

U.S. DEPARTMENT OF
ENERGY



Biomass Basics:
The Facts About Bioenergy



We Rely on Energy Every Day

Energy is essential in our daily lives. We use it to fuel our cars, grow our food, heat our homes, and run our businesses. Most of our energy comes from burning fossil fuels like petroleum, coal, and natural gas. These fuels provide the energy that we need today, but there are several reasons why we must develop sustainable alternatives.



We are running out of fossil fuels

Fossil fuels take millions of years to form within the Earth. Once we use up our reserves of fossil fuels, we will be out in the cold - literally - unless we find other fuel sources. Scientists estimate the world will run out of fossil fuels within the next 50 to 120 years.

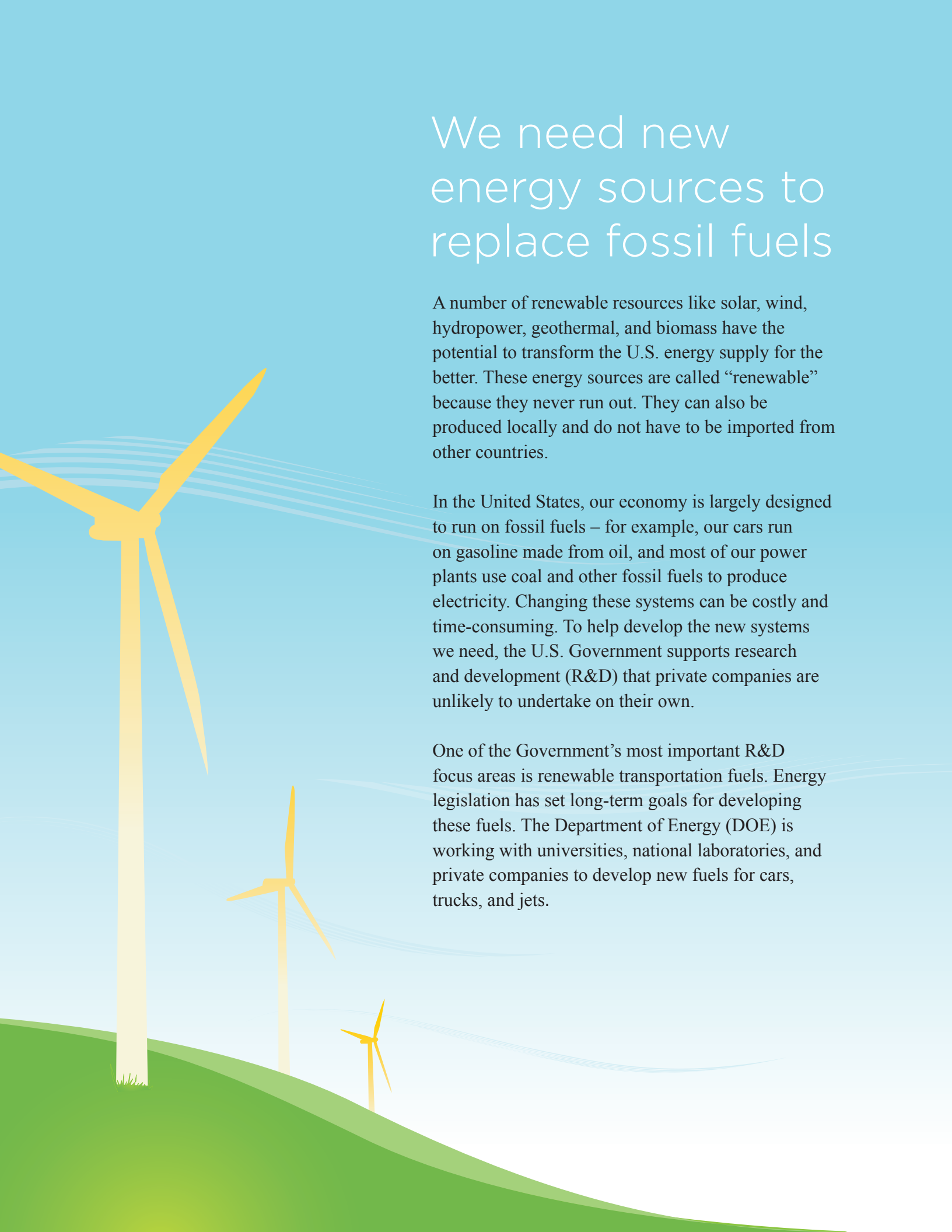
Fossil fuels, such as petroleum, need to be imported from other countries

Some fossil fuels are found in the United States but not enough to meet all our energy needs. In fact, the United States is currently importing 58% of its oil from other countries. Sometimes political or social conflicts make it difficult to buy fuels from other nations. When it is hard to buy enough oil, the price can increase significantly and reduce our supply of gasoline – affecting our national security. Because energy is extremely important to our economy, it is better to produce energy in the United States so that it will always be available when we need it.

Use of fossil fuels can be harmful to humans and the environment

When fossil fuels are burned, they release carbon dioxide and other gases into the atmosphere. Some of these gases pollute the air we breathe and contribute to climate change – which threatens ecosystems and could lead to flooding, drought, or famine in some parts of the world.





We need new energy sources to replace fossil fuels

A number of renewable resources like solar, wind, hydropower, geothermal, and biomass have the potential to transform the U.S. energy supply for the better. These energy sources are called “renewable” because they never run out. They can also be produced locally and do not have to be imported from other countries.

In the United States, our economy is largely designed to run on fossil fuels – for example, our cars run on gasoline made from oil, and most of our power plants use coal and other fossil fuels to produce electricity. Changing these systems can be costly and time-consuming. To help develop the new systems we need, the U.S. Government supports research and development (R&D) that private companies are unlikely to undertake on their own.

One of the Government’s most important R&D focus areas is renewable transportation fuels. Energy legislation has set long-term goals for developing these fuels. The Department of Energy (DOE) is working with universities, national laboratories, and private companies to develop new fuels for cars, trucks, and jets.



BIO MASS

is an exciting, versatile energy source

One of the most promising renewable energy sources for transportation is biomass. Biomass is any organic material that has stored sunlight in the form of chemical energy, such as plants, agricultural crops or residues, municipal wastes, and algae. DOE is focusing on new and better ways to make liquid transportation fuels or “biofuels,” like ethanol, biodiesel, and renewable gasoline. DOE is also investigating the potential of producing power and a range of products from biomass.

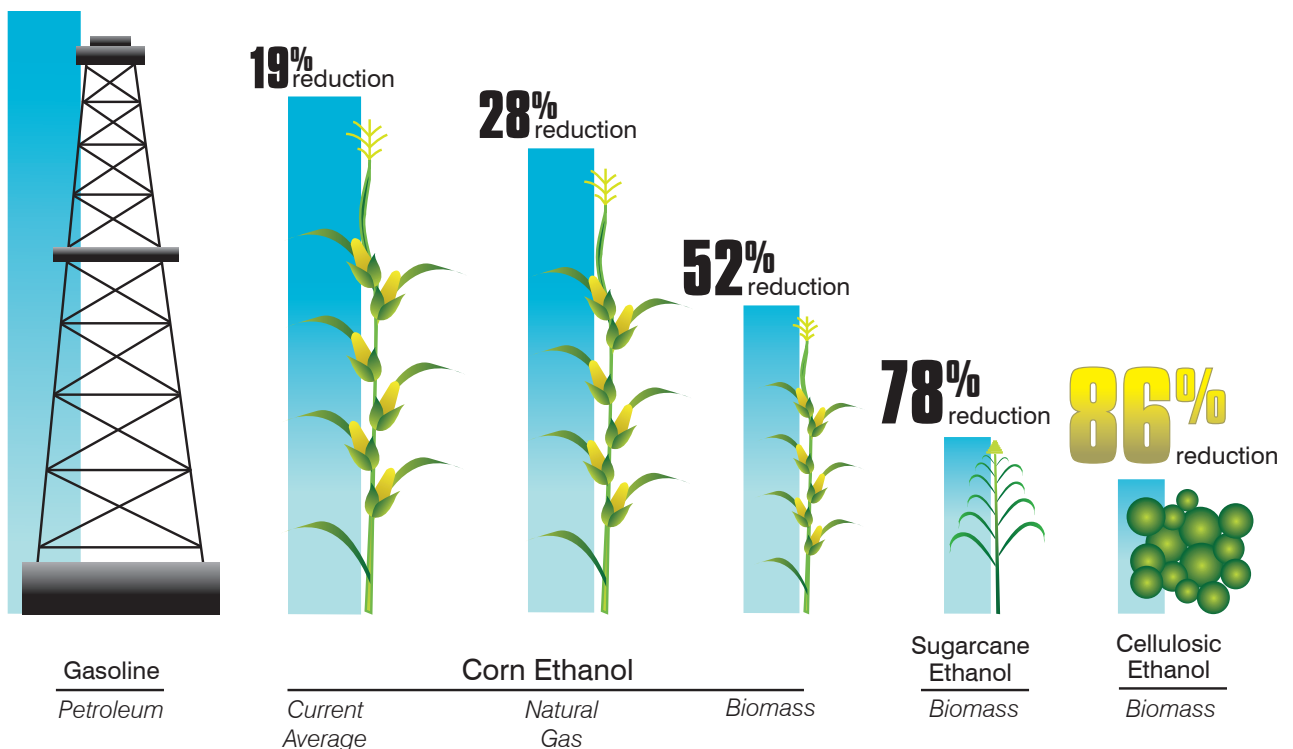
Ethanol is the most widely used biofuel in the United States today. It may be available at your local gas station. Ethanol is currently sold as E-10, a blend of 10 percent ethanol and 90 percent gasoline. E-10 helps cars run better and results in less pollution than regular gasoline. At some gas stations, ethanol is also sold as an alternative fuel known as E-85. E-85 contains 85 percent ethanol and is used in specially designed cars and trucks known as flexible fuel vehicles (FFVs). More than seven million FFVs are on the road today. Many people own FFVs and do not even know it. To determine if your vehicle is an FFV, check the inside of your car’s fuel filler door for an identification sticker, consult your owner’s manual, or visit www.fueleconomy.gov and click on “Flex-Fuel Vehicles.”

Biofuel production will become even cleaner and cheaper

Today, in the United States, most ethanol is made from corn. Corn ethanol is better than fossil fuels in several ways. Corn ethanol results in lower greenhouse gas emissions, and corn can be grown locally so energy is not used to transport crude oil from other countries. In addition, one of the byproducts of corn-based ethanol is Distiller's Dried Grains with Solubles, or DDGS, a high-protein animal feed being used in the United States and overseas. The use of corn for ethanol has prompted concerns over higher prices and availability; however, increases in corn yields have helped address these issues.

Biofuels Reduce Greenhouse Gas Emissions

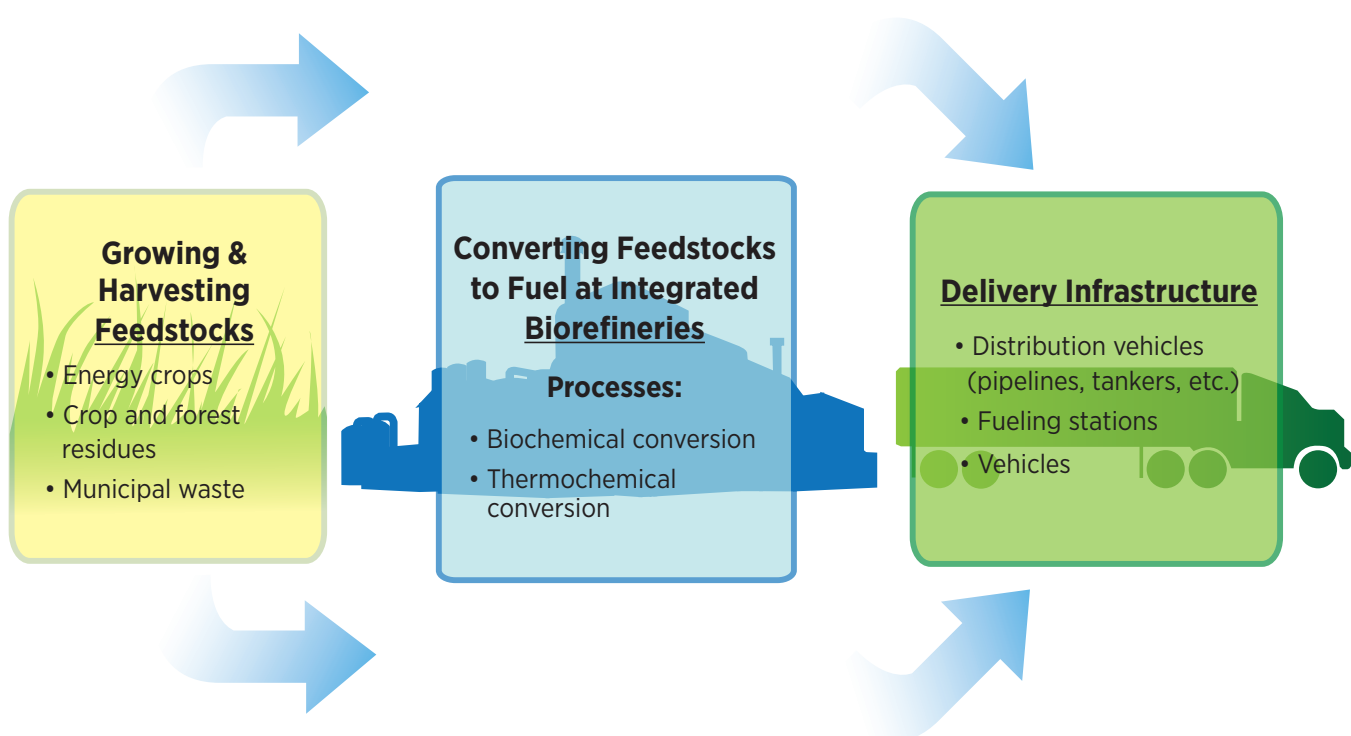
Reductions Vary by Feedstock and Type of Energy Used for Processing



Corn ethanol represents the first generation of biofuels. DOE is currently focusing on new technologies to make biofuels from many non-food sources. In the future, biofuels will be produced increasingly from crop residues (e.g., corn cobs, stalks), forestry residues (e.g., forest thinning, wood byproducts), energy crops (e.g., switchgrass, miscanthus), sorted municipal wastes, and algae. Ethanol produced from cellulose in non-food sources is called “cellulosic ethanol.” Other types of biofuels that can be made from cellulose include renewable gasoline, diesel, and jet fuel. Cellulosic biofuels are an excellent alternative to petroleum-based fuels for several reasons:

- **Cellulosic biofuels provide domestic energy** – Cellulosic biomass is a renewable resource that, unlike fossil fuels, will not run out. It can be grown in nearly every state, so it does not have to be imported from other countries.
- **Cellulosic biofuels are better for the environment** – Biofuels can be produced using more environmentally friendly and sustainable technologies. Use of cellulosic biomass significantly reduces greenhouse gas emissions, which cause climate change.
- **Integrated biorefineries support economic growth** – A biorefinery is a facility that combines biomass conversion processes and equipment to produce fuels, power, and value-added chemicals from biomass. Because integrated biorefineries produce multiple outputs and useful products, they open up new markets in the United States.

Production and Distribution of Cellulosic Biofuels



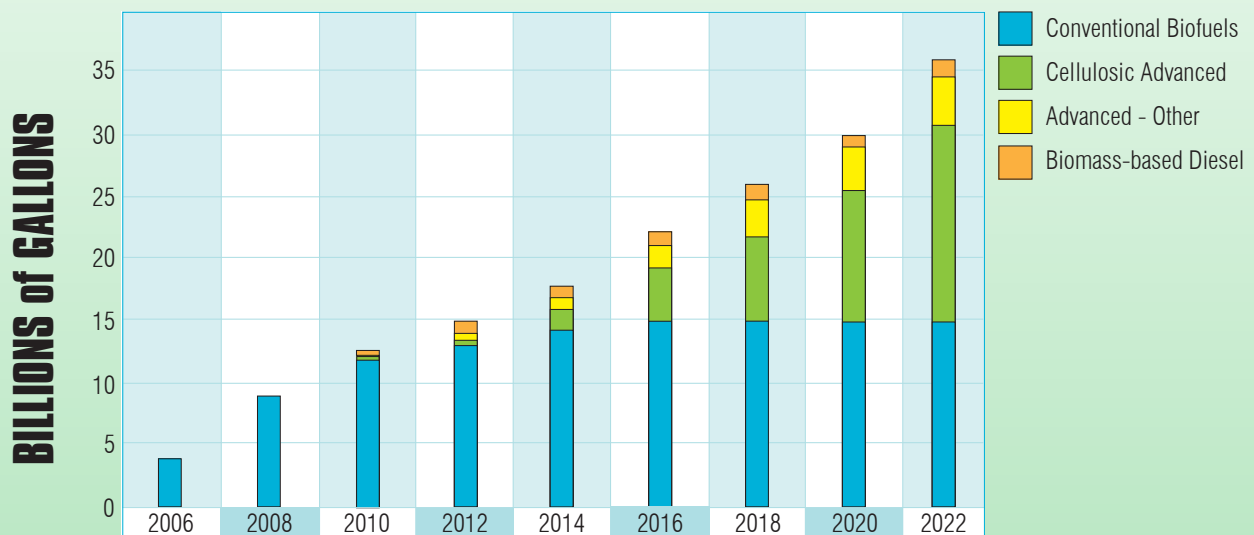
DOE is investing in clean, renewable biofuels to diversify the U.S. fuel supply

The Energy Independence and Security Act of 2007 sets the goal of producing 36 billion gallons of biofuels a year by 2022. If the United States is able to achieve this goal, in 10 to 15 years cellulosic biofuels will be found in many gas stations across the country.

DOE's Biomass Program is investing in strategic research, development, and deployment projects across the United States. These projects will improve the efficiency and lower the cost of producing biofuels so that they can become an increasing part of our fuel supply.

Mandated Biofuel Production Targets

Production targets are set by the *Energy Independence and Security Act of 2007*



DOE is committed to protecting the environment

Although cellulosic biofuels are better for the environment than petroleum-based fuels, some people are concerned about the amount of land that will be used for “energy crops,” meaning crops that are grown to produce biofuels. They are worried that farmers will produce energy crops instead of food or use natural areas, such as prairies or forests, to grow biomass.

DOE and its partners are making sure that biomass and biofuels are produced in ways that do not harm people or the environment. Researchers have been able to reduce the amount of energy needed to produce corn-based ethanol. They are now turning their focus to improving the production of advanced biofuels. Current activities include developing non-food feedstocks that require very little water or fertilizer, and harvesting forest wastes in ways that improve the health of forested areas. Energy crops may also be grown on marginal lands that are not suitable for farming. These activities are part of an effort to make sure that biofuels are sustainable – or capable of being produced indefinitely without harm to society or the natural world.



LEARN MORE ABOUT BIOENERGY

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