

Are Biofuels Really the Choice Fuel for the Future?

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The most beneficial biofuels for carbon intensity reduction are biodiesels produced by wastes, such as used cooking oils and other fats, which are truly being recycled into energy. However, supply of these feedstocks is largely limited by the amount of food consumption. Currently, only an estimated 7% of biofuels comes from wastes and residues. The majority of biofuels are produced from corn, soybean, and vegetable oils, which not only require environmentally costly resources like fertilizer, water, and land to produce—they also compete with food consumption and push up already-high food prices globally. As a result, biofuel has become increasingly controversial.

On the environmental side, biofuels have a smaller carbon footprint than traditional forms of fuel when burned. However, the process by which they are produced makes up for that: biofuel feedstocks grown on land cleared from tropical forests, such as soybeans in the Amazon and palm oil in Southeast Asia, generate particularly high greenhouse gas (GHG) emissions during production, as well as accompanying biodiversity losses. Fertilizer applications are required for growing feedstock, and the process of producing and applying fertilizers also releases high levels of GHG. Some research even suggests that GHG emissions resulting from biofuel production and use, including those from indirect land-use change, may be higher than those generated by fossil fuels, depending on the time horizon of the analysis.

On the social side, biofuel feedstocks would otherwise be used for human consumption or animal feed, and diverting these crops to biofuels could lead to food shortages and higher food prices. Some studies suggested that the increased use of biofuels contributed 20-50% to corn prices during the previous food crisis in 2007-08. According to Gro Intelligence, an AI-powered climate and agriculture analytics platform, the total amount of crops used annually for biofuels is equal to the calorie consumption of 1.9 billion people.

Global biofuel production reached a record high before the Russia and Ukraine conflict, growing 5% per year on average in the past decade. In the U.S., about 36% of total corn and 40% of soybean oil production went into biofuels in 2021. The conflict between Russia and Ukraine has disrupted the production and export of about one-fifth of the world's corn and more than half its sunflower oil, increasing the risk of food shortages for hundreds of millions of people, especially in developing countries. According to the World Resources Institute, a 50% reduction in grain used for biofuels in Europe and the U.S. would compensate for all the lost exports of Ukrainian wheat, corn, barley, and rye.

The global policies toward biofuel have wavered, depending on different priorities. Biofuels are usually blended with standard gasoline and diesel to boost energy supplies and reduce the environmental impact of fossil fuels. Some governments, including in Brazil, Indonesia, and Germany, are considering easing biofuel blending mandates to address food security. Other governments, like the U.S. and India, are pushing for higher blending levels to address concerns over fuel price inflation and energy independence.

In short, if biofuels were produced by recycling true waste, they could help cut GHG emissions without negative social consequences. However, the amount of biofuels made globally from recycled waste is too small and unlikely to have a material impact on volume. But the potential is there: biofuels still represent a small portion of the energy mix worldwide, providing only 3% of the world's fuels for road transport and a very small amount of aviation. The International Energy Agency counts on global demand for biofuels to grow by 41 billion liters, or 28%, from 2021 to 2026 as a base case, while the “Fit for 55” package from the EU requires much higher average growth of 8% per year to 2030. Yet significant challenges remain. In their current form, biofuels could lead to more emissions, significant loss of biodiversity, and exacerbate problems such as poverty and hunger in developing nations. And as global food waste issues are addressed, the feedstock available for making such biofuels will be reduced even further. Maybe it is time to rethink biofuels' position in the future global energy mix.

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