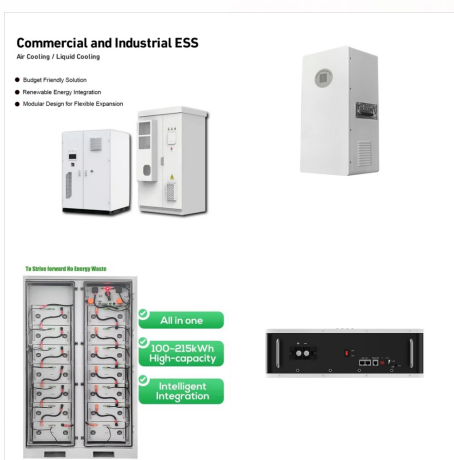




Bioenergy is renewable energy produced from organic matter (called "biomass") such as plants, which contain energy from sunlight stored as chemical energy. Bioenergy producers can convert this energy into liquid transportation fuel???called "biofuel"???through a chemical conversion process at a biorefinery.



Renewable energy can play an important role in U.S. energy security and in reducing greenhouse gas emissions. Using renewable energy can help to reduce energy imports and fossil fuel use, the largest source of U.S. carbon dioxide emissions. According to projections in the Annual Energy Outlook 2023 Reference case, U.S. renewable energy consumption will ???



Biofuel Biomass is the only renewable energy source that can be converted into liquid biofuels such as ethanol and biodiesel. Biofuel is used to power vehicles, and is being produced by gasification in countries such as Sweden, Austria, and the United States. Unlike other renewable energy sources, such as wind or solar, biomass energy is

# BIOFUELS OR RENEWABLE ENERGY



Biofuels could be one of the best sources of clean, renewable and sustainable energy for transportation fuels, power generation and other consumer bioproducts. INL also leads development of knowledge pertaining to the preconversion, densification and custom formulation of on-spec bioenergy feedstocks for industrial biorefineries.



Biofuels, primarily ethanol and biodiesel, are liquid fuels produced from renewable biological sources, including plants, animal fat, and algae.<sup>1</sup> Biofuels have the potential to reduce the energy and greenhouse gas emission intensities associated with transportation, but can have other significant effects on society and the environment. Depending on demand, crop growing ???



Renewable energy is energy derived from natural sources that are replenished at a higher rate than they are consumed. Sunlight and wind, for example, are such sources that are constantly

# BIOFUELS OR RENEWABLE ENERGY



Biodiesel is an alternative, renewable fuel with significant promise for addressing major energy problems. While biodiesel is not a "silver bullet" solution to our energy problems, it can provide 3 - 6 % of the energy required in this country. Effective energy management systems are needed to optimize energy use throughout all sectors of our



The processes for producing ethanol, renewable diesel, renewable heating oil, and renewable aviation fuel require a heat source, and most producers of these biofuels currently use fossil fuels. Some U.S. ethanol producers burn corn stalks for heat and ethanol producers in Brazil use sugar cane stalks (called bagasse) to produce heat and



Biofuels are liquid fuels produced from renewable biological sources (e.g., plants, algae) that yield environmental and economic benefits. They can replace liquid fuels such as gasoline, jet and diesel fuel that are critical to our transportation needs. U.S. Department of Energy LP 10 1000 Independence Avenue, SW Washington D.C. 20585. An

# BIOFUELS OR RENEWABLE ENERGY



It is the largest source of renewable energy globally, accounting for 55% of renewable energy and over 6% of global energy supply. Liquid biofuel consumption more than doubles from 2.2 million barrels of oil equivalent per day (mboe/d) (4.3 EJ) in 2022 to over 5 mboe/d (10 EJ) in 2030, mainly for road transport.



? Renewable energy, usable energy derived from replenishable sources such as the Sun (solar energy), wind (wind power), rivers (hydroelectric power), hot springs (geothermal energy), tides (tidal power), and biomass ???

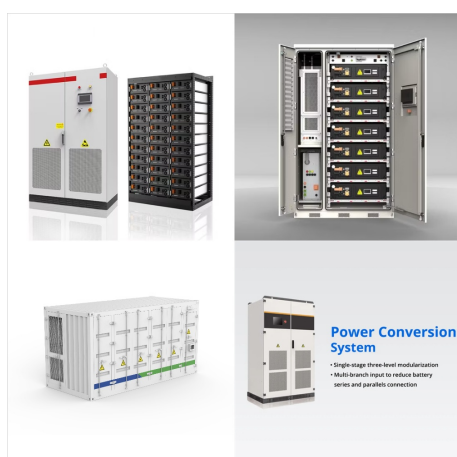


In shipping, too, adoption of biofuel is at levels far below the 2030 targets set by the International Energy Agency. Renewable natural gas, or biomethane, is another fuel that potentially could





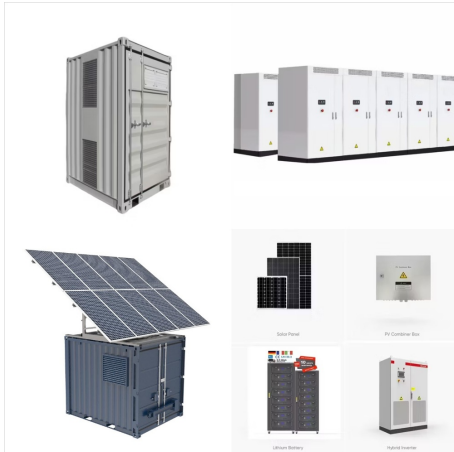
As we progress, biofuels should be seen as part of an integrated solution that includes other renewable sources and energy efficiency practices, to build a resilient and sustainable energy future. Each generation of biofuels brings its own set of challenges and benefits that need to be considered in the context of global energy transition and



Despite this, the existing evidence suggests that, if no land-use change (LUC) is involved, first-generation biofuels can???on average???have lower GHG emissions than fossil fuels, but the reductions for most feedstocks are insufficient to meet the GHG savings required by the EU Renewable Energy Directive (RED).



It has five strategic thrusts: Country Official Biofuel Targets Brazil 40% rise in ethanol production, 2005-2010; Mandatory blend of 20????25 % anhydrous ethanol with petrol; minimum blending of 3 % biodiesel to diesel by July 2008 and 5 % (B5) by end of 2010 Canada 5% renewable content in petrol by 2010 and 2 % renewable content in diesel



However, while biofuels offered energy security benefits, their prices climbed more quickly than those of gasoline and diesel in many countries. To mitigate increases in transport fuel costs, our Renewable Energy Market Update forecasts new global renewable power capacity additions and biofuel demand for 2023 and 2024. It also discusses key



Office of Energy Efficiency & Renewable Energy, "Biofuel Basics", Bioenergy Technologies Office, accessed January 2022. Christina Nunes, " Biofuel, explained ", National Geographic, July 2019.



The production of biofuels can be very energy intensive, which, if generated from non-renewable sources, can heavily mitigate the benefits gained through biofuel use. A solution proposed to solve this issue is to supply biofuel production facilities with excess nuclear energy, which can supplement the power provided by fossil fuels. [ 108 ]

# BIOFUELS OR RENEWABLE ENERGY



Biofuels can be utilizing as fuel additives or in their pure form. Further, biofuels are commonly classified into bioethanol and biodiesel [5]. The liquid biofuels can be utilized as an alternative source for conventional fuels in the transportation sector, contributing to approximately 18% of primary energy consumption [1], [6]. Today, approximately 80% of liquid biofuel is ???



Renewable energy comes from unlimited, naturally replenished resources, such as the sun, tides, and wind. Renewable energy can be used for electricity generation, space and water heating and cooling, and transportation. Non-renewable energy, in contrast, comes from finite sources, such as coal, natural gas, and oil.



Renewable energy (or green energy) As an energy source, biomass can either be used directly via combustion to produce heat, or converted to a more energy-dense biofuel like ethanol. Wood is the most significant biomass energy source as of 2012 [97]

# BIOFUELS OR RENEWABLE ENERGY



Biomass is an organic renewable energy source that includes materials such as agriculture and forest residues, energy crops, and algae. Scientists and engineers at the U.S. Department of Energy and its national laboratories are finding new, more efficient ways to convert biomass into biofuels that can take the place of conventional fuels like gasoline, diesel, and jet ???