



*Feeding the Growth of Renewable Diesel and Jet Fuel Markets –  
The Role of Distiller's Corn Oil*

FUEL ETHANOL LABORATORY CONFERENCE – FELC 2021 – WEDNESDAY OCTOBER 6<sup>TH</sup>  
2021

# Sustainable Solutions for Sustained Growth

Conestoga is investing in the future through the development & implementation of innovative, low-carbon solutions.



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RENEWABLE ALCOHOL



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M I D S T R E A M



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SUSTAINABLE FEEDS



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# What about now...for ethanol?

- Low Carbon fuel, available and logistically feasible NOW
- Continued improvements upstream (farming practices) and downstream (CCS and CCUS) from production assets
- Co-Products that provide sustainability to additional markets
  - Distillers Corn Oil presents a major opportunity
    - Renewable Diesel and Jet markets are major demand sources



# Renewable Diesel and Renewable Jet

- Renewable Diesel (RD)

- GHG emissions reduced appx 80% vs conventional ULSD
- Primary market domestically PADD 5 – mainly CA
- Credit values support economics (LCFS, RINs, BTC)
- Molecularly equivalent to ULSD, 100% drop-in fuel
- Rail and Ship delivery at current, logistically challenging
- Primary feedstock slate
  - Vegetable Oils (not Canola) – including DCO
  - Used Cooking Oils
  - Animal Fats (Tallow, Choice White)
  - Emerging options – woody biomass, camelina, pennycress

- Renewable Jet / Sustainable Aviation Fuel (RJ/SAF)

- GHG emissions reduced appx 80% vs conventional jet fuel
- Global market, though less incentivized then CA LCFS, tax credit proposed at \$1.50 per gallon
- Currently approved for 50% blend rate, moving to 100% in future
- Current primary market CA...LCFS opt in fuel
- Look for more headlines around CORSIA and COP26
- Good long term market because of difficulty to electrify
- Primary feedstock slate
  - Vegetable Oils (not Canola) – including DCO
  - Used Cooking Oils
  - Animal Fats (Tallow, Choice White)
  - Emerging options – woody biomass, camelina, pennycress

# Ethanol's for SAF – Current Issue

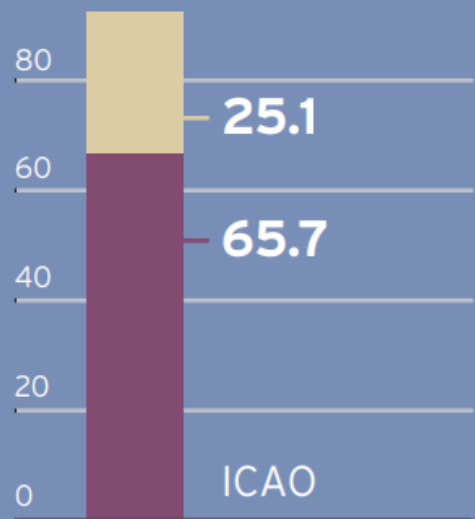
## ETHANOL FOR JET FUEL: ICAO VS GREET



90.8

g/MJ

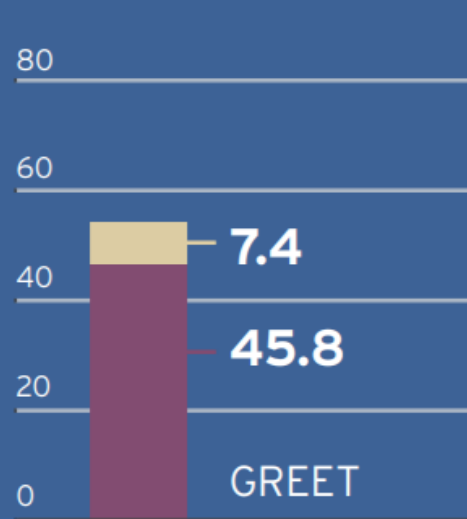
ETHANOL



53.2

g/MJ

ETHANOL



These ratings are based on two main factors:

**INDUCED LAND USE VALUES:** ICAO relies on a land use estimate that is three and a half times higher than GREET and scores significantly higher at 25.1 g/MJ. GREET recognizes the increased efficiencies from U.S. farmers and rates ethanol's land use change at 7.4 g/MJ.

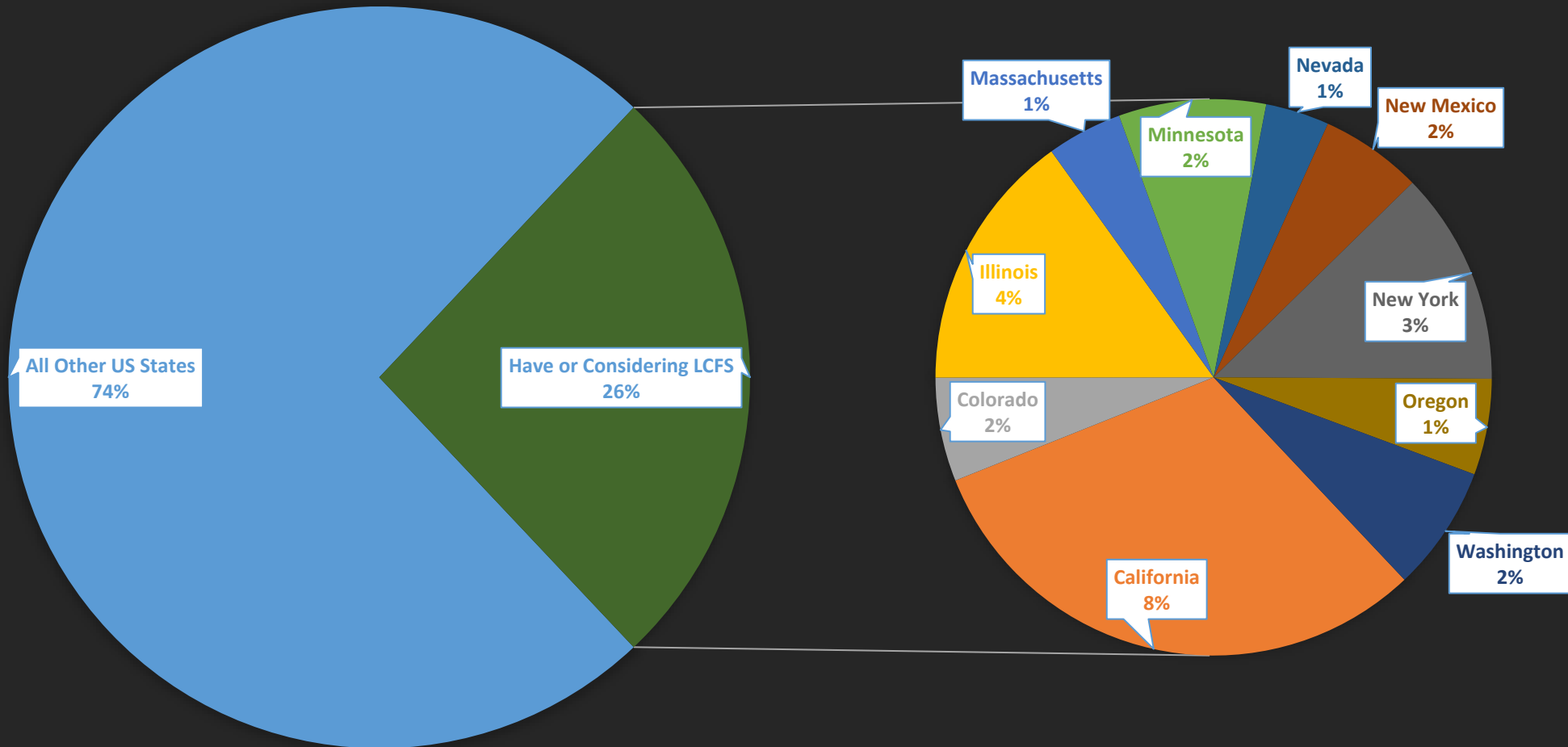
**ATTRIBUTIONAL GHG EMISSIONS:** ICAO bases its corn-grain ethanol on information nearly ten years old in its estimate of direct GHG emissions of 65.7 g/MJ. GREET updates its model annually and rates ethanol as 45.8 g/MJ.

*These differences cause ICAO to rate corn-based ethanol 71% higher than GREET.*

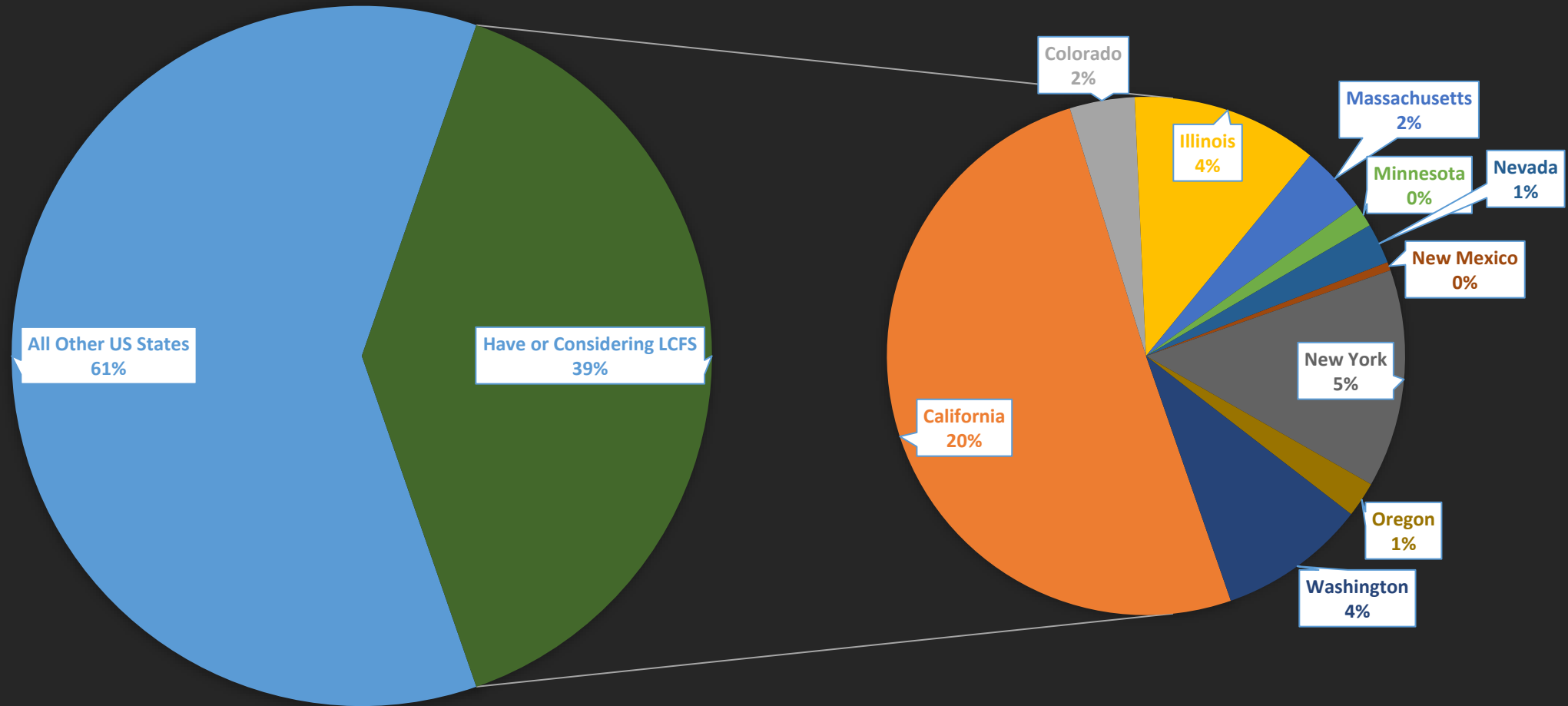
For more information, visit [GrowthEnergy.org](https://growthenergy.org)

# On-Road Diesel Demand

2019 US ON-ROAD DIESEL +38.5 BILLION GALLONS

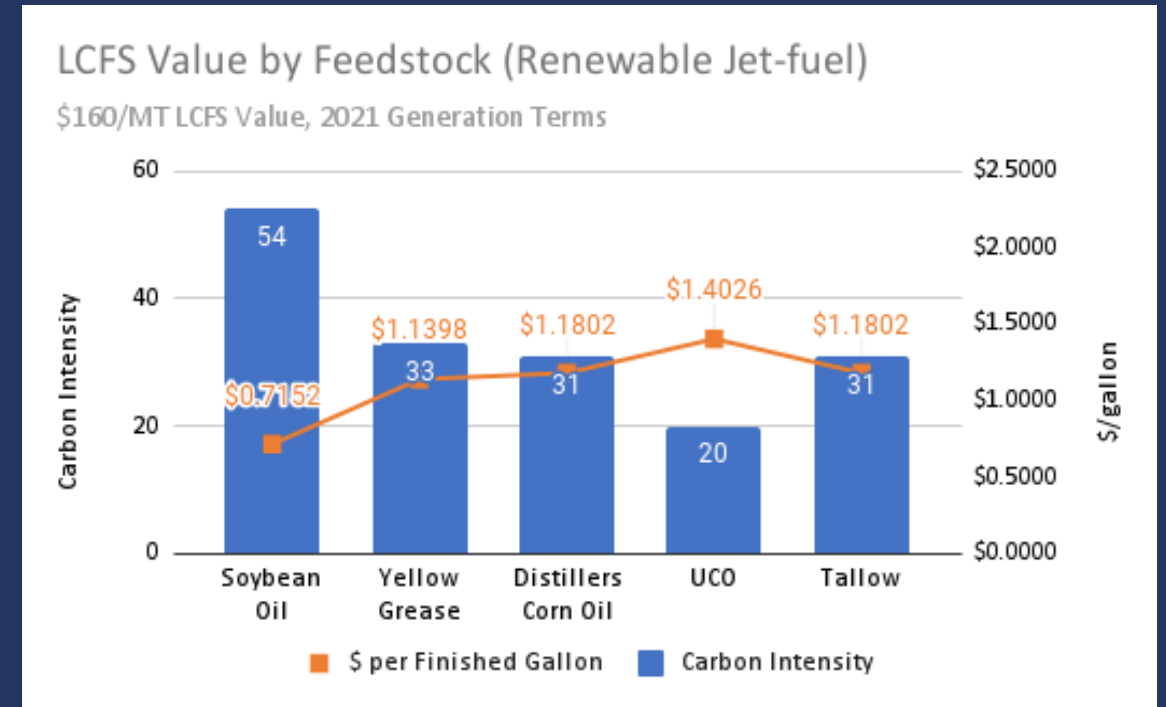
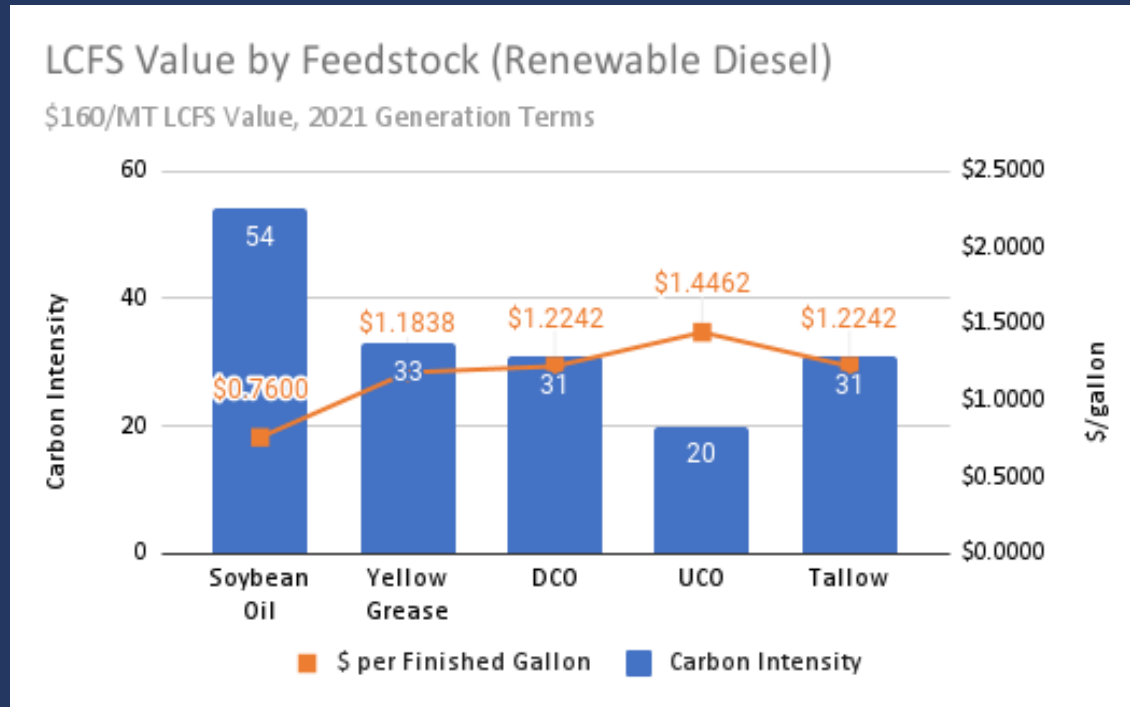


## 2019 US JET FUEL MARKET +23.7 BILLION GALLONS



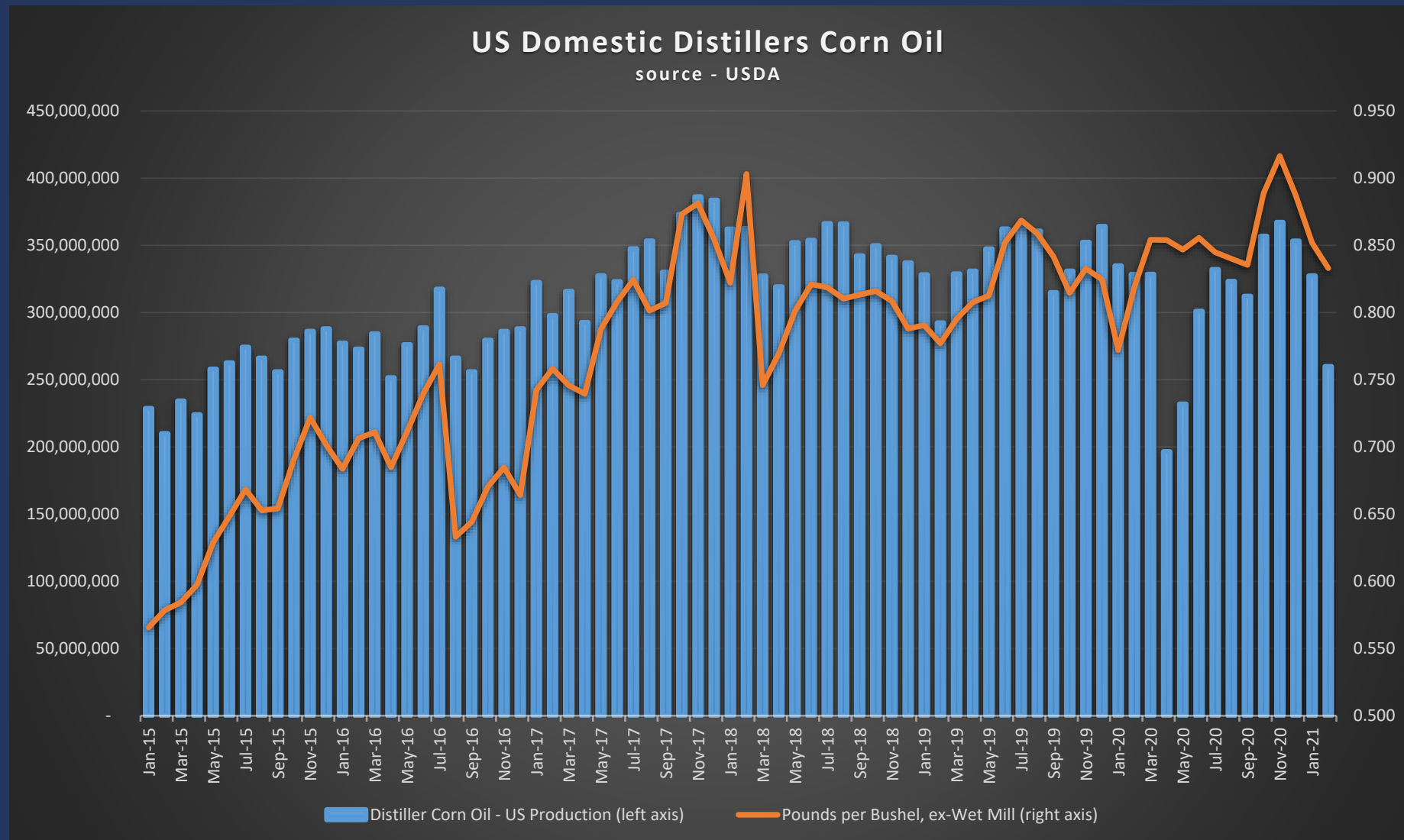
# Carbon Value by Feedstock

Current LCFS values of \$160 per MT of Carbon create a +\$0.06 per pound carbon premium for DCO use in renewables jet or diesel production, relative to soybean oil.



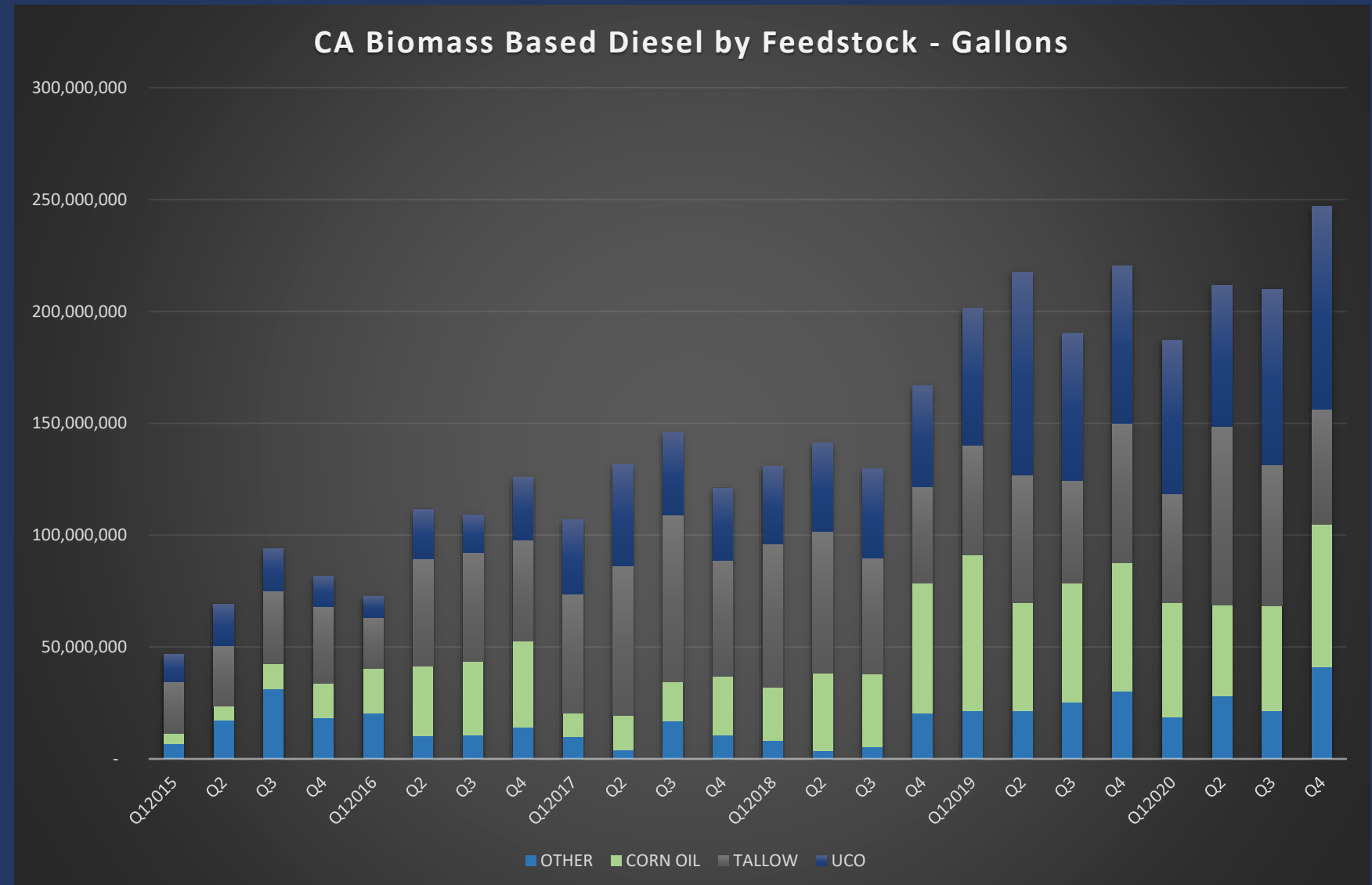
# US Distillers Corn Oil Production

- 2020 DCO appx 3.76b lbs.
- 2020 DCO avg. 0.851 lbs./bu
- 2019 DCO appx 4.07b lbs.
- 2019 DCO avg. 0.823 lbs./bu

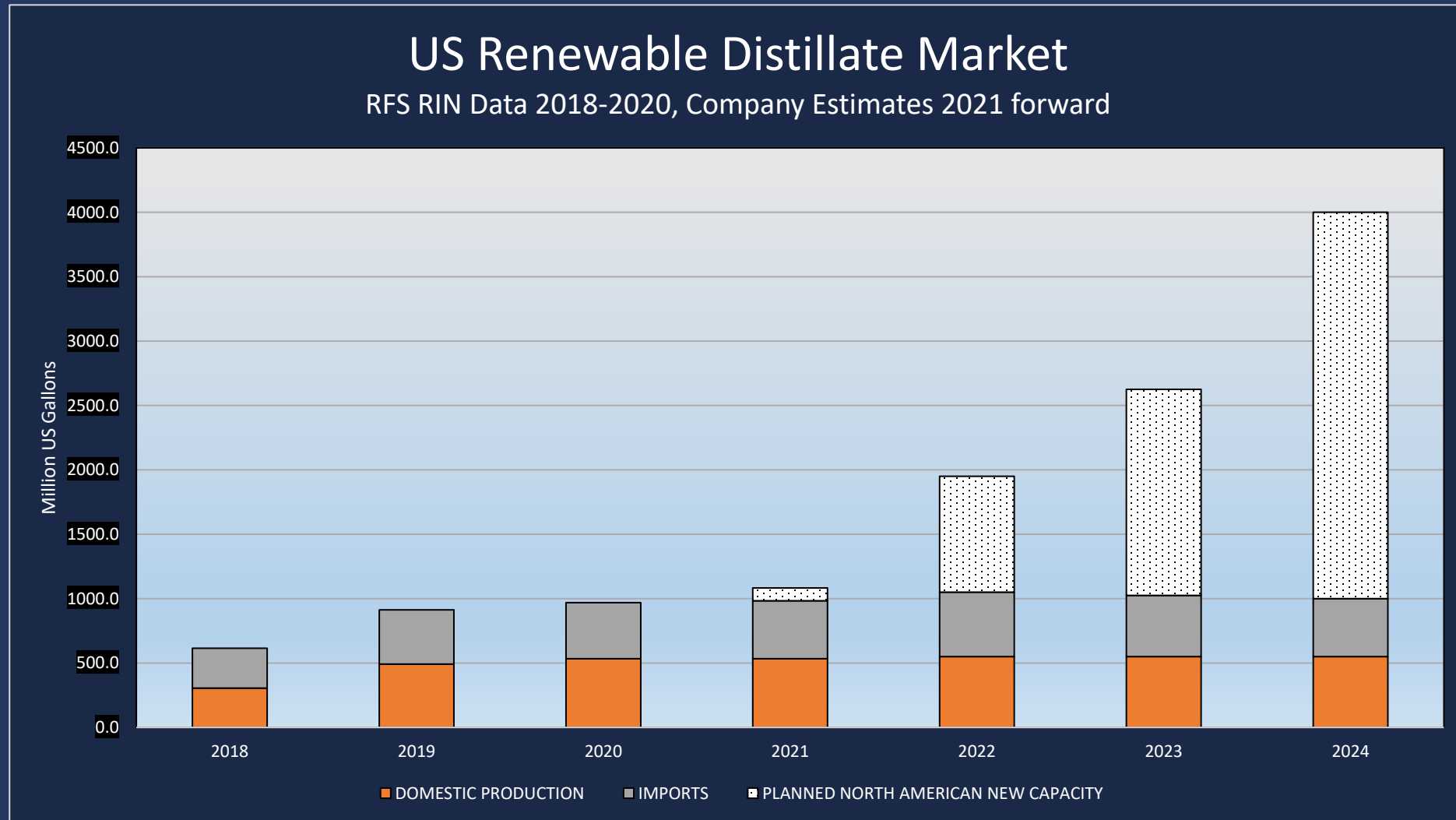


# CARB – Biomass Based Diesel by Feedstock

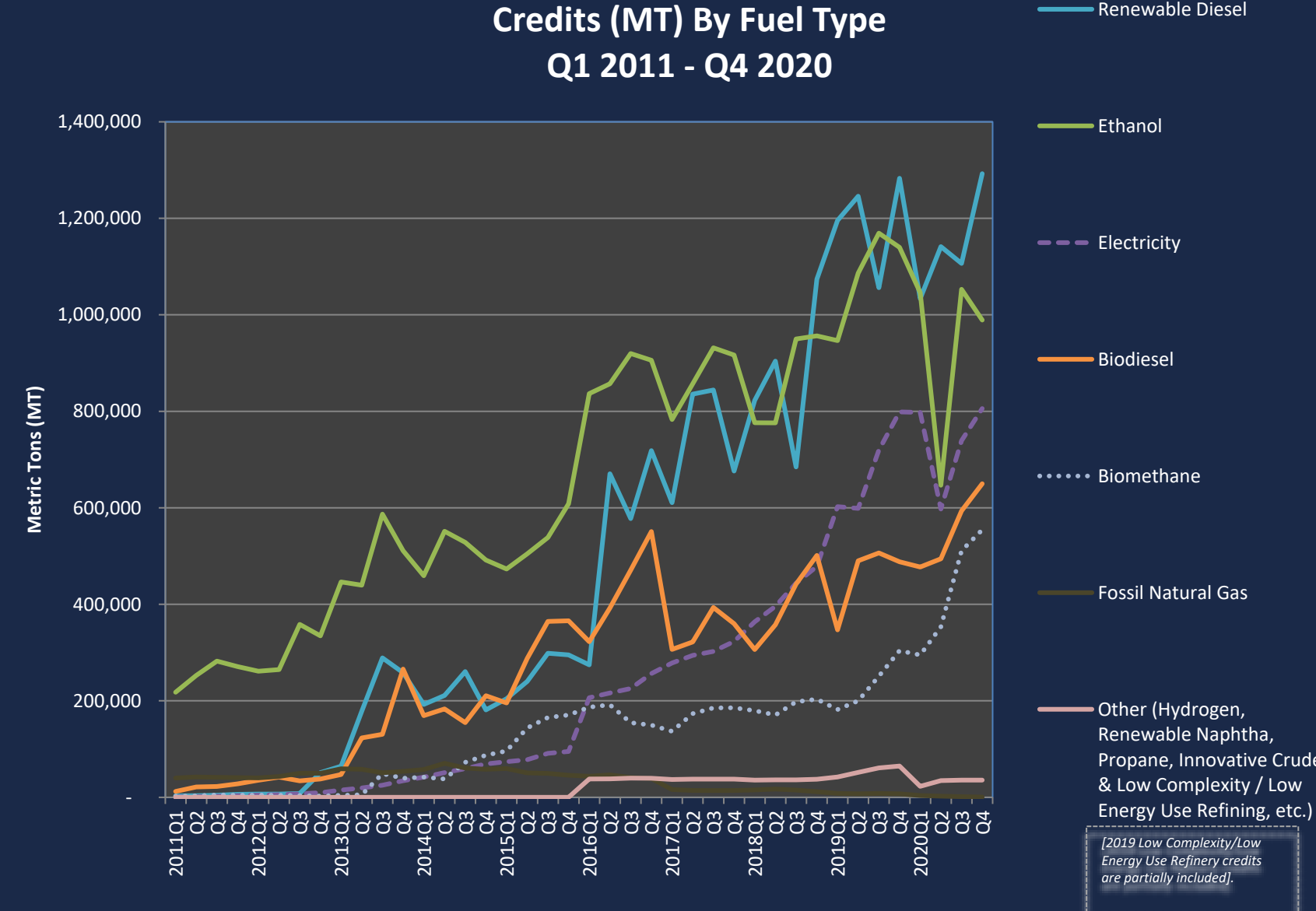
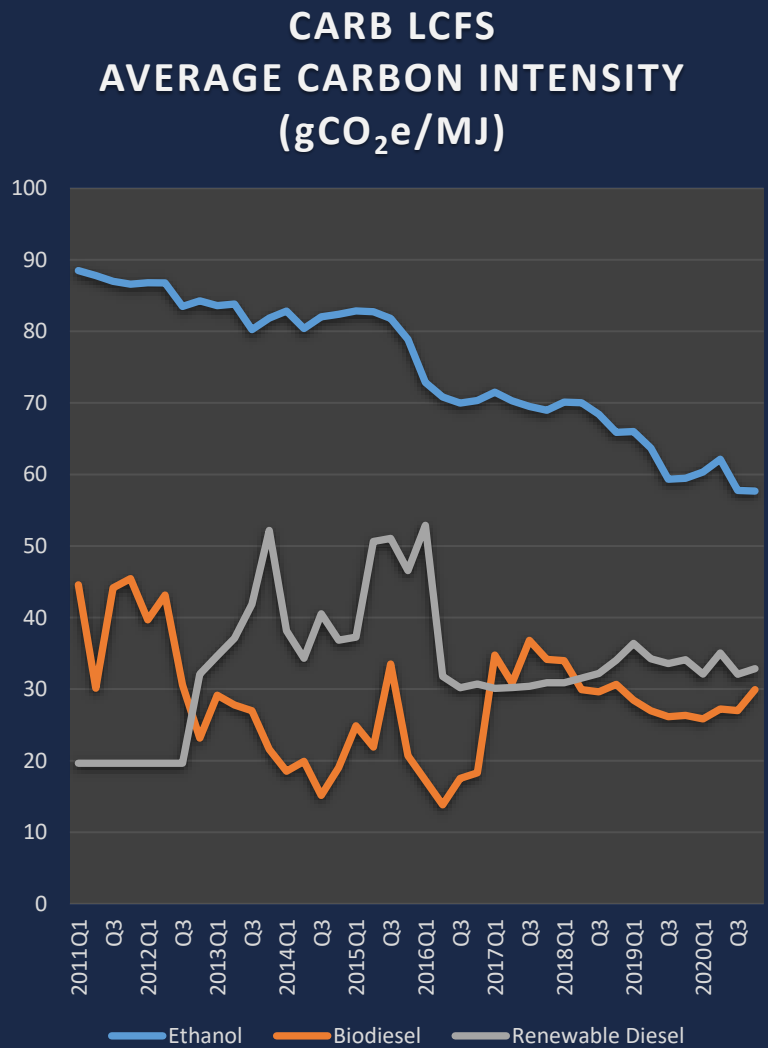
- 2020 DCO - appx 200mmg
- 2020 DCO – appx 1.5b lbs.
- 2019 DCO – appx 228mmg
- 2019 DCO – appx 1.7b lbs.
  - 930MM pounds was for RD
  - 772MM pounds was for BD



# Growing Market



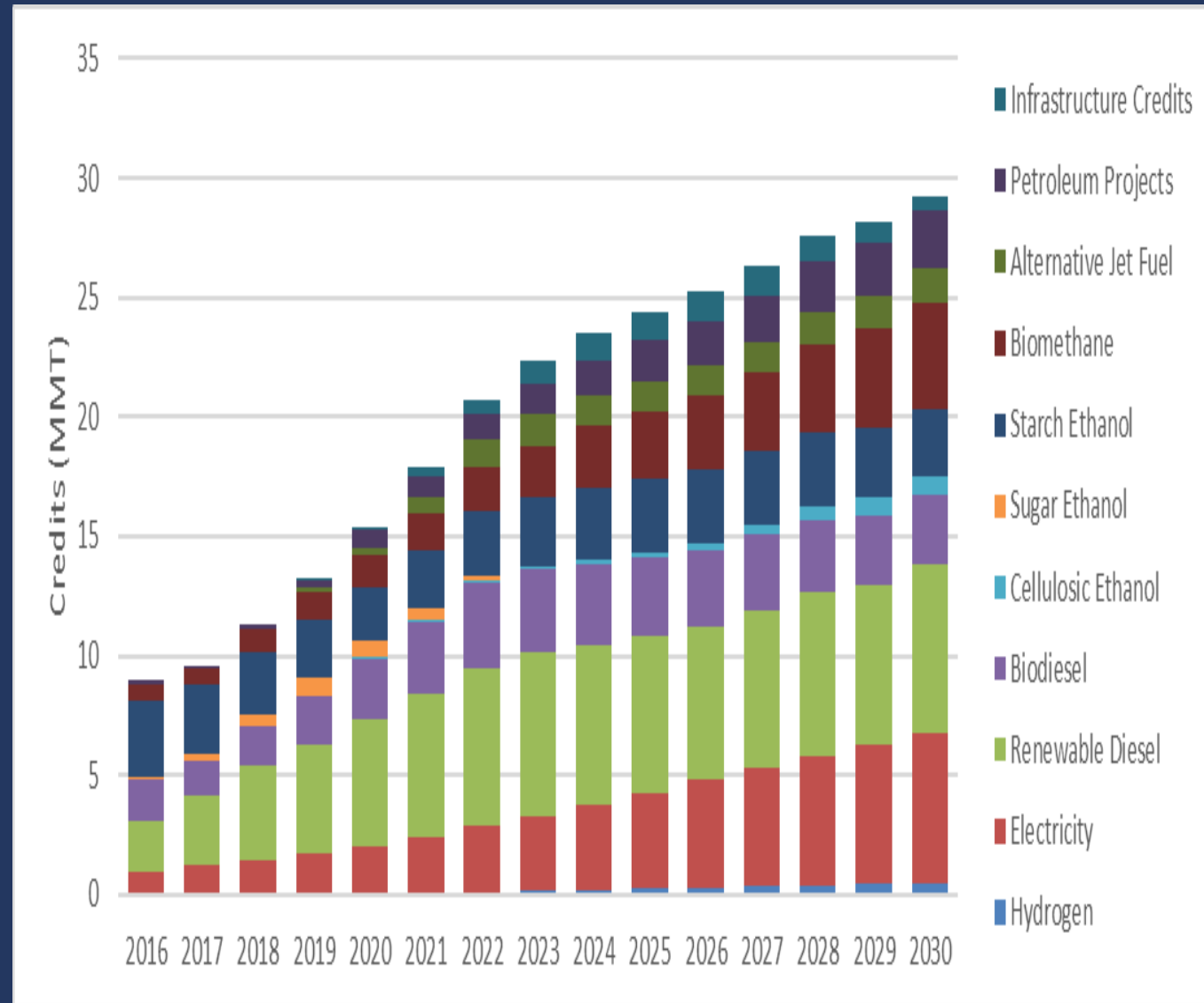
# Per Fuel Credit Generation and CI Trends



# California Illustrative Compliance Scenario

Per CARB, via its 2018 illustrative compliance scenario

- by 2025, credit generation will be:
  - 12% Starch Ethanol
  - 16% Electricity
  - 27% Renewable Diesel
- by 2030, credit generation will be:
  - 10% Starch Ethanol
  - 21% Electric
  - 24% Renewable Diesel
- 2020 actual reported data show, credit generation consisted of:
  - 19% Electric (vs 2018 est. of 13% in 2020)
  - 30% Renewable Diesel (vs 2018 est. of 34% in 2020)
  - 16% Starch Ethanol (2018 est. of 14% in 2020)



THANK YOU!

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