



Biofuels fact sheet

Since 2006, BP has committed more than \$1.5 billion to biofuels research, development and operations as a response to increasing energy demand and the need to reduce overall greenhouse gas emissions from transport fuels.

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About biofuels

A biofuel is a fuel made from biomass. Biomass is organic material with stored chemical energy. Examples are plant materials such as sugar cane, corn, wheat, energy grasses such as miscanthus, vegetable oils, wood and algae. The term biofuels covers a wide range of products, some of which are commercially available today, and some of which are still in the research and development stage. Biofuels done well can make a positive contribution to energy security, greenhouse gas emissions and rural development. But not all biofuels are equal - some are better than others. BP does biofuels well.

Energy Diversification

- Biofuels can help diversify the fuel supply for transport, and thus decrease the transport sector's dependence on oil.

Greenhouse Gas Emissions

- Biofuels offer the potential to deliver lower overall greenhouse gas (GHG) emissions compared with conventional fuels (gasoline and diesel or LPG and CNG).
- Biofuels reduce GHG emissions entering the atmosphere on a total well-to-wheels or crop-to-car basis. That is, the carbon dioxide (CO₂) emitted when the biofuel is burnt in the vehicle is offset by the CO₂ absorbed during the growing of the crop. However, GHG emissions are released in the production of fertilizers, pesticides, crop cultivation/harvesting, manufacture and transport of biofuels. Biofuels deliver GHG savings when these emissions are less than the corresponding emissions from the production/combustion of conventional gasoline and diesel.
- Today's biofuels produced from conventional crops (such as bioethanol from sugar cane, or biodiesel from vegetable oils) deliver a 10-90% GHG emission reduction on a well-to-wheels or crop-to-car basis, versus conventional fuels such as gasoline and diesel.
- Future technology developments offer the potential for biofuels to deliver greater GHG emission savings on a well-to-wheels basis of up to 90% versus conventional fuels. This can potentially be achieved through a combination of using less energy-intensively grown crops, or waste materials, and highly efficient/high yielding conversion processes.
- Transport accounts for around 21% of all carbon dioxide emissions and this is projected to rise to 23% by 2030.

Sustainability

- Some biofuels are done well - they can improve energy security and reduce GHG emissions without unacceptable negative consequences. Some biofuels are done badly - they cause deforestation, destroy habitats and don't reduce GHG emissions. BP does biofuels well.
- BP has introduced self-imposed biofuel sourcing guidelines.
- We have engaged with several international organizations that have advocated legislation and drawn up voluntary guidelines to promote responsible biofuels production, avoiding risks such as damage to sensitive ecosystems, for example forests.
- We support mandated sustainability standards and greater regulatory support to encourage advanced generation biofuels.

Availability

- In the longer term, through developments in crop and conversion technologies, biofuels offer the potential to comprise a material share of the transport fuels market in key regions.

For example:

- The US Department of Energy has forecast that biofuels could serve 20-30% of the US transportation market by 2020.
- The International Energy Agency has estimated that biofuels could form up to 30% of the global road transportation market by 2050, in work done in co-operation with the World Business Council project on Sustainable Mobility.

New/advanced generation biofuels

- Conventional biofuels are usually blended into fuel in small proportions (5-10%), providing useful, but limited, reductions in net greenhouse gas emissions.
- Next generation biofuels offer several advantages compared to conventional biofuels:
 - Use of non-food/non-intensively farmed crops or waste, therefore enhancing GHG emission savings, increasing the overall potential availability/supply of biofuels, and potentially improving the cost of production.
 - Enhanced conversion efficiencies/yields again improving the GHG emission performance and increasing overall availability.
 - Improved fuel characteristics enabling blending with conventional fuels in higher proportions without vehicle modifications.

- BP is working with DuPont to develop biobutanol - a first step towards advanced next generation biofuels with enhanced fuel characteristics that enable higher blending in conventional fuels. Further advances in conversion technology will enable the use of alternative feedstocks (such as lignocellulosic feedstocks - including fast-growing, high-yielding energy grasses) resulting in greater GHG emissions savings and higher yields/availability.

Why BP?

- BP has a long history of addressing the issue of growing CO₂ emissions, offering increasingly cleaner fuels to customers and identifying new growth opportunities to develop our business.
- BP is a major biofuels operator. For example, in the US we blended more than 1.03 billion gallons of ethanol and 1.66 million gallons of biodiesel into fuels in 2008.
- BP has a focused biofuels strategy, investing in production of ethanol from sugar cane in Brazil, the development of the advanced fuel molecule biobutanol in partnership with DuPont, and a joint venture with Verenum to produce ethanol from lignocellulosic feedstocks, including dedicated energy crops, in the US.
- BP is investing \$500 million over 10 years in the Energy Biosciences Institute (EBI), at which expert biotechnologists are investigating many possible applications of biotechnology to energy, including advanced fuels.
- Biofuels are directly linked with BP's core skills and competencies (supply, transportation, processing, blending, distribution, and marketing).



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