial is conducted
  - Submitted concept paper for 2-year study to **DOE-BETO**
    - Port and supply chain requirements, vessel requirements, life cycle analysis, total cost of ownership, and sea trial advisory
  - Engine testing would be conducted as a companion effort
    - Everllence(MAN), WinGD

RFA
RENEWABLE FUELS ASSOCIATION

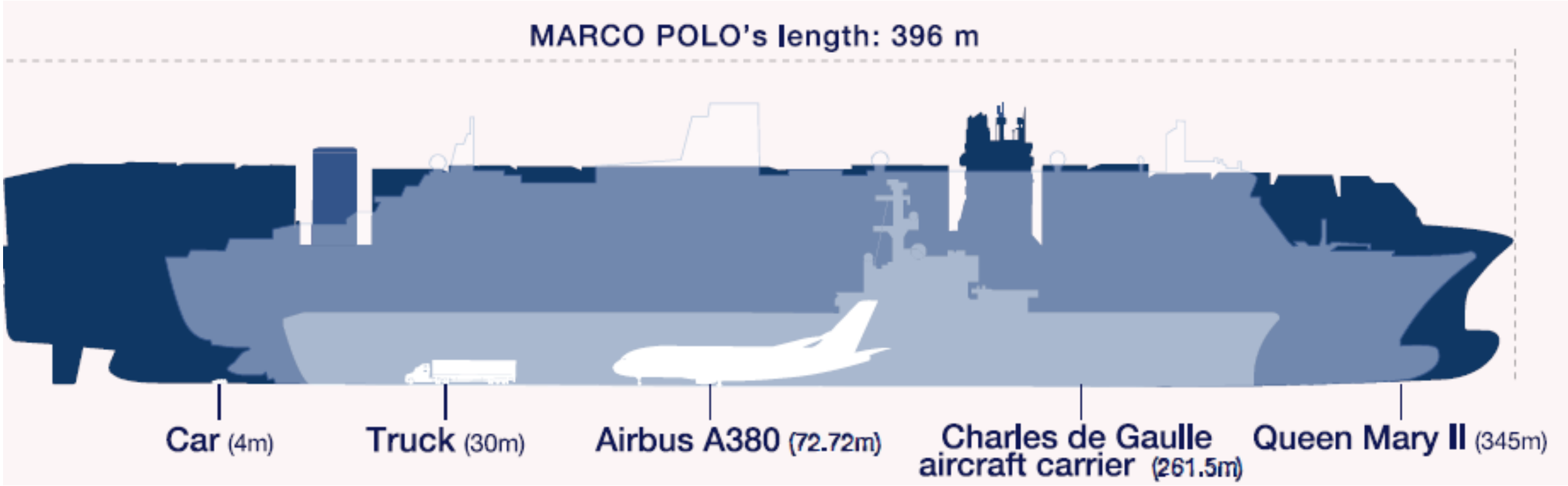
Maritime Opportunity



RFA
RENEWABLE FUELS ASSOCIATION

22.000teu Container Vessel approx. 400m

(Train133km)



© 2026 WinGD

Argonne: Study of U.S. Ethanol as Marine Fuel

- U.S. submitted working paper to IMO on **corn ethanol** carbon intensity in January for review
  - **Estimated CI at ~36 gCO2e/MJ!**
  - No ILUC
  - IMO committee has tentatively accepted the value, but subject to additional review
- **Argonne proposed studies** that lay groundwork for usage
  - Identify and address issues needed before a sea trial is conducted
  - Submitted concept paper for 2-year study to **DOE-BETO**
    - Port and supply chain requirements, vessel requirements, life cycle analysis, total cost of ownership, and sea trial advisory
  - Engine testing would be conducted as a companion effort
    - Everllence(MAN), WinGD

RFA
RENEWABLE FUELS ASSOCIATION

SAF – Sustainable/Synthetic

- Airlines have been under significant pressure to reduce GHG emissions associated with aviation:
  - Aviation sector responsible for 10% of U.S. transportation GHG emissions.
  - Sector consumes **24-27 billion gals.** of petroleum-based jet fuel annually.
- Low-carbon, renewable jet fuel (SAF) is seen as the most feasible solution for reducing emissions.
- Ethanol is an attractive candidate for SAF:
  - Today's ethanol offers 40-50% reduction in GHG emissions vs. gasoline.
  - Established production assets and infrastructure.
  - Ethanol-to-jet fuel technology is being proven at commercial scale.

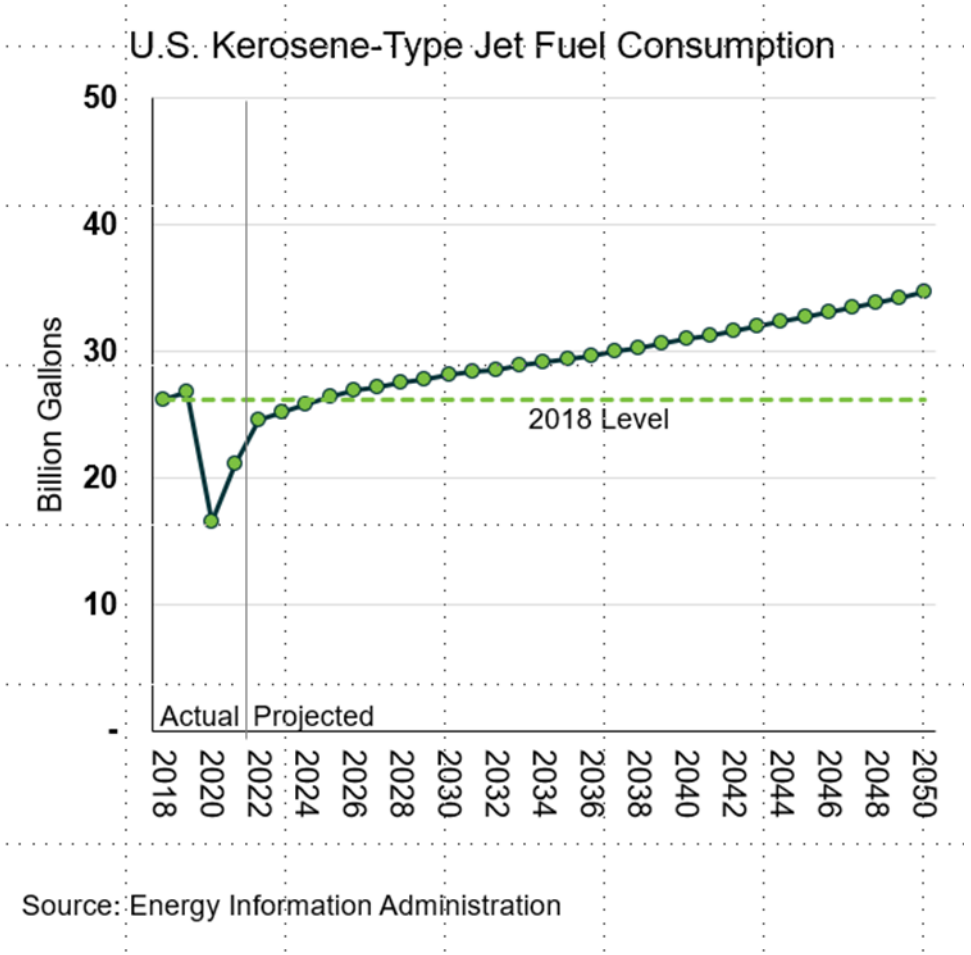
© 2025 Renewable Fuels Association. All rights reserved.

Ethanol & SAF — Current Landscape

- Several **U.S. ATJ projects announced or advancing**.
- Ethanol can qualify with **efficiency gains, CCS, and improved farm practices**.
- SAF represents a **major potential demand source for ethanol and corn**.
- **Policy design will determine ethanol's role** in the SAF market.

RFA
RENEWABLE FUELS ASSOCIATION

How Big is the Jet Fuel Market?

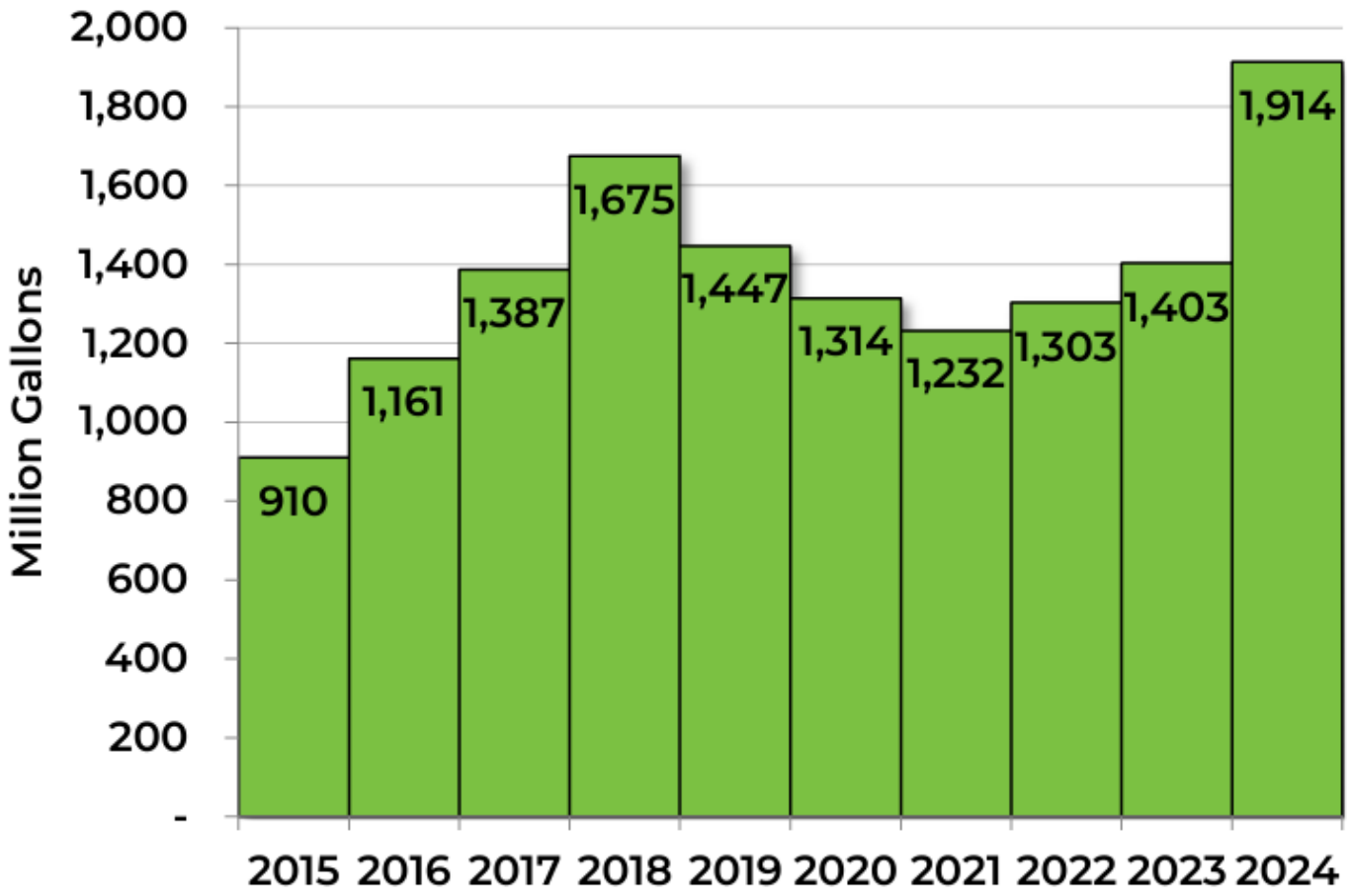


Source: Energy Information Administration

- U.S. demand expected to hit 30BG by 2035 and 35BG by 2050.
- SAF typically blended at a 50:50 ratio with kerosene-type jet fuel:
  - Equivalent to 15BG of theoretical SAF demand by 2035
  - 1 gallon of SAF requires 1.6-1.7 gallons of ethanol (due to dehydration/oxygen removal)
- To meet HALF of the SAF Grand Challenge target of 2030, roughly **2.4BG of ethanol** would be needed.

© 2025 Renewable Fuels Association. All rights reserved.

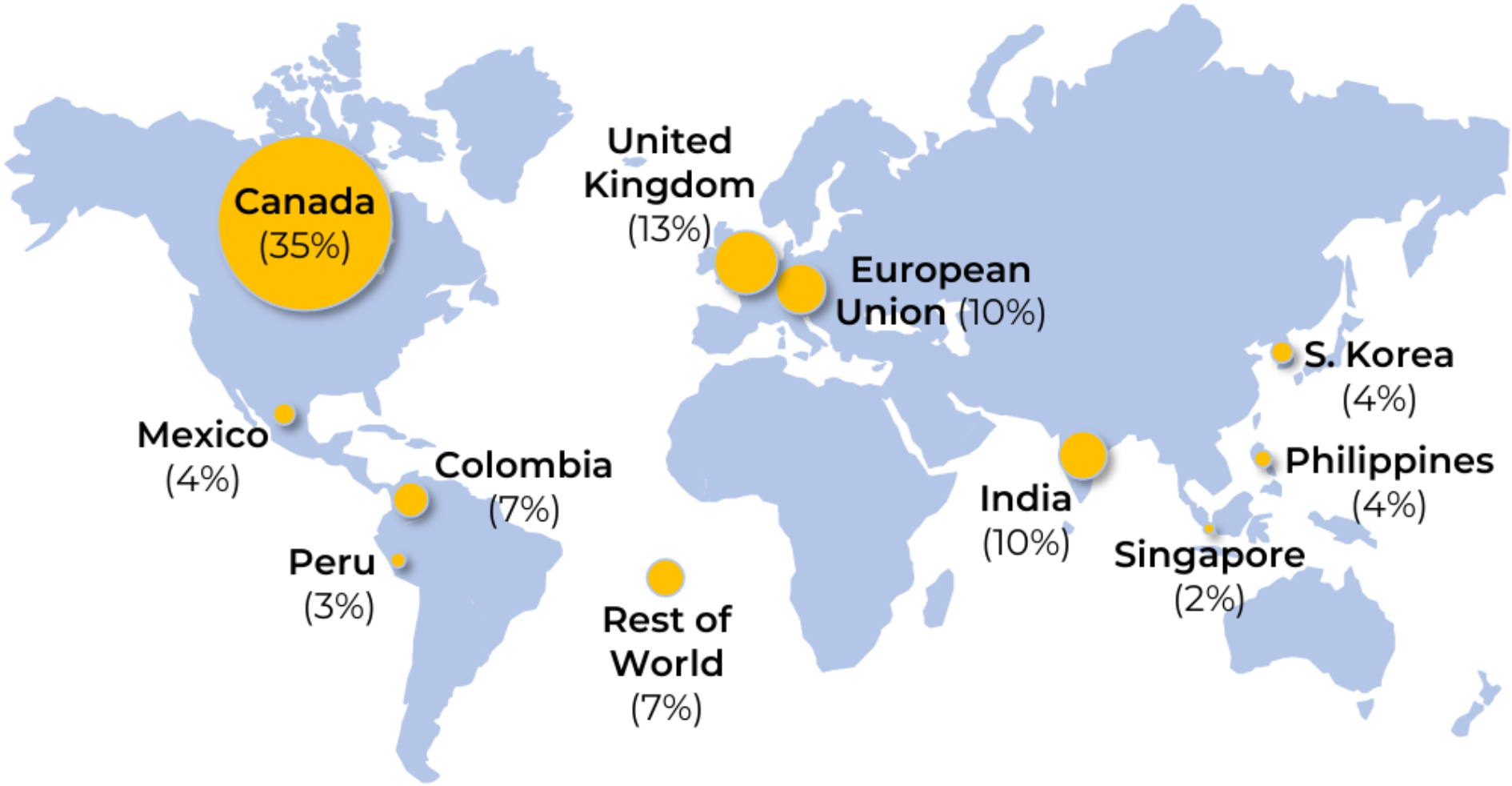
Ethanol Exports – 12% of production



U.S. ethanol exports surged to 1.91 billion gallons in 2024, a record by far. Shipments not only **jumped 510 million gallons from 2023** but also **topped the previous record by more than 200 million gallons.** American-made ethanol was **exported to 80 countries** on all six inhabited continents.

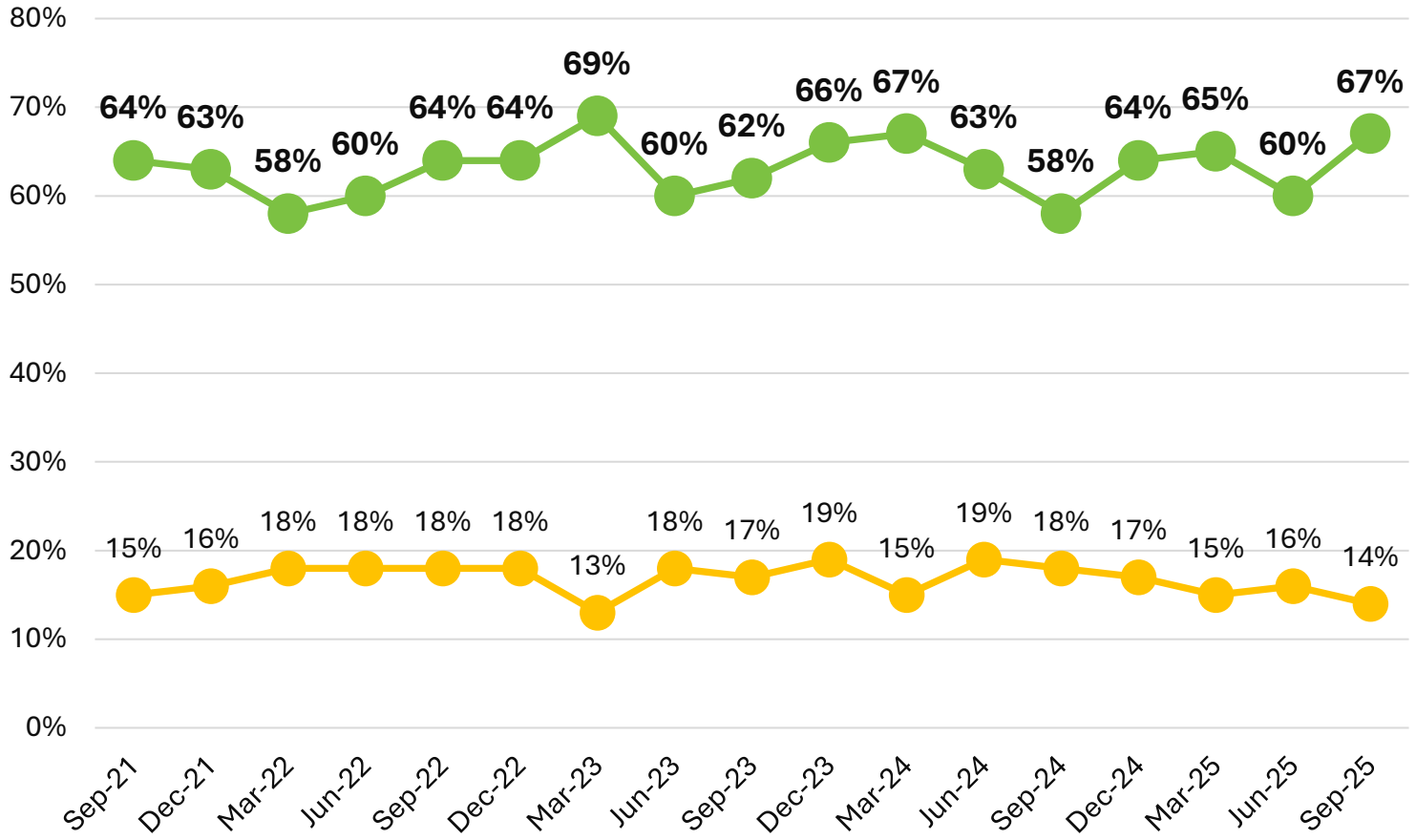
RFA
RENEWABLE FUELS ASSOCIATION

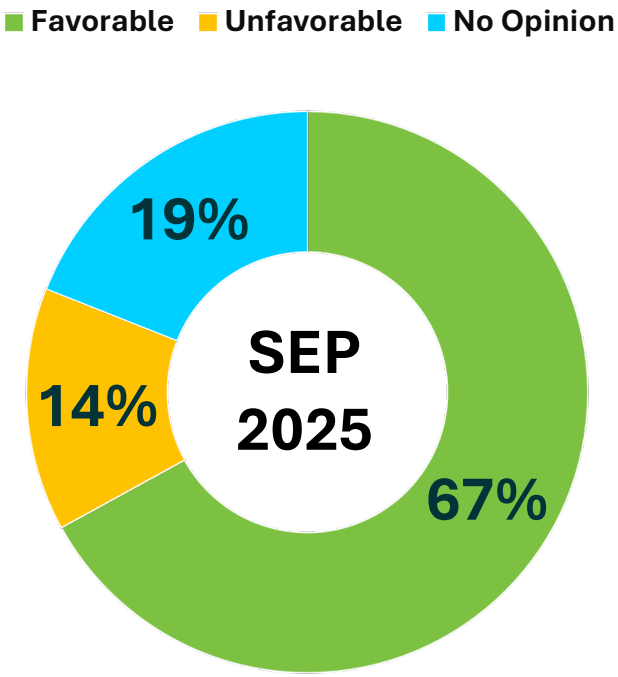
Ethanol Exports by Market



RFA
RENEWABLE FUELS ASSOCIATION

Ethanol's Overall Favorability

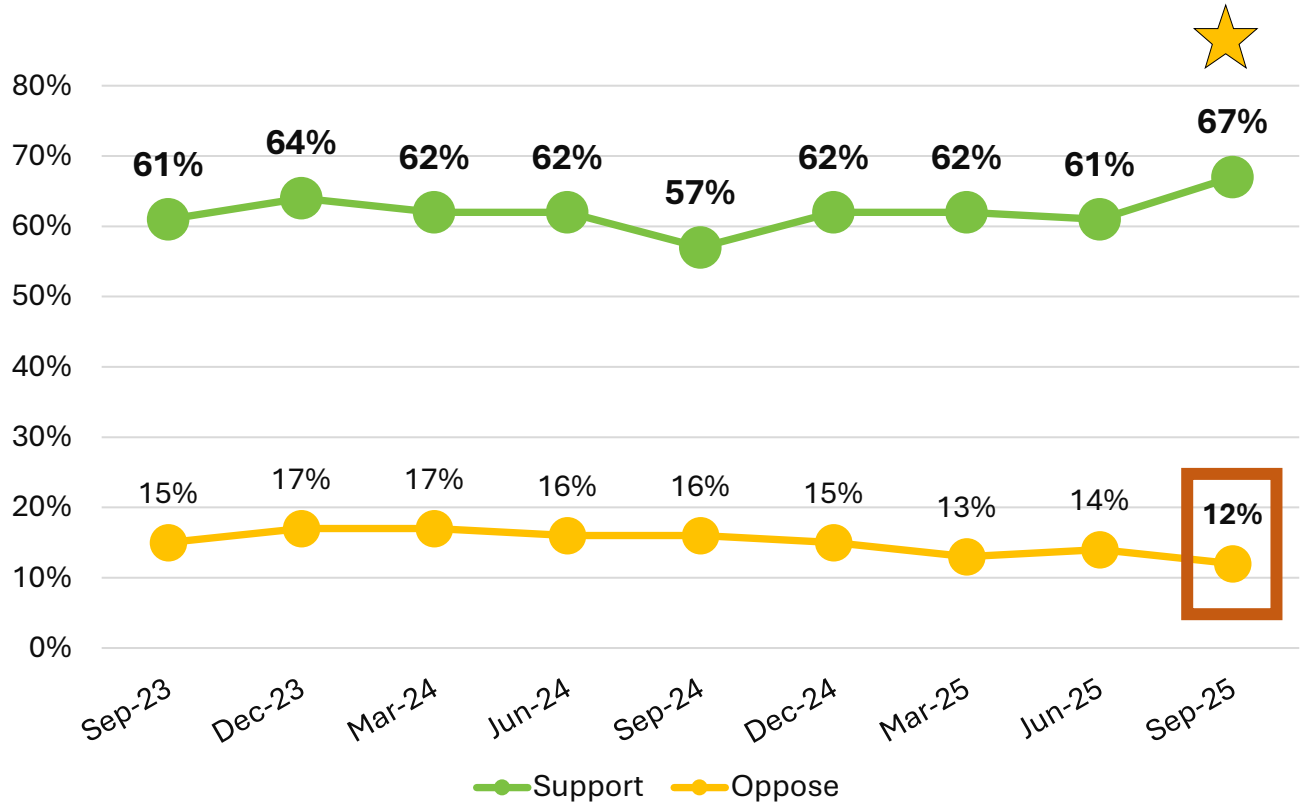




RFA
RENEWABLE FUELS ASSOCIATION

Support for Year-Round E15 Legislation

Nationwide Consumer and Fuel Retailer Choice Act

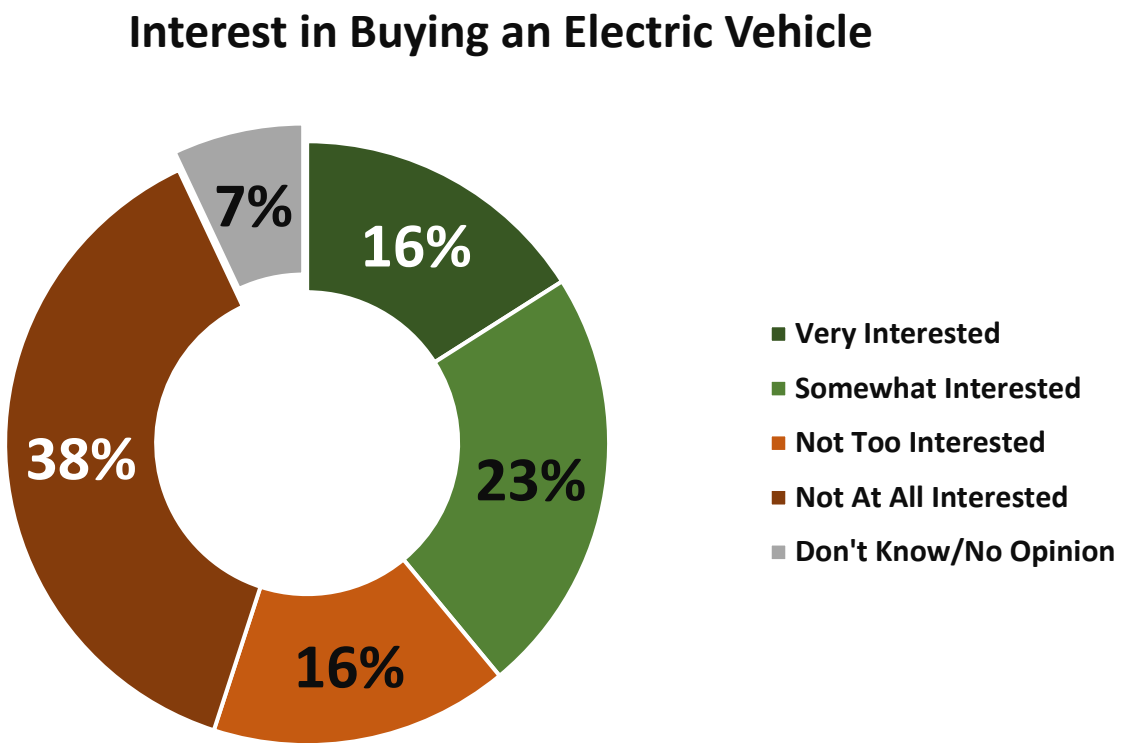


RFA
RENEWABLE FUELS ASSOCIATION

Electric Vehicle Policies

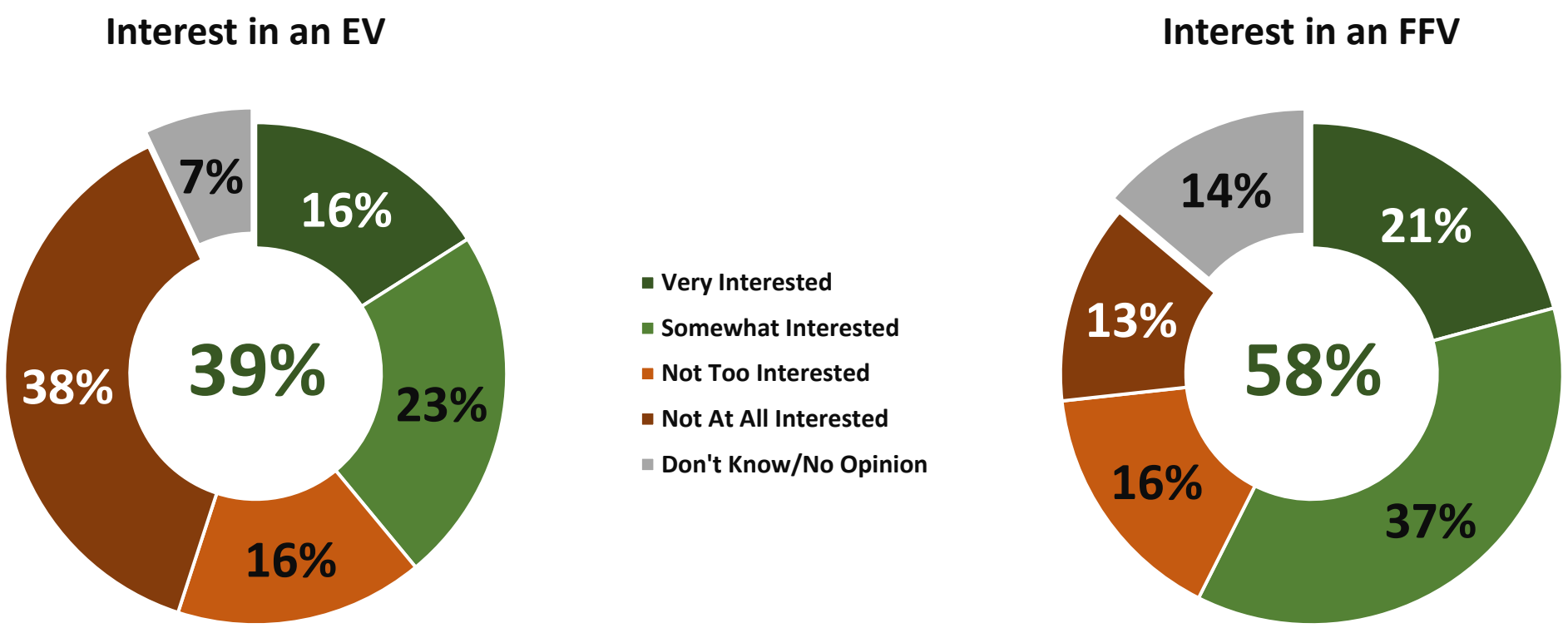
65% oppose
banning vehicles with liquid-fuel engines

67% oppose
mandating buyers purchase EVs



RFA
RENEWABLE FUELS ASSOCIATION

Upcoming Vehicle Purchase/Lease



Energy Independence

88% It is important for America to be energy independent

67% America should reduce reliance on foreign energy sources

74% Renewable fuels like ethanol are important to energy independence

RFA
RENEWABLE FUELS ASSOCIATION

Ethanol's Bottom Line…

- We are NOT done growing in the light duty gas tank.
- BUT, ethanol has the potential to replace petroleum and petroleum products across several product categories.
  - Potential markets represent more than 200 billion total gallons.
  - Market alternatives for ethanol will need time to develop.
  - **Demand will be driven by sustainability and GHG criteria.**
- Ethanol cannot and will not be a complete replacement, but the market potential is there.
- The potential of a diminishing light duty fuel market is not a "sky is falling" scenario, nor the end of US corn ethanol's story...

© 2025 Renewable Fuels Association. All rights reserved.

Thank You!

Jared Mullendore
Renewable Fuels Association
jmullendore@ethanolrfa.org

www.ethanolrfa.org
(773) 895-2933

RFA
RENEWABLE FUELS ASSOCIATION