The Road to Net-Zero - U.S. Corn Ethanol Policy Support and Carbon Reduction Updates

June 26, 2024

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A global network of professionals building worldwide demand and developing markets for U.S. grains and ethanol.

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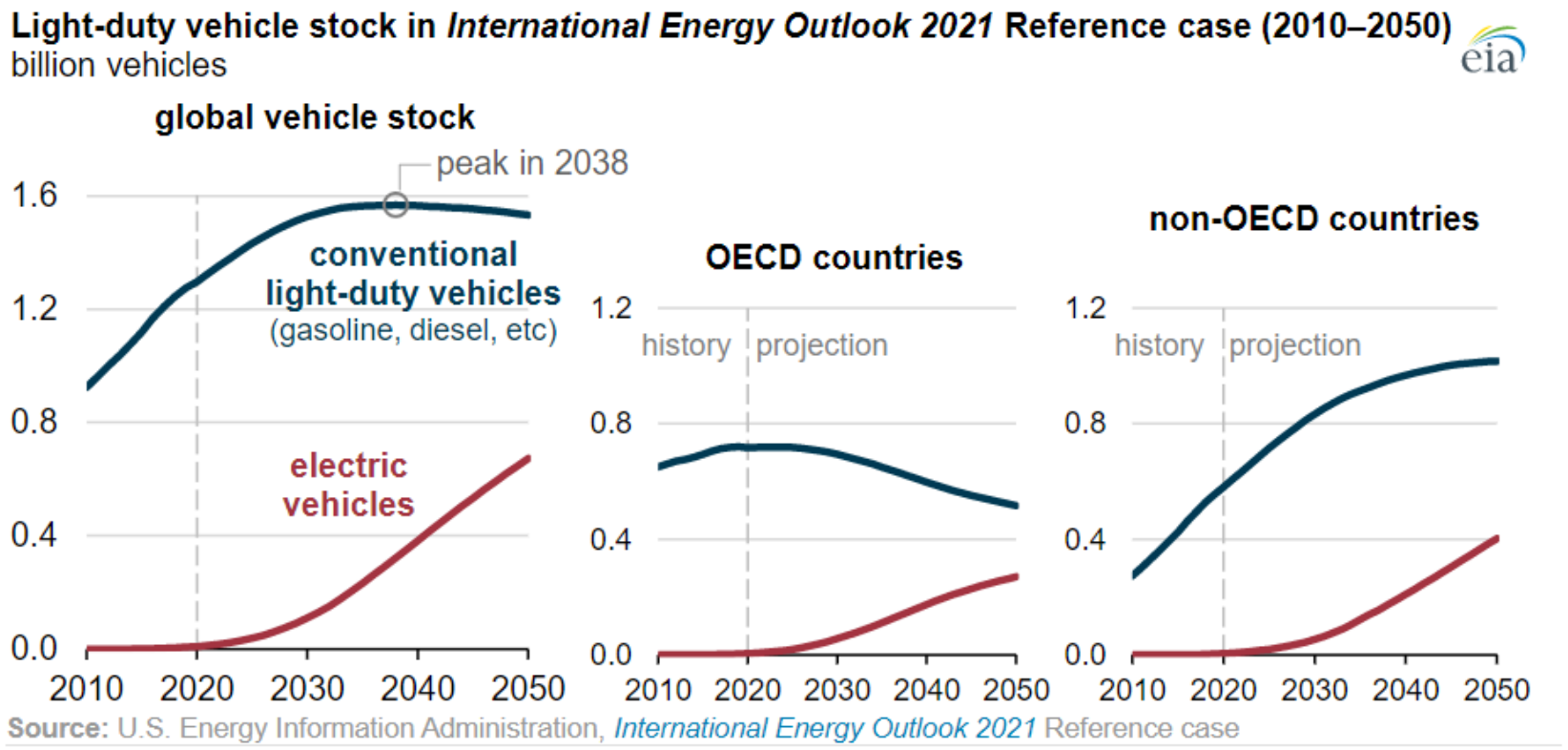
Internal Combustion Engines will continue to dominate the market

- Global light-duty vehicle fleet contained 1.31 billion vehicles in 2020
- EIA projects fleet will grow to 2.21 billion vehicles by 2050
- Internal combustion engines still represent 70% of vehicles in 2050



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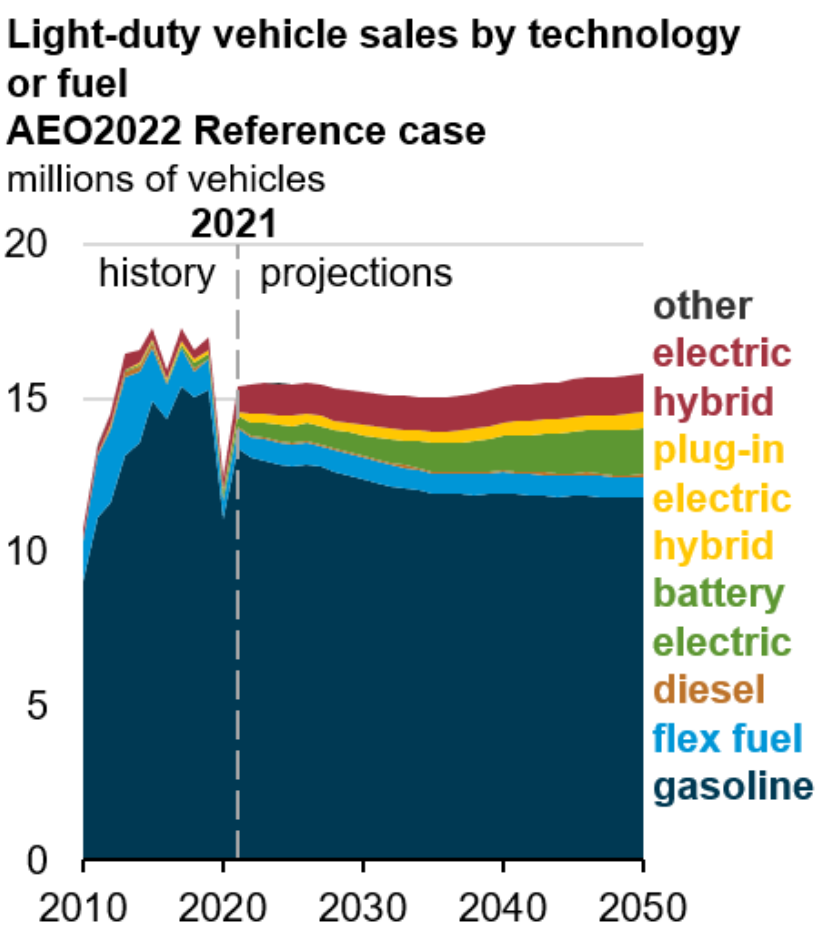
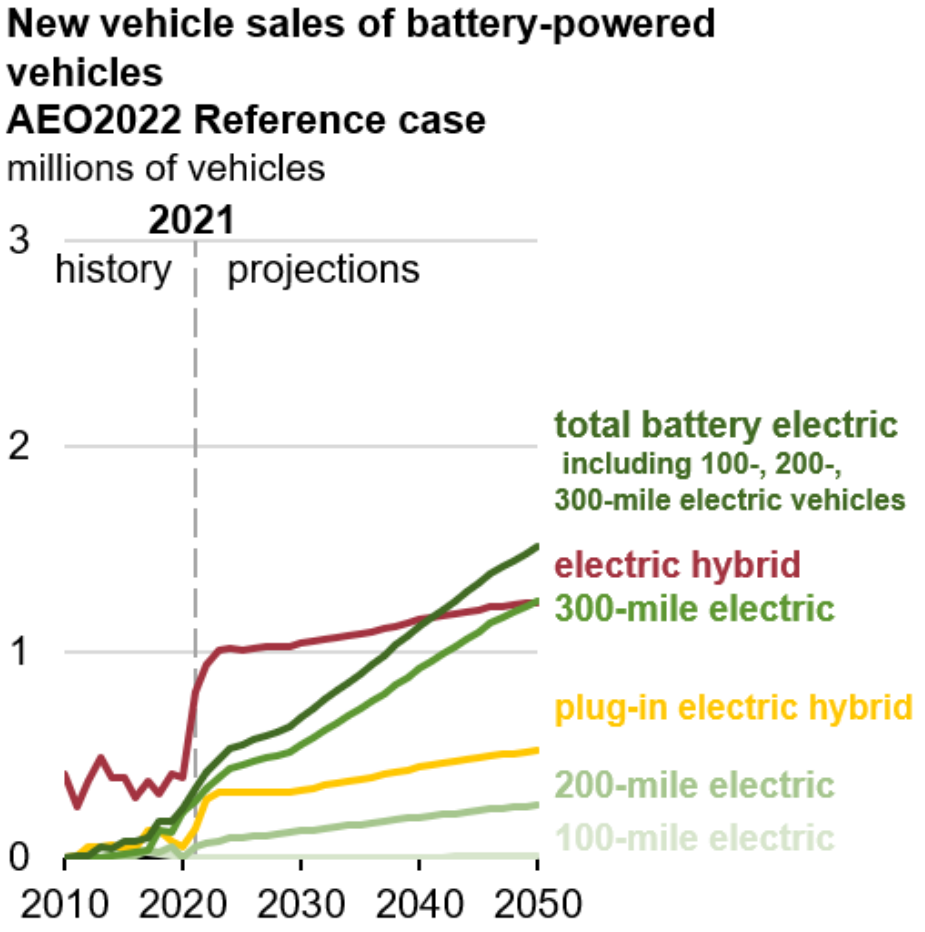
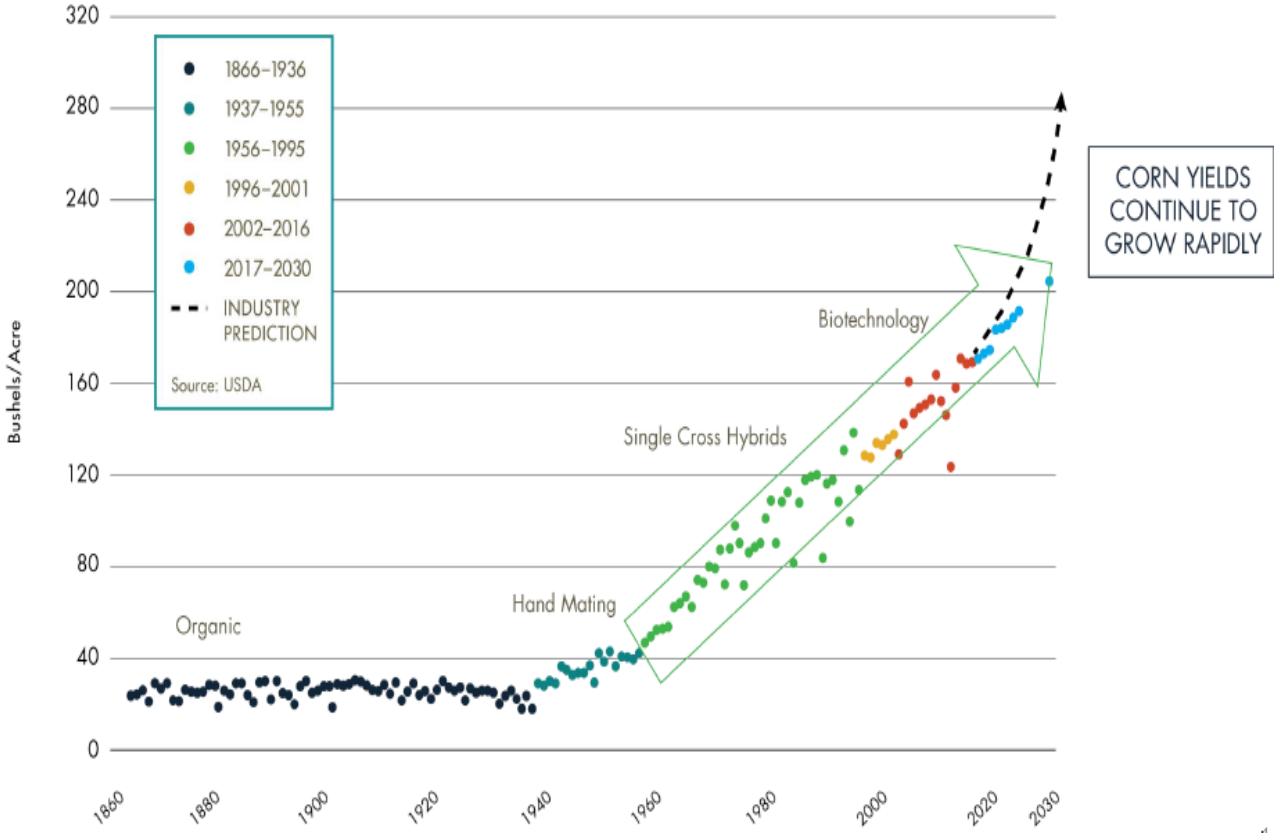
Even in 2050, majority of U.S. cars will run on gasoline.





Source: U.S. Energy Information Administration –Annual Energy Outlook 2022

US able to supplement domestic production



CORN YIELDS CONTINUE TO GROW RAPIDLY

Approximately 10% of global bioethanol production enters global markets

U.S. dedicated 95 million acres to corn or 38.4 million hectares in 2023

- 37% of production feeds livestock
- 35% of production processed for bioethanol with coproduction of high-protein feed [dried distillers grains (DDGS)]
- Crop yields are expected to increase 1-2% per year
- Exceptional increase in residue harvesting technology expected

Source: U.S. Department of Energy 2023 Billion-Ton Report

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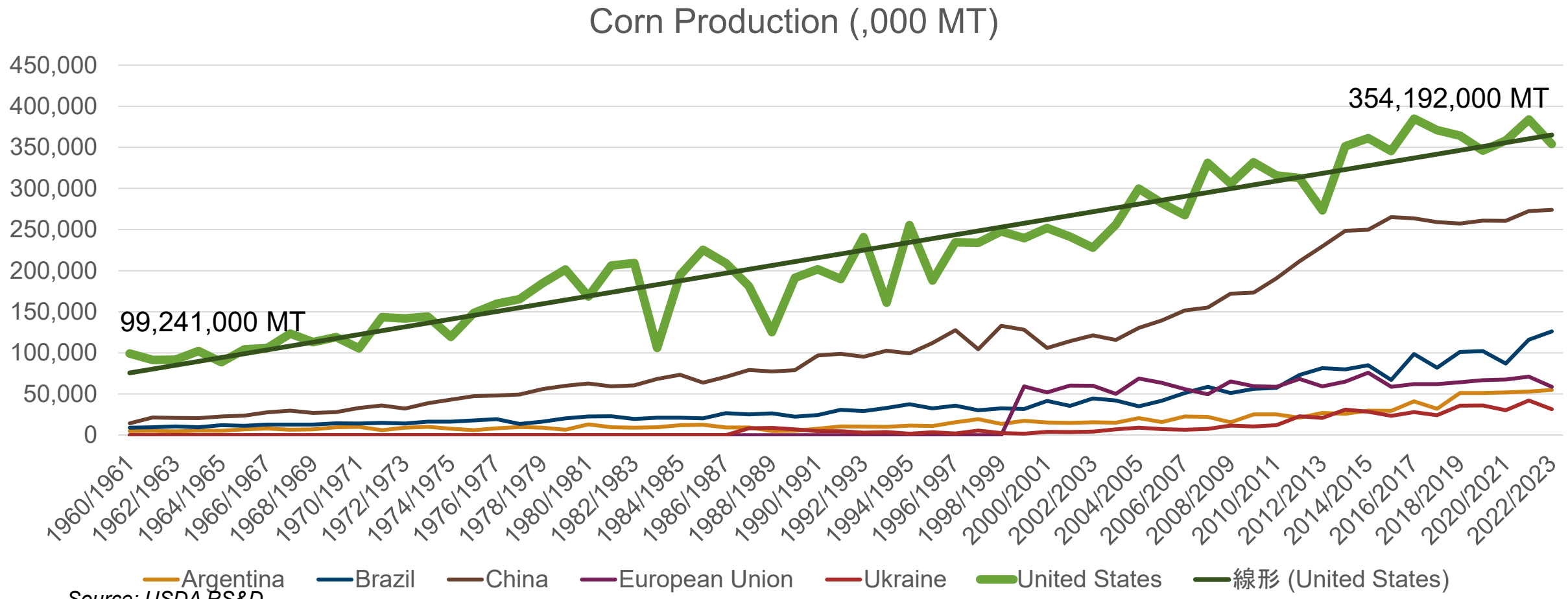
Corn Production Throughout History



Source: USDA PS&D

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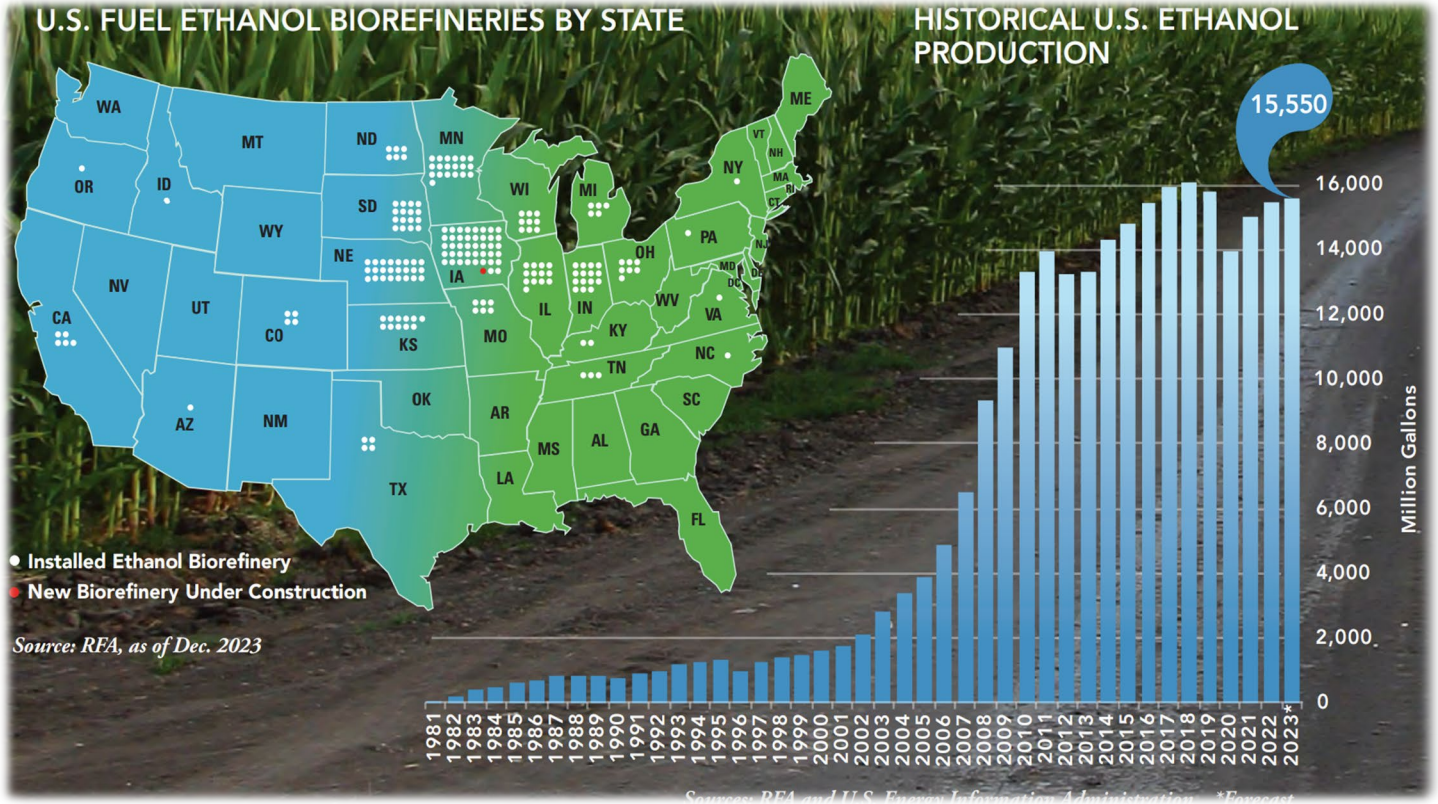
U.S. produces over 15 billion gallons of bioethanol each year yet U.S. excess capacity at over 2 billion gallons, or nearly 9 billion liters



U.S. Fuel Ethanol Plant Production Capacity as of January 1, 2023

PAD District	Number of Plants	Production Capacity (MMgal/year)	Production Capacity (Mb/d)
PADD 1	3	247	16
PADD 2	173	16,648	1,086
PADD 3	3	380	25
PADD 4	4	220	14
PADD 5	4	168	11
U.S. Total	**187**	**17,663**	**1,152**

Fuel Ethanol Production Capacity is intended to measure estimated gallons of fuel alcohol that a plant is capable of producing over a period of one year (365 consecutive days) starting on the first day of each report month.

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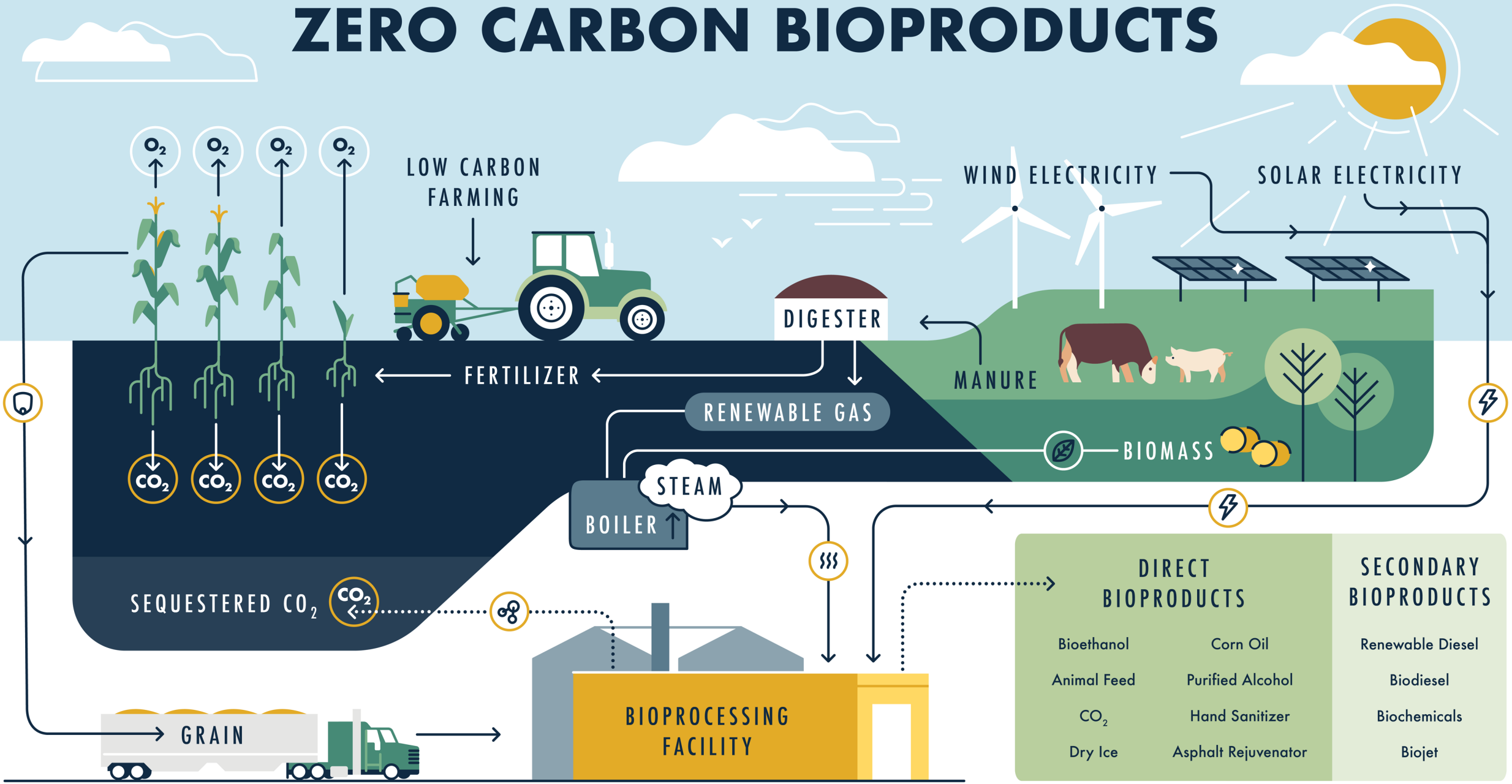
ZERO CARBON BIOPRODUCTS



DIRECT BIOPRODUCTS

- Bioethanol
- Animal Feed
- CO_2
- Dry Ice
- Corn Oil
- Purified Alcohol
- Hand Sanitizer
- Asphalt Rejuvenator

SECONDARY BIOPRODUCTS

- Renewable Diesel
- Biodiesel
- Biochemicals
- Biojet

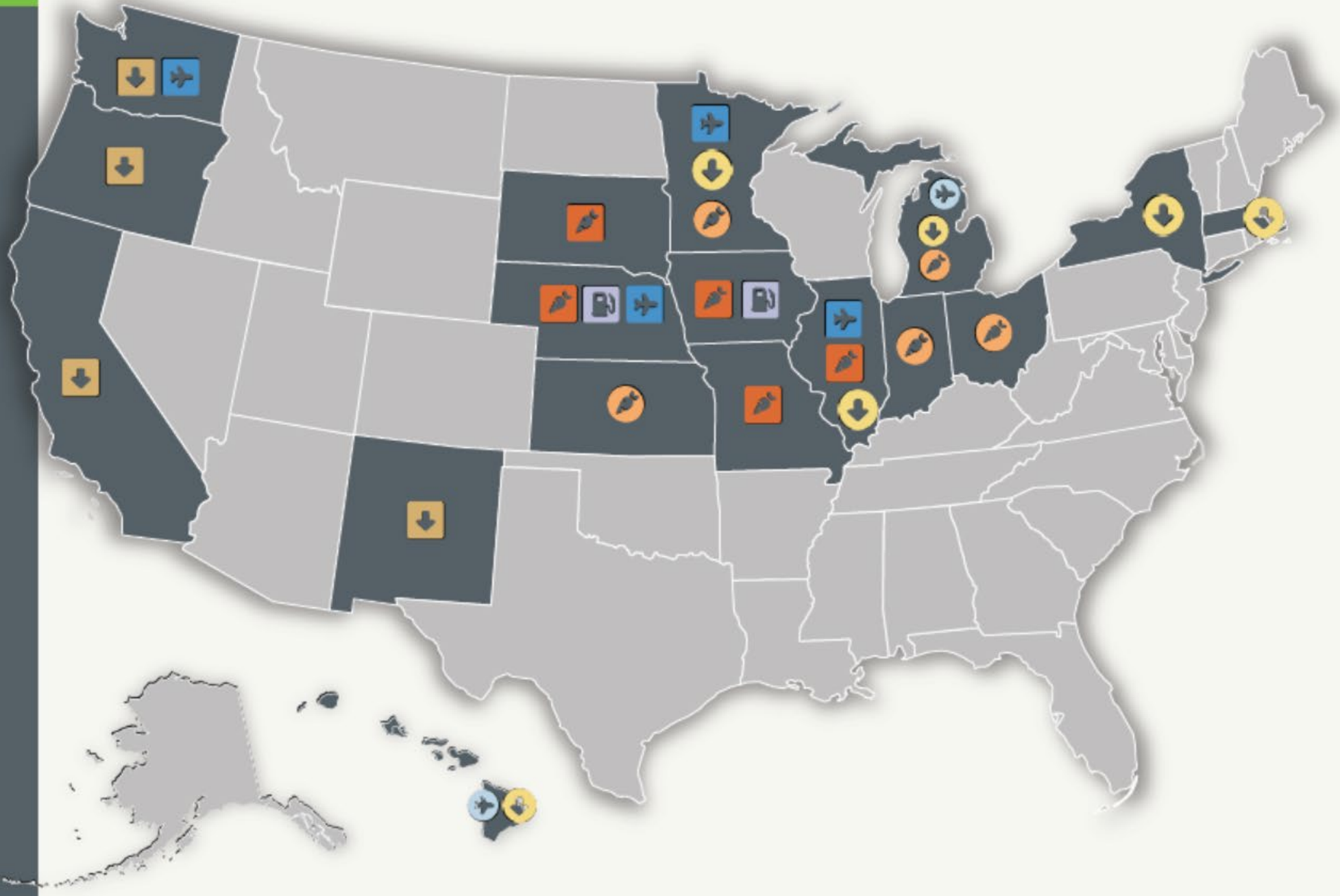
2024 State Activity

LCFS
- Existing
- Considering

E15 INCENTIVE
- Enacted
- Considering

E15 STANDARD
- Existing
- Considering

SAF INCENTIVE
- Enacted
- Considering



State Activity

Higher Blend Tax Incentives

- Iowa - $0.09/gallon for E15
- Missouri - $0.05/gallon for E15 and higher blends
- Nebraska - $0.05/gal for E15, $0.08/gal for E25+
- Illinois - 10% less sales tax for E15 & 100% for E85
- Under discussion
  - ✓ Ohio - $0.05/gallon for E15 and higher blends
  - ✓ Indiana - $0.05/gallon for E15 and higher blends
  - ✓ Michigan – $0.05/gal for E15, $0.085/gal for E85
  - ✓ Minnesota - $0.05/gallon for E15 and higher blends
  - ✓ South Dakota - $0.05/gallons for E15

Low Carbon Fuel Standards

- CA, OR, WA – in place
- IL, MI, MN, MA, NM, NY – considering

E15 Fuel Standards

- Iowa and Nebraska

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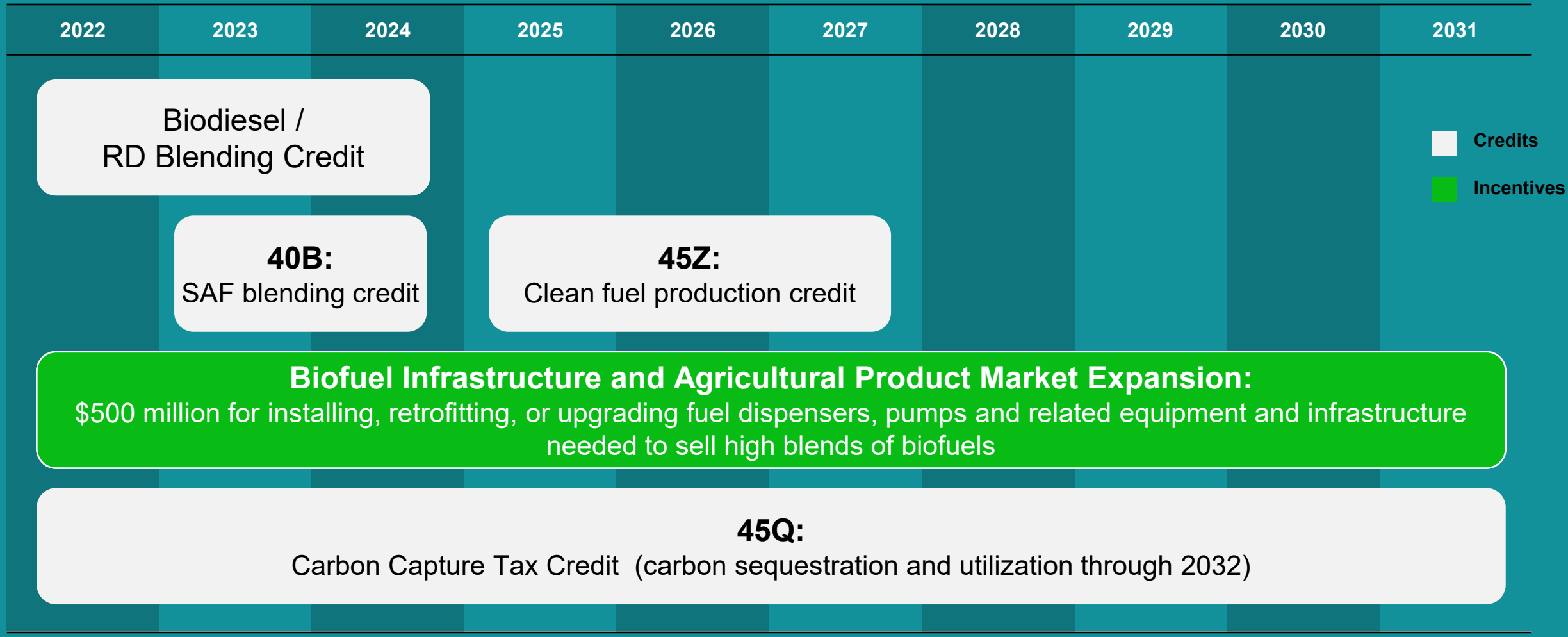
Inflation Reduction Act

Key Biofuels Provisions



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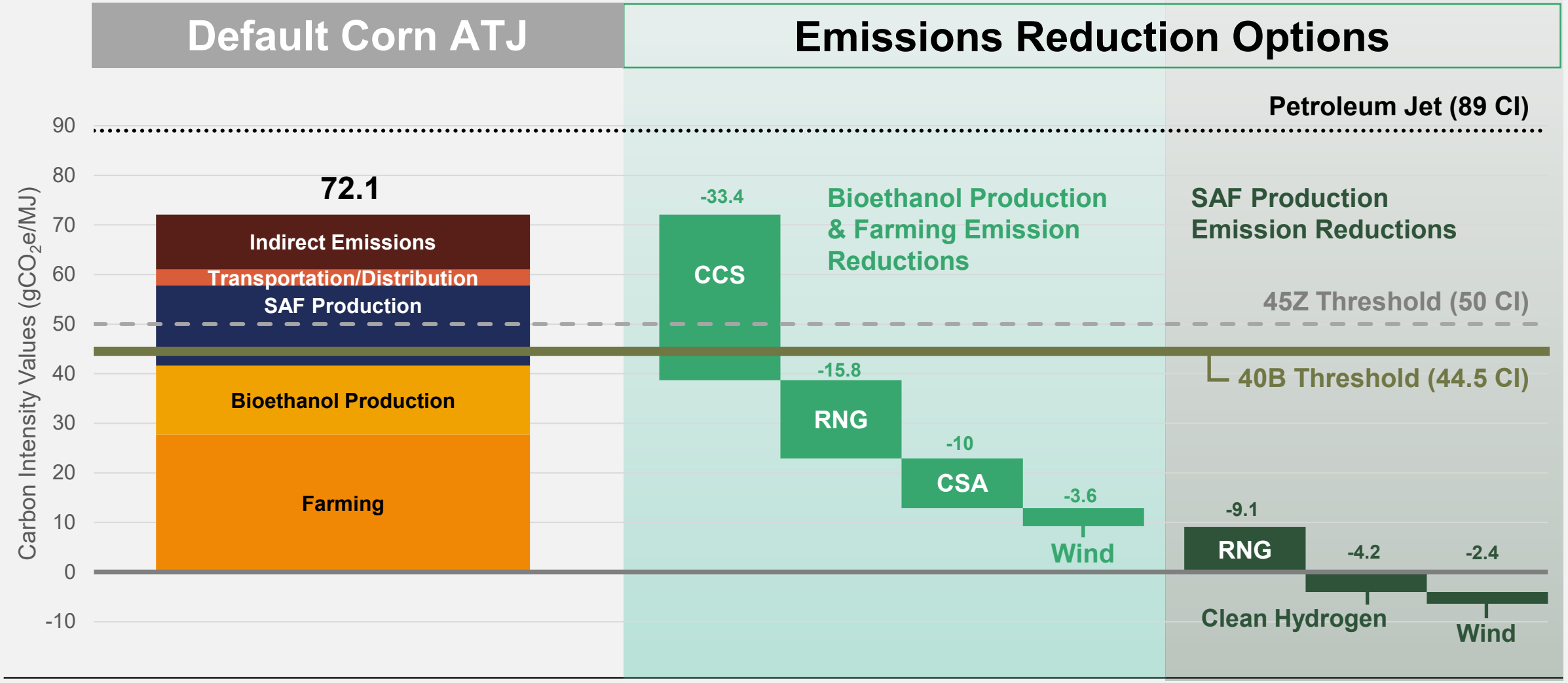
40B GREET Pathway for Corn Ethanol Feedstock



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SOURCE: Department of Energy 40B GREET model (2024)

*The unit of measurement for all carbon intensity (CI) scores is gCO2e/MJ

*To be eligible for 40B tax credit, the fuel's CI must be at least 50% lower than baseline CI of petroleum jet fuel

Policies underpin the growth of biofuels demand

Policies that create incentives for biofuels are expected to continue to spread and become more stringent

BRAZIL

-LCFS

-Plants must meet sustainability criteria, which include targets for the reduction of GHG emissions and low carbon farming practices.

-Current Ethanol Demand: 220 million gallons

COLOMBIA

-CI reduction requirement

-75% baseline average

-Current Ethanol Demand: 180 million gallons

JAPAN

-CI reduction requirement & ISCC PLUS Certification

-55% CI reduction compared to gasoline

-Current Ethanol Demand: 218 million gallons

EUROPEAN UNION

-CI reduction requirement & ISCC EU Certification

- 50% CI reduction requirement for biofuels produced in operations that began production on or before Oct. 5, 2015

60% CI reduction requirement for biofuels produced in operations that began production after Oct. 5, 2015

-Current Ethanol Demand: 400 million gallons

ALBERTA

-CI reduction requirement

-25% CI reduction compared to gasoline

-Current Ethanol Demand: 165 million gallons

BRITISH COLUMBIA

-LCFS

-67% CI reduction compared to gasoline

-Current Ethanol Demand: 125 million gallons

ONTARIO

-CI reduction requirement

-45% CI reduction compared to gasoline

-Current Ethanol Demand: 400 million gallons

QUEBEC

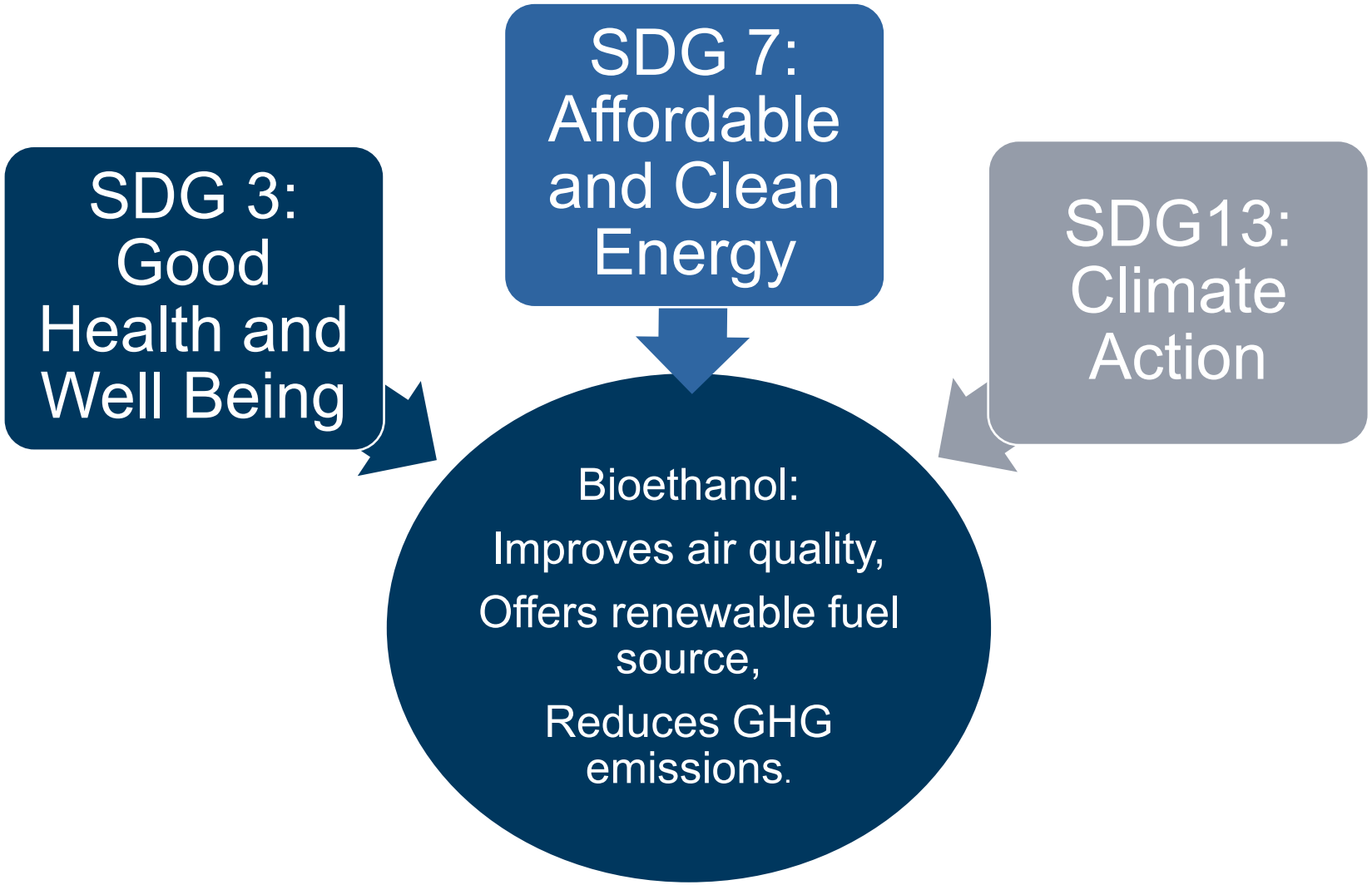
-CI reduction requirement

-45% CI reduction compared to gasoline

-Current Ethanol Demand: 240 million gallons

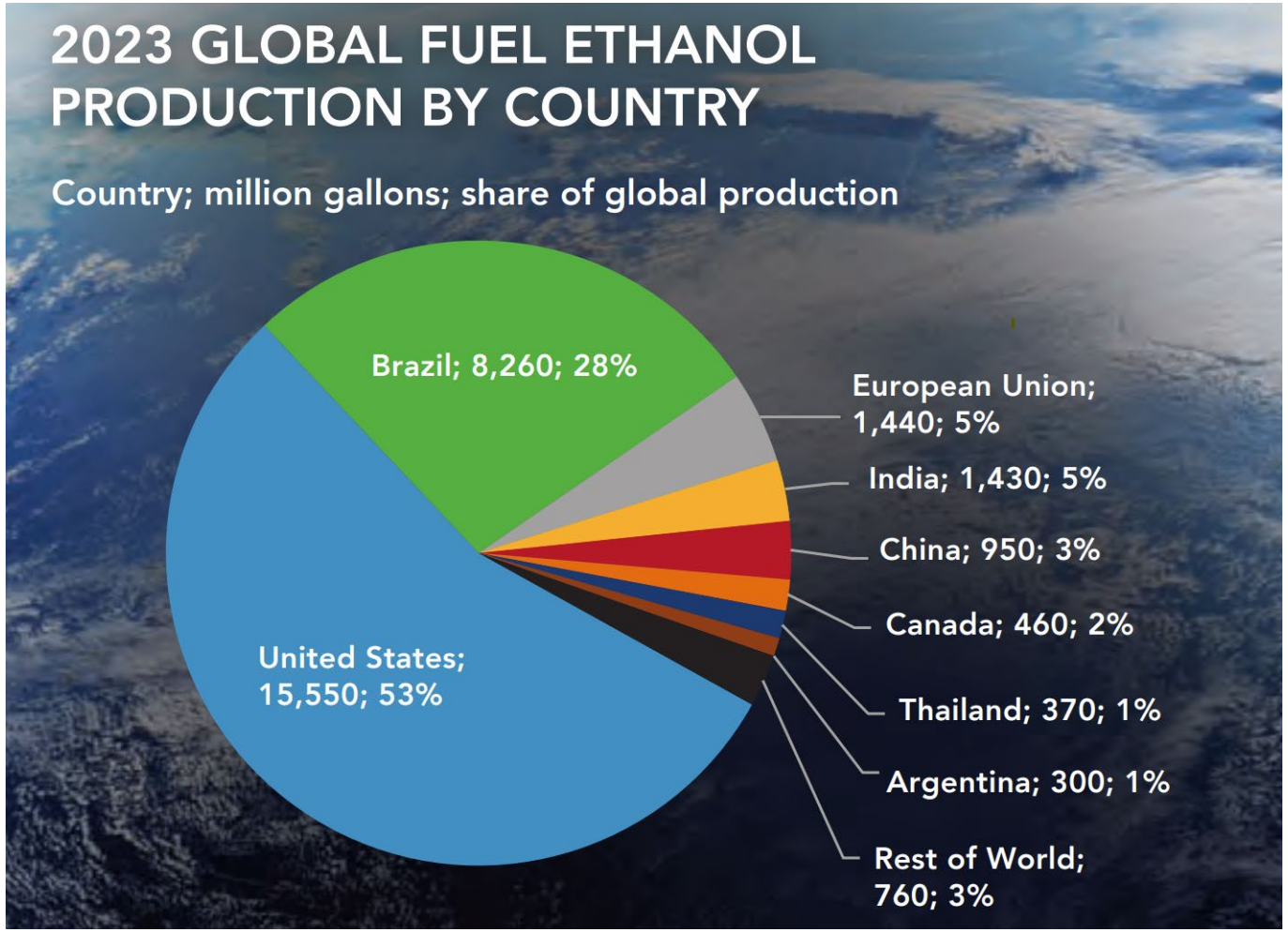
Low Carbon Fuel Standards (LCFS) are an emerging policy framework in key biofuel markets largely because of its emphasis on CIs, which is intended to be technology neutral.

Bioethanol advances the UN sustainable development goals



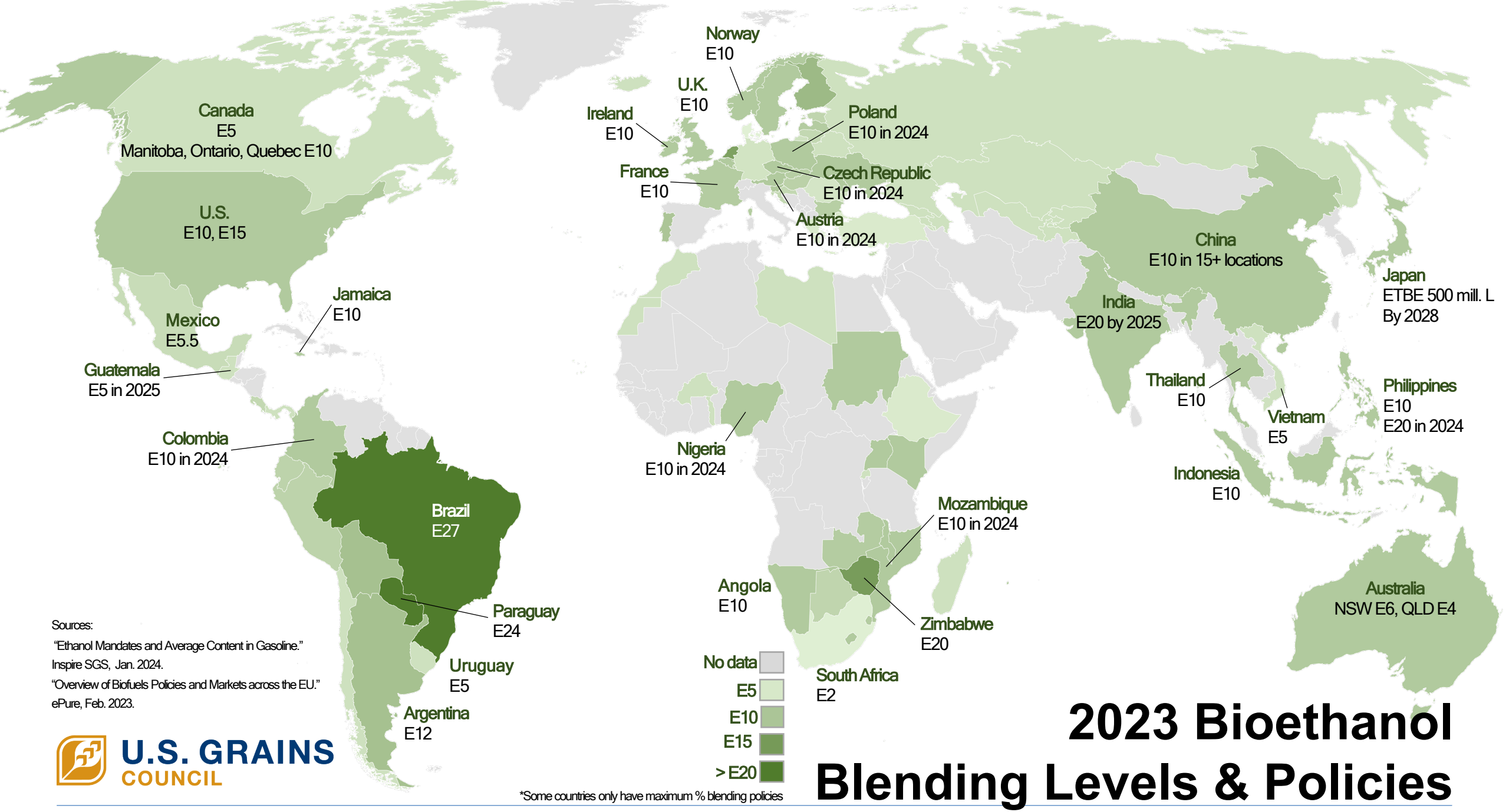
Source: United Nations Sustainable Development Goals

Bioethanol Is a Global Industry



- Global fuel ethanol production hit a record 29.5 billion gallons in 2023, eclipsing its pre-pandemic high-water mark. The United States remained the largest producer, accounting for over half of global output.

- Strong blending policies **drive** uptake and **decrease** emissions.
  - U.S.
  - Brazil
  - India
  - Canada
  - EU



Sources:

"Ethanol Mandates and Average Content in Gasoline." Inspire SGS, Jan. 2024.

"Overview of Biofuels Policies and Markets across the EU." ePure, Feb. 2023.

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*Some countries only have maximum % blending policies

2023 Bioethanol Blending Levels & Policies