

GEN-1 ETHANOL OPPORTUNITIES:

*Improving Lifecycle GHG Benefits of
Existing Biofuel Production*

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Heightened Focus on Net-Zero Emissions

California Executive Order Requires Zero-Emissions Vehicles by 2035

SEPTEMBER 25, 2020 BY ALYSSA DANIGELIS

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Joe Biden's \$5T climate plan: Net zero emissions by 2050

By BILL BARROW June 4, 2019

WHITE HOUSE

Biden order requires net-zero federal government emissions by 2050

A White House fact sheet said the order will direct federal agencies to derive electricity from carbon-free sources by 2030.



President Joe Biden's order to hit net-zero emissions could eliminate a sizable chunk of planet-heating emissions from the world's No. 2 contributor to climate change. | Anna Moneymaker/Getty Images

By ZACK COLMAN
12/08/2021 02:59 PM EST

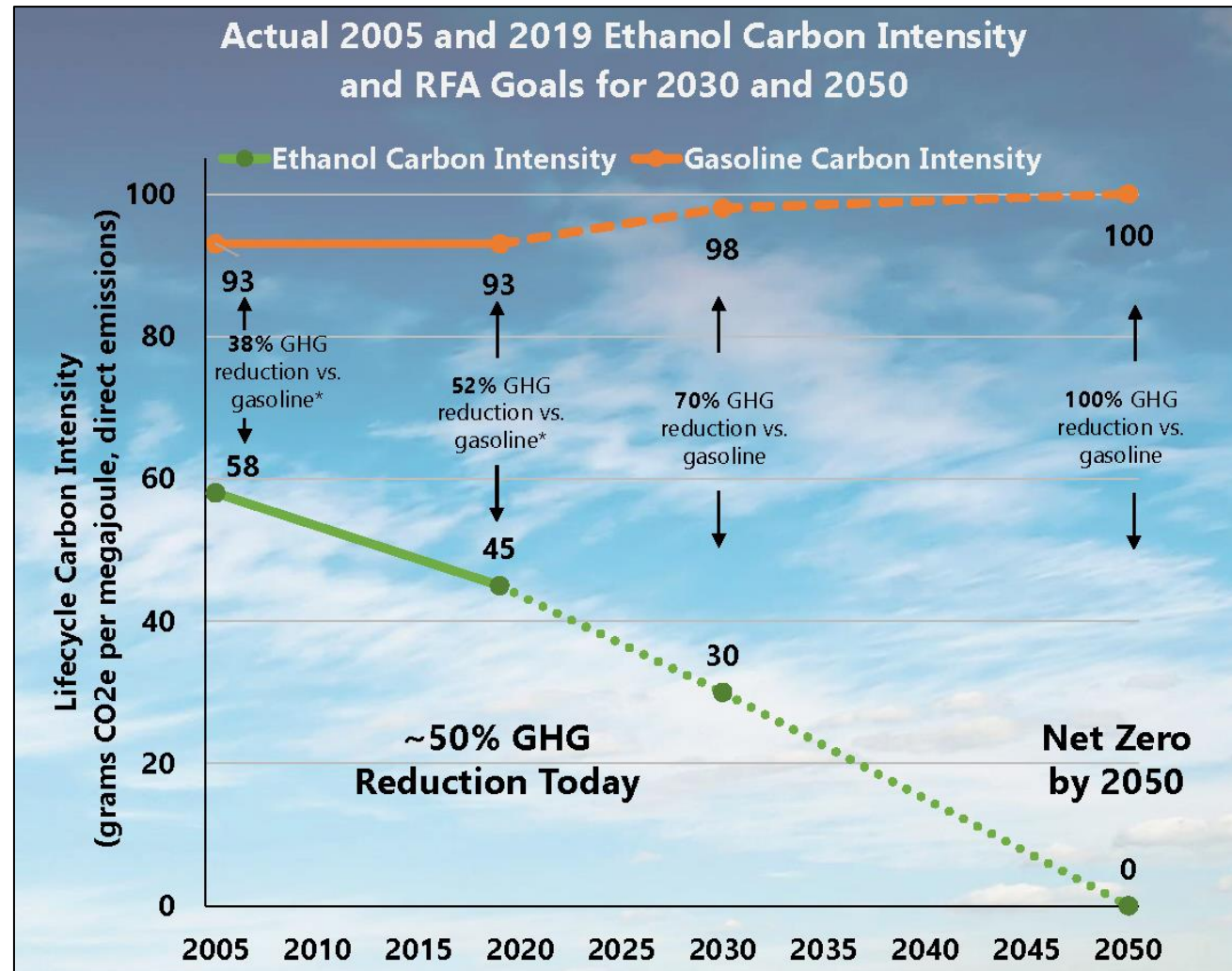


RFA Members Have Responded



- Pledge by RFA producer-members:
 - By **2030**, ensure ethanol **reduces** GHG emissions by at least **70%**, on average, compared directly to gasoline.
 - By **2050**, ensure ethanol achieves **net-zero** lifecycle GHG emissions, on average.

Progress to Date ... and the Road Ahead



*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, Bioprod. Bioref.*, 15: 1318-1331.

Case Study: Western Plains Energy

- WPE (Oakley, KS) recently installed a **2.7 MW wind turbine**
 - Goal to offset **50% of the plant's annual electrical load**
- First in a series of **decarbonization projects** WPE has identified, with a goal of producing **carbon-neutral fuel**
- “Every kilowatt-hour that we use from the wind turbine has a direct effect on decarbonizing our production process”
- *Derek Peine, General Manager*



Case Study: **Dakota** **ETHANOL**

- Dakota Ethanol (Wentworth, SD) was selected for **USDA's Regional Conservation Partnership Program**
 - **Climate-smart agriculture practices** (no-till, cover crops and nutrient management) for farmers supplying corn to the facility
 - Potential **premium of \$0.40/bushel**
- “Properly structured clean fuel policies can incentivize significant GHG contributions from the farmers who supply our corn. Compensating the 500 farmers in Dakota Ethanol’s grain shed to lower the carbon intensity of their corn production ... would result in significant climate and economic benefits.”
 - *Scott Mundt, CEO*

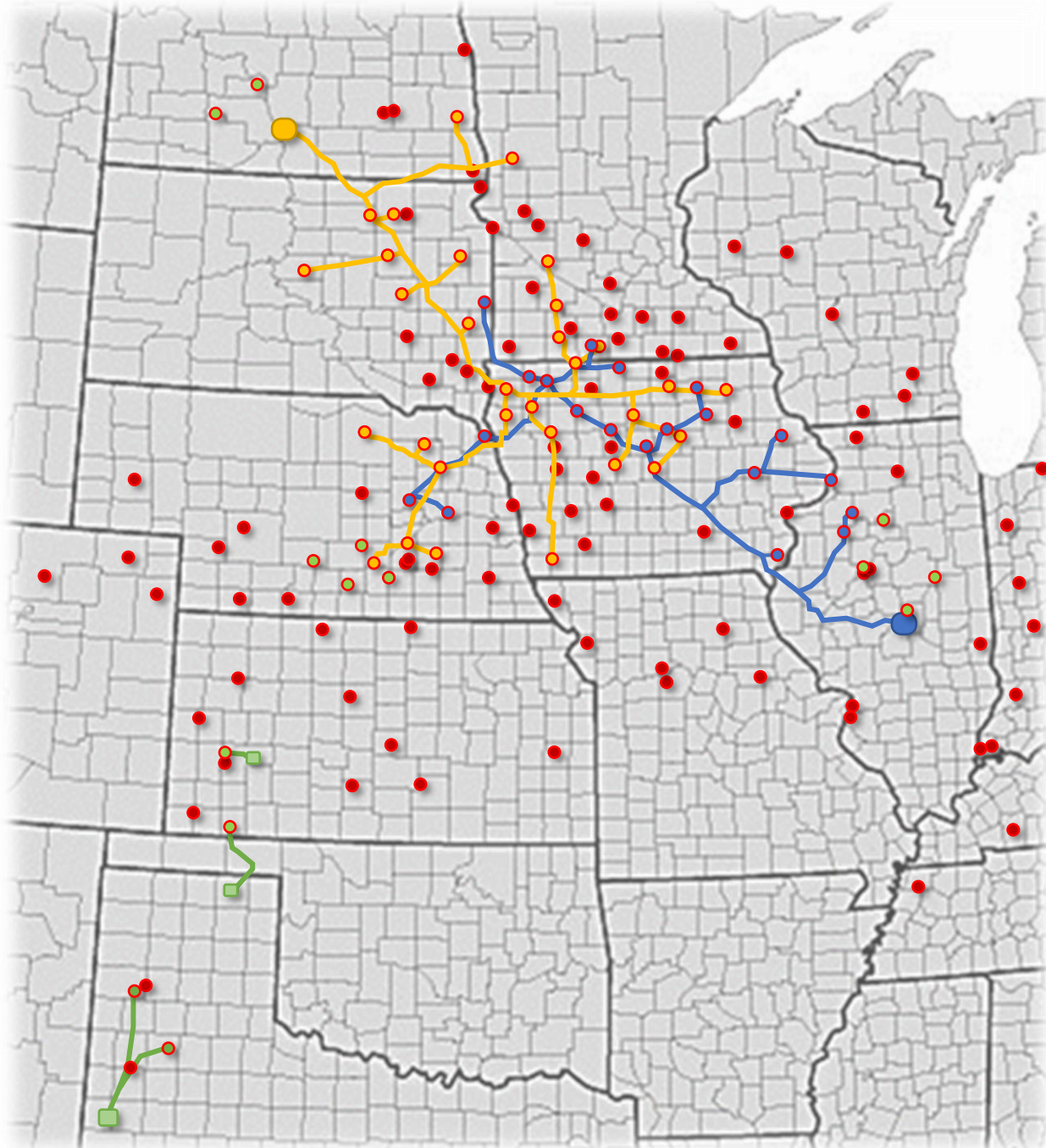
Case Study: AEMETIS

- Undertaking interconnected projects to supply low-carbon biofuels, including ethanol from its facility in Keyes, CA
 - Completing a **36-mile pipeline to source biogas** from dairy digesters
 - Using at ethanol facility and upgrading for sale as RNG
 - Facility also sells distillers grains to dairy producers
 - **Carbon Zero initiative** to convert below-zero-carbon feedstocks into liquid renewable fuels
 - Bought site for a renewable diesel and SAF production facility
 - Feedstock to include distillers corn oil from Keyes ethanol plant
 - Plan for sugars from waste wood to be extracted and trucked to ethanol plant
 - Conducted a study that estimated **1 MMT of CO₂ can be sequestered** in underground saline formations near Keyes facility

Carbon Capture and Sequestration (CCS)

- Roughly half of ethanol biorefineries are moving forward with plans for CCS
- Can cut **25-35 g CO₂/MJ** off CI score

- Summit Carbon Solutions pipeline route (proposed)
 - Biorefineries providing CO₂ to SCS pipeline
 - SCS sequestration site (proposed)
- Navigator CO₂ Ventures pipeline route (proposed)
 - Biorefineries on Navigator pipeline route
 - Navigator sequestration site (proposed)
- Other CO₂ pipeline routes (active or proposed)
 - Other biorefineries with CCS (active or proposed)
 - Other sequestration sites



RFA “Pathways to Net Zero” Study

- Identified and analyzed impacts of actions to allow industry to achieve net-zero emissions by 2050, including:
 - Conservation tillage;
 - Renewable energy usage on farms and at ethanol facilities;
 - Enhanced facility efficiency;
 - Conversion of corn kernel fiber;
 - Increased sales of wet distillers grains; and
 - Carbon capture and sequestration.
- Expect report to be released this month.

Thank You!