ISSUE BRIEF:

THE MYTH OF "FOOD VS. FUEL"

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I. EXECUTIVE SUMMARY

This issue brief takes a two-part approach to debunk the long-disproven myth of "food vs. fuel," which says that biofuels production has negative impacts on food security. This myth is untrue, and the two-step approach—first examining land-use change, and second food prices—will give a complete picture of how food vs. fuel is false.

II. LAND-USE CHANGE (LUC)

The food vs. fuel myth says that biofuels production has reduced the land used to grow food, as that land has been diverted to grow crops to produce biofuels. That is completely false given the evidence of the last two decades—the period of large-scale expansion of the biofuels industry—as explained below.

A. CROP ACREAGE AND YIELD

The simple truth is that crop acreage in the United States has not increased due to ethanol production, nor has the biofuels industry taken away land from other crops. Two major areas of evidence prove this.

First is corn acreage itself. Since 2000, the total U.S. farmland area has decreased by almost 50 million acres.[1] For cropland specifically, the total land area used for crops has declined significantly since 1978, the year E10 was legalized nationwide: from 369 million acres to 345 million in 2000 to 330 million today.[2] Further specifying for corn acreage only, there was only a slight increase from 82 million acres in 1978 (with zero gallons of ethanol production) to 88 million acres today (with 15 billion gallons of ethanol production).[3] Even more telling is that in the last ten years, the number of bushels of corn grown for ethanol has actually declined, even while the industry matured to its current size.[4]

Second, corn production has grown more efficient over the years, which explains how the biofuels industry has grown given that crop acreage has not. From 2007 onward, the period of the Renewable Fuel Standard (RFS), there has been a clear upward trend of corn yield,[5] beginning at 150 bushels per acre and in 2023 hitting 175 bushels per acre.[6] Looking back even further, in 1978 corn yield per acre was only 101 bushels.[7] Nebraska in particular shows an even greater growth trend, with current efficient farming practices netting corn producers 194 bushels per acre in 2021.[8]

B. ETHANOL YIELD

Continuing from corn acreage above, another key statistic disproving the land-use myth in terms of corn production is that in the last ten years there has been a major decrease in the percentage of U.S. corn production grown specifically for ethanol: from 48% in 2013 to just 35% in 2022.[9] How? The answer is straightforward: just as farmers have become more efficient in their corn production practices, so too have biofuels producers grown more efficient at the biorefinery.

Consider the average ethanol yield per bushel of corn over time: 2.5 gallons in 1995,[10] 2.7 gallons in 2006,[11] and 2.9 gallons currently.[12] This production efficiency increase helps explain why the ethanol industry has been able to produce many more gallons per year without increasing the amount of feedstock needed. As shown above, corn production for

[1] Shahbandeh, M. (2023). *Total area of land in U.S. Farms 2000-2022.* Statista.
[2] Economic Research Service. *Major Land Uses*. U.S. Department of Agriculture (USDA).
[3] National Agricultural Statistics Service. *Corn Statistics*. USDA.
[4] Ibid. note 3.
[5] ICF (2018). *A Life-Cycle Analysis of the Greenhouse Gas Emissions from Corn-Based Ethanol.* USDA Office of Energy and Environmental Policy.
[6] Ibid. note 3.
[7] Ibid. note 3.
[8] Ibid. note 3.
[9] Office of Energy Efficiency & Renewable Energy. *U.S. Corn Production and Portion Used for Fuel Ethanol*. U.S. Department of Energy (DOE).
[10] Lorenz, D. and Morris, D. (1995). *How Much Energy Does It Take to Make a Gallon of Ethanol?* Institute for Local Self-Reliance.
[11] Mosier, N.S. and Ileleji, K. (2006). *How Fuel Ethanol Is Made from Corn*. Purdue University Extension.
[12] Renewable Fuels Association. *Ethanol Co-Products.*

ethanol has held steady and even declined while the U.S. ethanol industry expanded from 6.5 billion gallons per year in 2007 to 15 billion gallons per year currently. [13] Further refinement of biorefinery practices remains on the horizon as producers seek to maximize ethanol and co-products.

C. LUC REALITIES

It's crucial to remember that the corn used for ethanol production is field corn, which is fed to animals, not the sweet corn fit for human consumption. With that in mind, land-use change has not occurred in the manner or to the extent that biofuels opponents believe.

Food vs. fuel proponents state that food crops have been switched to corn to meet biofuels production demands, but the reality is that any land-use change that occurs are "crop-switching" acres (from wheat or cotton) or acres expiring from the Conservation Reserve Program.[14] Overall, since 2010 research has shown that LUC due to biofuels production has been "sharply" lower than the late-2000s estimates.[15]

III. FOOD PRICES

Food vs. fuel mythmakers argue that ethanol and other biofuels have raised food prices for everyday consumers. Again, this component of the overall myth is clearly disproven based on the evidence of the last twenty years.

A. THE REAL CAUSE FOR FOOD PRICE INCREASE

Biofuels opponents have long claimed, without evidence, that the biofuels industry has raised food prices and contributed to food insecurity. That claim could not be further from the truth, as the historical record proves. Between 1989 and 2008, only a weak relationship existed between ethanol and food commodity prices,[16] and comparing the commodity price index before and after the "biofuel boom" of 2000 showed no evidence for a higher rate of price increases.[17]

From 2005 – 2009 U.S. ethanol policies had a 1.1% or less impact on prices of consumer staples like beef, pork, and eggs.[18] And since 2011, food prices impacts from biofuels are even less, with prices increasing at less than 1%.[19] Overall, the RFS has been responsible for only tiny changes in the food price index, and the long-run effects on food prices from biofuels production are negligible,[20] with the total percentage of every dollar spent on food staying below fifteen cents.[21] The real culprit for increased food prices is crude oil prices, as many studies have proved.[22] In real numbers, a 1% swing in oil prices increases food prices by 0.2%.[23]

B. ETHANOL CO-PRODUCTS

One significant factor in biofuels' contributions to a lower food and crop price inflation rate is ethanol's co-products.[24] At a biorefinery, corn kernel starch is fermented to make ethanol, but the rest of the kernel is preserved in co-products, including dried distillers grains (DDGs), a protein-rich animal feed. Over 15 pounds of a 56-pound bushel of corn is returned as DDGs in the ethanol production process, nearly 30%,[25] and as a result, ethanol production creates the fourth-largest grain-based livestock feed source in the world.[26] The false dichotomy of food vs. fuel can actually be thought of then as feed *and* fuel.

FOR FURTHER INFORMATION

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[13] Alternative Fuels Data Center. *Global Ethanol Production by Country or Region*. U.S. DOE.
[14] Renewable Fuels Association. *Setting the Record Straight*.
[15] Ibid. note 5.
[16] Filip, O. et al. (2017). *Food versus fuel: An updated and expanded evidence*. Centre for Applied Macroeconomic Analysis.
[17] Shrestha, D.S. et al. (2019). *Biofuel impact on food prices index and land use change*. Biomass and Bioenergy.
[18] Babcock, B.A. (2011). *The Impact of U.S. Biofuel Policies on Agricultural Price Levels and Volatility*. Center for Agricultural and Rural Development.
[19] Taheripour, F. et al. (2020). *Impacts of the U.S. Renewable Fuel Standard on Commodity and Food Prices*. Center for Global Economic Analysis.
[20] Ibid. note 19.
[21] Ibid. note 14.
[22] Sun, Y. et al. (2023). *The asymmetric effects of oil price shocks on the world food prices: Fresh evidence from quantile-on-quantile regression approach.* Energy.
[23] Bogmans, C. et al. (2022). *Global Food Prices to Remain Elevated Amid War, Costly Energy, La Niña.* International Monetary Fund.
[24] Ibid. note 17.
[25] Minnesota Biofuels Association. *Food vs Fuel*.
[26] Growth Energy. *Setting the Record Straight: Food vs. Fuel.*