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Biofuels: Agriculture and Energy

Summary of Comments - May 2023

On May 3, 2023, OurEnergyPolicy hosted a discussion on the role of biofuels in the U.S. energy transition, development of sustainable feedstocks and emerging technologies. Find the recording here.

SPEAKERS

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Summary of Key Points

- Biofuels are produced from biomass and organic feedstocks, and the four major categories are ethanol, biodiesel, renewable diesel, and "others" which includes sustainable aviation fuel (SAF).
- Ethanol makes up 80% of biofuel production, mostly blended with gasoline to extend the petroleum supply and reduce smog-causing emissions.
- Biofuel production creates added value for agricultural byproducts -- such as soy oil or wheat straw -- that may otherwise end up as waste.
- Though some corn crops are grown explicitly for ethanol production, food and fuel feedstocks do not need to conflict.
- The greatest market opportunity for biofuels is decarbonizing transportation, and as smaller vehicles increasingly transition to electricity there will be a greater emphasis on the role of biofuels in decarbonizing heavy-duty vehicles, maritime, and aviation.
- Biofuels represent a rapidly emerging market, and ethanol producers in particular are prepared to substantially increase supply if market demand rises.
- To support the increased role biofuels in the U.S. energy mix, greater investment in supportive infrastructure is needed.

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Biofuels in the U.S. Energy Economy

- Motivated by concerns about energy security and reducing dependence on foreign oil supplies, the Energy Policy Act of 2005 included the first-ever Renewable Fuel Standard and brought about rapid growth in ethanol and biodiesel markets.
  - A federal rule requiring U.S. government vehicles to maximize biofuel use within certain geographic areas now means that the U.S. army is the country's largest consumer of biofuels, with a target of utilizing 25% biofuels in non-tactical vehicles by 2050.
  - State energy offices have enacted similar policy measures to spur biofuel production and use, such as California's ambitious Renewable Fuel Standard and an Illinois tax credit incentivizing SAF production.
- Transportation accounts for 34% of U.S. greenhouse gas emissions, but there is potential to sustainably produce 1 billion tons of dry biomass for biofuels that can offset those emissions.
- As of 2022 in the U.S., there are 200 biorefineries producing 18 billion gallons of starch-based ethanol.
  - In summer 2022, ethanol made up 10.4% of the U.S. gasoline fuel mix for light- and medium-duty vehicles. This helped reduce gas prices at the pump by stretching supplies and offsetting demand for 600 million barrels of petroleum.
  - Ethanol production capacity doubled from 2007-2012, indicating that if market demand increases rapidly the ethanol industry will be able to scale up its supply at a matching pace.
  - Though most ethanol is produced from corn starch, the industry is developing technology to enable expanded feedstocks that utilize cellulosic materials.
  - A recent emergency waiver from the U.S. Environmental Protection Agency (EPA) allows sales of E15 gasoline (blended with 15% ethanol) for summer 2023 in order to ease prices and ensure adequate gasoline supplies for U.S. drivers.
- Sustainable Aviation Fuel (SAF) presents a massive market opportunity for biofuels.
  - An estimated 650 million tons of biomass will be required to meet all SAF needs in 2050. The U.S. Department of Energy's Sustainable Aviation Fuels Grand Challenge is working to determine the best path toward meeting this demand.
  - The Clean Skies for Tomorrow Coalition, established by the World Economic Forum in 2019, is a group of 60 countries committed to achieving 10% SAF by 2030. This presents an export opportunity for U.S. biofuel producers, but exported SAF must comply with the carbon intensity guidelines established by international regulators.
- 42% of emissions associated with biofuels occur during agricultural processes, such as emissions from farming equipment, fertilizer use, and feedstock transportation.
  - Technological advancements in farming have made the production of biofuel feedstocks more efficient, including a reduction in the acreage required to grow corn for ethanol.
  - Decarbonizing transportation requires decarbonizing agricultural processes.