What are Biofuels?

Biofuels are renewable fuels produced from sustainably sourced biomass, including plant material and animal waste. They can be liquid or gaseous, and can replace fossil fuels like gasoline, diesel, or natural gas.

Renewable Sources of Biofuels

Potential sources of renewable biofuels in California (CA) include sustainably sourced forest residues, agriculture residues, and municipal solid waste (MSW). As CA increases pace and scale of forest restoration activities to minimize wildfire risks and increase forest health and water retention, forest residues are expected to be a major source of biomass for biofuels production in the state.

Types of Biofuels

While biofuels have the potential to provide climate-friendly energy, not all biofuels are created equal. For example, ethanol is the same chemical product regardless of its source material; however, the renewable source material used (corn, forest residues, or MSW) results in very different greenhouse gas (GHGs) emission reductions. Numerous different liquid or gaseous renewable biofuels can be produced from biomass in CA, including hydrogen, ethanol, aviation fuel, gasoline or diesel, and natural gas.

Hydrogen

Current hydrogen production is dominated by fossil sources. However, using sustainably sourced biomass to produce renewable hydrogen could reduce carbon dioxide from the atmosphere and support CA climate and energy goals at costs competitive with those of hydrogen produced from natural gas or coal.

Ethanol

Ethanol is a domestically produced alternative fuel commonly made from corn, but it can also be made from forest biomass or agriculture residues. Most motor gasoline sold in the US contains about 10% ethanol by volume. Corn ethanol is estimated to have a net GHG reduction of approximately 12–13% relative to gasoline; whereas, renewable ethanol from forest residues or agriculture residues is expected to have GHG reductions exceeding 80%.

Aviation Fuel

Aviation fuel produced from sustainable feedstocks (e.g., forest residues, agriculture residues, or MSW) is very similar in chemistry to fossil jet fuel, but has an 80% lower carbon footprint than traditional jet fuel. Renewable aviation fuel can be safely mixed with conventional jet fuel without any technical modifications to existing aircraft, engines, or airport fuel systems.

Gasoline or Diesel

Renewable gasoline and renewable diesel are biomass-derived transportation fuels that are chemically identical to their petroleum counterparts and therefore minimize compatibility issues with existing infrastructure and engines. Nearly all domestically produced and imported renewable diesel in the US is used in the CA due to economic benefits under the Low Carbon Fuel Standard.

Natural Gas

Renewable natural gas (RNG) is fully interchangeable with conventional natural gas and thus can be used in natural gas vehicles as transportation fuel. In CA, a significant volume of RNG can be produced using commercially available technologies from sustainably sourced forestry and agricultural residues. RNG can be transported through existing infrastructure which can enable a lower cost solution to delivering fuel and reducing carbon dioxide emissions in the near-term.

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