GRUPPO MOSSI & GHISOLFI

GBEP
Global Bioenergy Partnership

A sustainable energy scenario for bioenergy

The role of second generation biofuels in greenhouse gas (GHG) reduction

LEGAMBIENTE

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Il Sole 24 ORE
La cultura dei fatti.

Biofuels and environment

Issues in the international debate

A large-scale diffusion of biofuels is a perspective compatibile for the environment?

Problems and charges:

- decrease of food crops, increase of prices of products, diffusion of industrialised monocultures, and consequences for the poorest
- depletion of forests and important ecosystems in order to increase cultivable areas (such as the tropical forest in Brazil and Malaysia)
- a limited benefit in terms of CO2 emission savings

Biofuels and environment

Policy developments:

- EU target 5,75% biofuel share by 2010. Recent 10% share of renewable energy in transport by 2020 (but not only biofuels). Changes in debate about obligatory targets

First-generation biofuels show great technological limits and therefore limited sustainable diffusion on a large scale.

- Marginal benefits in reducing greenhouse gas (GHG) and fuel prices.
- Need for big subsidies (Usa federal subsidies for $7 billion per year, plus tax on the import of ethanol) in a period of economic crisis.

The real issues

For second generation biofuels to become an answer to the climate and energy emergency

1) Increase productivity and reduce land use

UNDERSTANDING THE ROLE OF LAND IN COMPARING GREENHOUSE GAS EMISISONS FROM BIOFUELS AND CONVENTIONAL FUELS

Why calculating land use change just means accounting for the costs of using land as well as the benefits

GREET and UK Default Values CO2 Emissions for Various fuels, grams (CO2 equivalent) per mega joule of energy in fuel

	1	2	3	4	5	6	7	8
				Land Use Effects				
	Production Emissions	Refining and Retail Transport	Combustion	*Land Use Benefit* carbon removed from air by plants used for biofuels	*Land Use Cost* emissions from cropland expansion to replace crops on land diverted to biofuels (as estimated by Searchinger/Heimlich)	Total without any land use effects (rows 1+2+3)	Total counting land use benefit only (rows 1+2+3+4)	Total counting land use benefit and cost (rows 1+2+3+4+5)
GREET								
Gasoline	4	15	72	0	0	91	91	91
Corn Ethanol	24	40	71	-62	104	135 (+48%)	73 (-20%)	177 (+93%)
Biomass Ethanol	10	9	71	-62	111	90 (-1%)	28 (-70%)	138 (+51%)
Diesel	5	11	68	0	0	84	84	84
Soy Biodiesel	23	23	69	-76	110-180	115 (+37%)	39 (-57)	+149 to +219
UK Default Values –Diesel*	3	14	69			86	86	86
UK Default Palm to Biodiesel	8-9	35-36	69	-69	?	112-114 (+30% to +33%)	43-45 (-50% to -48%)	?
UK Default Rape biodiesel for UK	52	0	69	-69	?	121 (+41%)	52 (-40%)	?

Percentages are for biofuel compared to gasoline or diesel.

EEB, Hidden carbon costs when changing land use from food production to energy production (*Science*, Searchinger 2008; UK Renewable Fuel Agency, Gallagher review 2008).

The real issues

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2) Reduce water and energy balance

Tabella 1: Bilancio energetico dei biocombustibili di prima generazione – Rapporto tra energia fornita in fase di combustione (Output) ed energia necessaria per la fase di produzione del biocombustibile (Input)

FONTE: Adattato da [Russi 2007, IEA 2006, CONCAWE 2002]

BIOCOMBUSTIBILE	FEEDSTOCK	OUTPUT/ INPUT ENERGIA senza allocazione ai coprodotti	OUTPUT/ INPUT ENERGIA con allocazione i coprodotti	FONTE
Bioetanolo	Canna da zucchero (Brasile)	8		IEA/GB 2006
	Mais	<2		
	Barbabietole / grano (media)	1,2	1,45	CONCAWE 2002
Biodiesel	non specificato	<3		IEA/GB 2006
	Colza (Svezia)	2,5	3,2 - 3,5	Bernesson et al 2004
	Colza	1,9	2,3	CONCAWE 2002
	Colza	0,7–1,0	1,0-1,5	Venturi&Venturi 2003
	Girasole	0,3-0,9	0,4-1,2	
	Soia	0,2-0,6	0,7-1,6	
	non specificato	0,98-1,16	1,21-1,51	Giampietro&Ulgiati 2005

Imported biofuels an estimated increase of 6-10% of energy consumptions

(Source IEA)

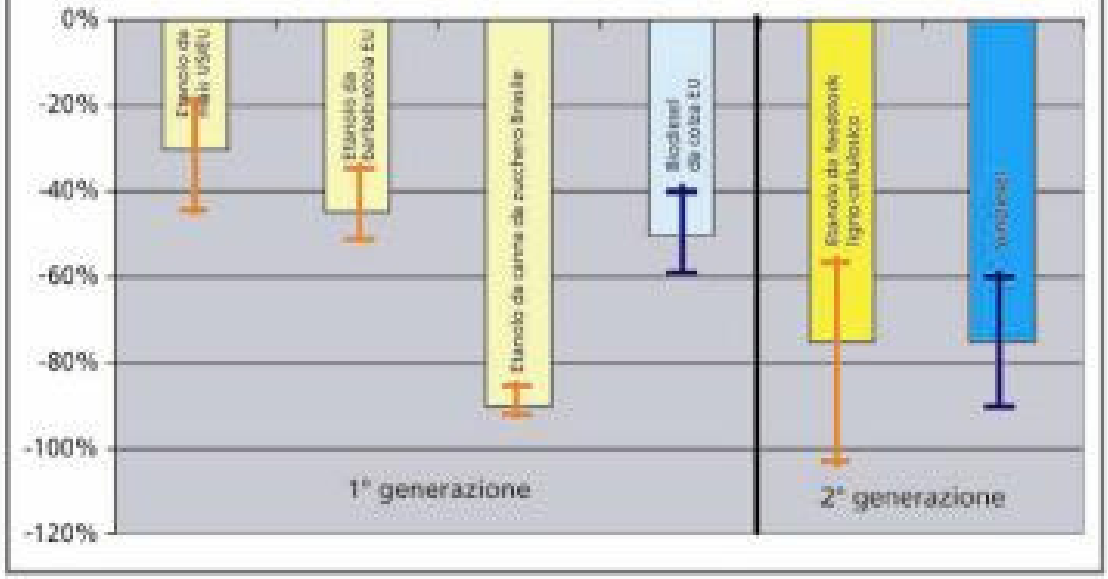
The real issues

For second generation biofuels to become an answer to the climate and energy emergency

3) Increase CO2 emissions savings

Figura 1. Riduzione netta delle emissioni di gas effetto serra per diversi tipi di biocombustibile di 1° generazione e 2° generazione rispetto all'utilizzo di combustibili fossili

(Fonte: adattato da IEA 2004 e PE 2004)



P. Frankl, Iea, 2007

A sustainable bionergy policy

Promote applied research on second-generation biofuels

The processes “biomass to liquid” for the production from lingo-cellulosic materials, able to achieve better results on energy efficiency and CO2 emission reduction, through a higher yield and a reduction (zero setting) of water consumption.

Establish sustainability criteria for all forms of bioenergy in the EU Renewable Energy Directive. To ensure that feedstocks do not cause displacement effects or harm biodiversity, and are used in the most efficient way possible.

Encourage a territorial approach aimed at the valorisation of more suitable and sustainable biomasses. Development of local energy supply chains, with integration and alternation of food and non-food culture, and a use of biomasses both for energy and heat purposes, and also for biofuel production.

National goals for gradual diffusion and subsidies are compatible with this scenario.

The role of biofuels in a scenario of GHG and fuel consumption reduction in transports

The reduction of CO2 emission by transports can occur within a policy that takes into account at the same time:

- • The reduction of consumption and emissions of circulating vehicles. Establishing strict long term emissions targets for more efficient vehicles (60 g/CO2/km).
- · Set objectives in terms of GHG savings in fuels. EU revision of Fuels Quality Directive (FQD), obligation to reduce intensity by 10% over 10 years.
- · Carbon tax for the promotion of fuels with lower CO2 emissions (biofuels, methane, electric and hybrid cars)

In Italy (transport +28% of CO2 growth since 1990) need for strong policies of re-balance and modal integration. Priority to investments for sustainable mobility in cities (two thirds of mobility's demand are in urban areas, 14milion people moving every day for job and study reasons); and for rail freight transport, stop to new motorways.