

Press Release

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Empa-study scrutinizes the ecological balance of various biofuels

«Biofuel» does not necessarily mean ecologically friendly

Biofuels are not necessarily more eco-friendly than fossil fuels. This was shown by a new study through Empa, commissioned by the three Federal Offices for Energy, Environment and Agriculture. The study examined the ecological balances of various biofuels. Though some biofuels reduce greenhouse gases by a third or more in comparison with gasoline or diesel, the cultivation and processing of raw biofuel materials such as corn or soybeans, cause serious environmental impacts to occur, and this clearly worsens the total ecological balance. Biofuel then, is not the same as biologically friendly fuel, and this difference is an important consideration in the present discussions regarding support measures for biofuels. In addition the study shows that the quantity of locally available bioenergy sources is rather limited.

«Energy efficiency and the resulting reduction of greenhouse gases can not be the only criteria for a total ecological evaluation of biofuels», said Rainer Zah, a scientist at Empa who together with his team of researchers evaluated various alternative fuels - Bioethanol, Biomethanol, Biodiesel and Biomethane - from an ecological view point, and took account of the cultivation, processing and conversion of their raw materials to a usable fuel. While the use of a number of biofuels can reduce greenhouse gases by more than 30 percent, the cultivation, processing and conversion of the raw materials into usable fuels cause quite an impact upon the environment. Such impacts range from the overfertilization and acidification of farm land, to the loss of the biodiversity through the uprooting of tropical forests. Using agricultural land for the cultivation of energy producing crops, stands in direct competition with other uses of such lands, as for example for the production of food, or maintaining the land in a natural form.

Transportation has only a limited impact on the environment

The results of the Empa-study, presented by the Federal Offices for Energy, Environment and Agriculture on May 22, 2007, show that not every biofuel is also biofriendly and while, in principle, each of the four examined fuels can be produced so as to be environmentally acceptable, the raw materials and their conversion into fuels determine which alternative fuel is better, from a total ecological view, than gasoline or diesel. The transport of biofuels, including foreign biofuels into Switzerland, has only a limited environmental impact. State support for biofuels, for example by reduced taxation as compared with diesel and gasoline, must therefore be done via differentiated paths. Zah: «The prefix "bio" does not mean in every case also

environmentally friendly».

A recent United Nations Report about durable bioenergy («Sustainable Bioenergy: A Framework for Decision Makers»)¹ reaches similar conclusions. The UN energy group – an entity whose function is to coordinate all of the various UN programs dealing with energy – emphasizes that the effects on economics, environment and society must be analyzed carefully before political decisions are made about possible development and promotion of technologies in the field of bioenergy.

Environmental impacts in the cultivation of bioenergy raw materials

The total ecological balance of biofuels is negatively impacted through the agricultural cultivation of raw materials. Thus, for example, in tropical countries, the uprooting of rain forest by fire leads to large quantities of CO₂, to an increase of air pollution through soot and noxious emissions like Nitrogen oxides, aerosols, dioxins, and causes the loss of biodiversity. Cultivation in moderate climate zones impacts negatively the environment because of intensive overfertilization and the mechanical treatment of the soil. The extremely high environmental damage caused in Europe by the production of ethanol from rye, the most studied of all biofuels and the one with the worst ecological balance by far, is due to its low yielding harvest.

Good results with refuse, waste materials and wood

With regard to the eco-balance, the energy recovery from refuse and waste materials – according to the study – performed best compared to fossil fuels. Not only are the high environmental impacts caused by the supply of raw materials eliminated, but also, pollutant emissions from refuse disposal are reduced. Likewise, good results are obtained from the use of wood and its gasification for energy, as the environmental impacts of obtaining the raw material are rather minimal.

Furthermore, in contrast to fossil fuels, the environmental impacts of all examined biofuels can be substantially reduced through specific measures. Austere certification guidelines for biofuels can reduce the problem of uprooting rain forests by fire. The scientists of Empa expect that in the near future it would be possible to better evaluate individual biofuels through better optimization of existing and newly developed manufacturing processes of such fuels. The Empa-study was based on data from «ecoinvent»², a worldwide unique scientific data bank for basic data pertaining to ecological balances, founded and developed by a network of Swiss research institutes and attended by Empa.

The availability of homegrown bioenergy is limited

Empa's study has also found that the quantity of homegrown energy is limited. When the available biomass could be converted into biofuels efficiently and in an environmentally friendly manner, and at the same time its energy efficiency is increased, then alternative energy sources as well as renewable energy forms could play an important role in our future power supply.

Further information

The press release of the Federal Offices as well as the complete final report (Ecobalance of energy products: Ecological evaluation of biofuels) may be found at www.bfe.admin.ch

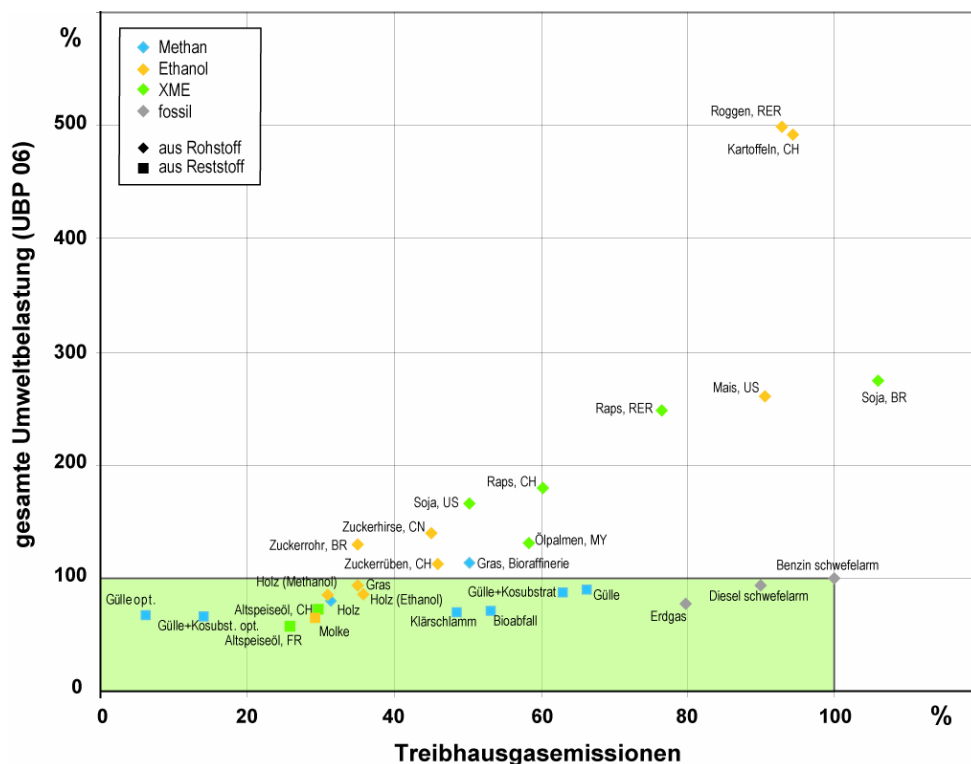
¹The report «Sustainable Bioenergy: A Framework for Decision Makers» by the UN energy group, an entity whose function is to coordinate all of the various UN programs dealing with energy, may be found at <http://esa.un.org/un-energy/>

²«Ecoinvent», a worldwide unique scientific data bank for basic data pertaining to ecological balances, founded and developed by a network of Swiss research institutes and attended by Empa (www.ecoinvent.ch)

September 3 to 5, 2007, in Davos Switzerland: R'07 world congress «Recovery of Materials and Energy for Resource Efficiency», which will include a workshop on the topic of biofuels, on Sept. 4 (www.r07.org)

Technical information

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Representation of the entire environmental impact (perpendicular) as well as the greenhouse gas emissions (horizontal) of the examined biofuels in percentage points as compared with gasoline. The fuels within the green surface fare better than gasoline in emissions of greenhouse gases as well as the entire environmental impact. (UBP 06: One method, developed in Switzerland estimates total environmental impact from the difference of actual emission values and existing legal regulations.) (Source: Empa)



Biofuels are at present the most important renewable form of energy when it comes to street traffic (Picture: iStockphoto)



Uprooting with fire for the cultivation of soy beans in the Amazon area - causing a negative impact on the ecological balance. (Picture: iStockphoto)