



How green are biofuels and bioenergy?

Environmental performance of biofuels and bioenergy

Biomass is the organic fraction of agricultural products (including vegetal and animal substances), from forestry and related industries, as well as the organic part of industrial and municipal waste. This includes for example wood, straw, energy crops, agricultural waste, agro-industrial waste, plants and animal waste.

Bioenergy is the production of energy from biomass for uses in transport, heat or electricity. In the specific field of liquid biofuels for transport, important programmes have been launched in Brazil since the end of the seventies but also more recently in the United States and the European Union. In the United States mainly corn is used for ethanol production. In Europe, rapeseed, sugar beet and corn are used for 1st generation biofuels. Second generation biofuels from ligno-cellulosic material might become operational in a few years. Within this context, since one of the drivers for bioenergy development at worldwide level is climate change policy, an important question to be answered is: How green are biofuels and bioenergy?



Background and policy framework

The Biofuels Directive presently under implementation in the European Union set a target of 5.75% of biofuels for transport purposes by end of 2010. In addition, the European Commission proposed on 23/1/2008 a Directive on the promotion of the use of energy from renewable sources. This Proposal is presently under review by the European Parliament and the Council. This Proposal aims to establish an overall binding target of a 20% share of renewable energy sources in energy consumption. It also proposes for each Member State to achieve at least a 10% share of renewable energy (primarily biofuels) in the transport sector by 2020. EU Member States are also in the process of formulation of National Biomass Action Plans that will establish targets per sector and corresponding measures at national level.

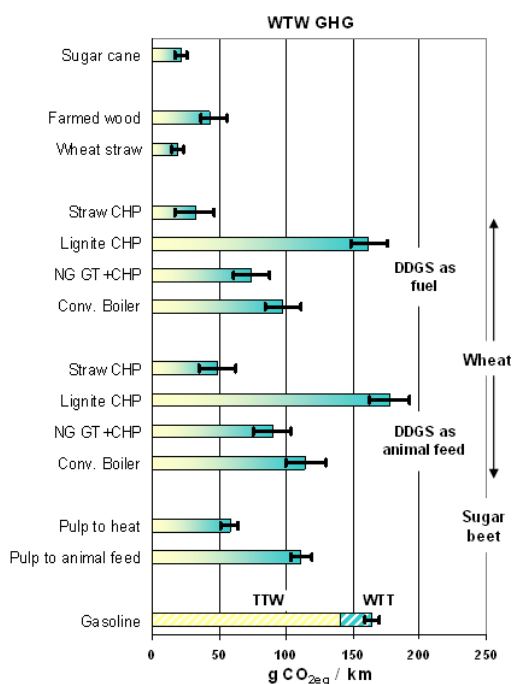
Main activities

The Biofuels/Bioenergy Action aims to provide information on the most important quantifiable parameters needed to formulate biofuels and bioenergy policy, such as:

- Availability from EU and external sources,
- Energy balance, greenhouse-gas-balance and environmental impact,
- Cost of production and mobilisation, competitive use and impact on existing industries,
- Potential in emerging countries,
- Effect on commodity/food/by-product prices and overall cost-benefit analysis.

In cooperation with a wide range of partners, the Biofuels / Bioenergy is thus contributing to activities related to:

- Life Cycle Analysis of biofuels,
- Agro-environmental assessment of direct and indirect impact of biofuels policies in tropical countries, with main emphasis on exporting countries such as Brazil, Malaysia and Indonesia,
- Scientific support to the preparation of biofuels sustainability certification schemes,
- Cost analysis of first and second generation biofuels.
- Scientific networking in the field of bioenergy at JRC (Biofuels Task Force) or international level (International Energy Agency, European Environment Agency, OECD...).



GHG emissions for ethanol pathways (2010+ vehicles) From JEC WTW

Well-to-Wheels (WTW) analysis of transport fuels

JRC, EUCAR and CONCAWE (JEC) have jointly evaluated the Well-to-Wheels (WTW) energy use and greenhouse gas (GHG) emissions for a wide range of potential future fuel and powertrains options. An extract of the JEC WTW Version 2c, March 2007 has been made to form an easily readable reference for people interested only in biofuels. Conventional fuels, namely standard gasoline and diesel, have been incorporated for comparison. In particular, the following biomass types are considered:

- Sugar beet, sugar cane, wheat and straw
- Oil seeds -rapeseed, sunflower- (to bio-diesel)
- Wood (to ethanol and to synthetic liquid fuels)
- Organic wastes (to compressed biogas)

The extract incorporates the complete pathway of the biofuel, from the production of the raw material to the final biofuel use in the car. It means to have listed in the report for each biofuel:

- availability in EU at given cost
- costs involved in the processing, transportation, infrastructures
- GHG emissions and energetic balance.

See: WTW analysis of future automotive fuels and powertrains in the European context, 2008

<http://ies.jrc.ec.europa.eu/WTW>

Detailed information can also be found at:

Biofuels / Bioenergy Action web site
http://re.jrc.ec.europa.eu/biof_

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