



What FAO Thinks and Does about Sustainable Bioenergy

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Forum
Rome November 2014

What is not true !

- **Sweeping statements on bioenergy sustainability** - Food crop feedstock always bad / Energy crops and residues always good - **Not that simple!**
- **Simple solutions to reconcile food and fuels are available** - **You must be joking!**



Food-based feedstocks always bad??

- **Flex crops (produce food and fuel) do not compete with food if fuel adds to food** – Possible but challenging through:
 - **Yield increase** (e.g. sugarcane in Brazil) - But possible competition over use of inputs!
 - **Substitution of export crops** (ex: cassava ethanol study in Tanzania)
 - **Integrated food-energy systems** (IFES)
 - **Outgrower schemes**



Enough Land? Most people think Yes

- **Biofuels currently use only 2-3% of all arable land** . Percentage could rise to 5-8% in the next decades
- **Sustainable agricultural intensification** and use of residues may reduce pressure on land
- **But need to be careful about competing use of residues** (soil management, animal feed, energy)



Challenge more on WHOSE land

Source: Dubois, 2008

Land belongs to	Size of bioenergy production unit	
	Large	Small/community type
Company (private or public)	A	C
Small producer or community	B	D

Outgrower schemes

And WHAT land

- **“No go areas”** (high carbon, high biodiversity) – **Relatively easy to define; more difficult to enforce**
- **“Best bet areas”** Often so-called degraded/marginal/abandoned land: But controversial/dynamic concepts that **need to be locally defined**

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What is more Interesting for investors !?



Key messages on land

Often more about “Whose” and “What” Land

Bioenergy must be **ADDITIONAL** to food

A lot to do with land and natural resources governance



Voluntary guidelines on sustainable tenure governance
of land, forests and fisheries



Biofuels and food prices

- Based on global studies biofuels cause 3 to 75% increase on international food prices - **Jury out for ever!**

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- Need to assess **price transmission** from commodity to food and from international to national and local levels
- Price changes **impact different people in different ways**



BEFS Tanzania – Who wins or loses from a rise in cassava food prices?

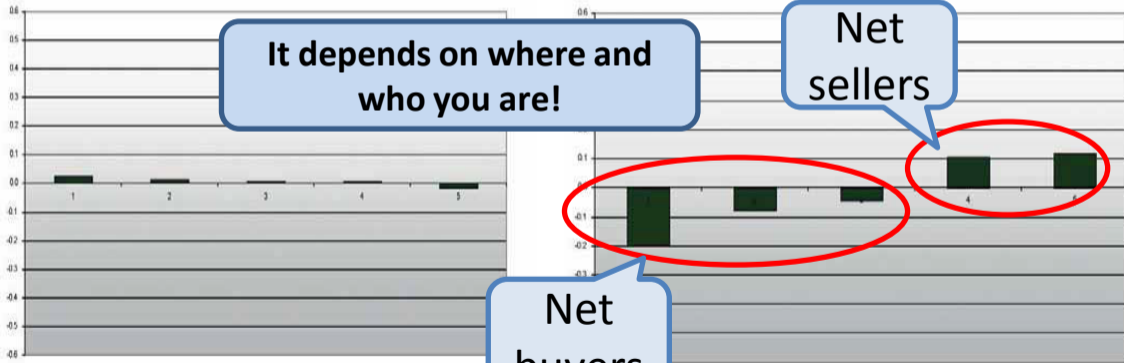
Welfare impacts in Kilimanjaro for a 10 percent increase in the price of cassava

Welfare impacts in Ruvuma for a 10 percent increase in the price of cassava

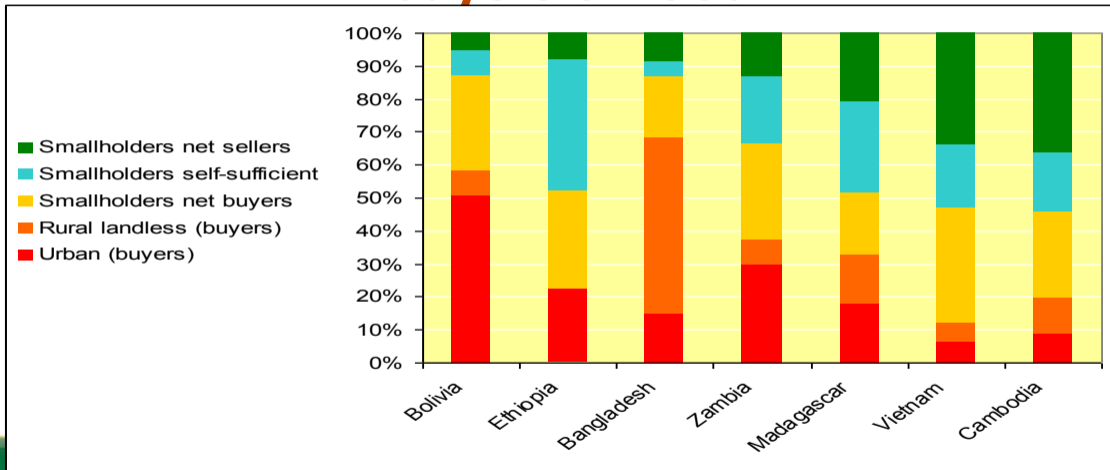
It depends on where and who you are!

Net sellers

Net buyers



Impacts will vary for net sellers and net buyers of food



Key message on food prices

There is a link

BUT

**Need to look at it at country and household levels
where it matters!**



Second generation biofuels: The silver bullet?

- **More conversion efficient** (uses all parts of the plant)
- **Less direct competition** with edible feedstock

BUT

- **Less edible by -products** if all plant used for bioenergy
- **Possible negative environment effects**
- **Possible indirect competition with food security** -land use; use of agricultural residues
- **No flexibility between food and energy markets**
- **Not ready on large scale yet and for some more**



By-products/residues: interesting but caution!

- Agricultural/wood/fisheries by-products/ **residues becoming commodities as increasingly used** (IEA predicts residues 25-30% of biofuel feedstock energy by 2050)
- Use of by-products allows for 10-30% **reduction in land needs**
BUT

Watch out for:

- **competing use of agricultural residues** (soil management – feed – bioenergy)
 - Cheapest fertiliser and soil protection for small-scale farmers
 - Often more than 40% animal feed in developing countries



Certification is the silver bullet !!!!!

Source: Dubois, 2008

Most address
poorly food
security
+
Challenge for
smallholders

Only works if many
other things are in
place

5. Other

4. Monitoring, e
Audit, certification o

3. Tools
and disincentives for policy implementation

2. Policies
, standards, regulations for sustainable bioenergy

1. Actors' roles
Roles (Rights, Responsibilities, & Benefits) of concerned actors and institutions
defined and agreed upon

BASIC CONDITIONS

- Secure and equitable tenure conditions
- Favourable market and investment
- Institutionalised participatory decision-making mechanisms
- Formal recognition of primary actors and institutions (government, private sector and civil society)

Key message on Sustainable Bioenergy

Bioenergy is **complex** and **multi-faceted** and therefore assessment of its sustainability must be:

- **evidence-based,**
- **contextualised, and**
- **integrated**



Sustainable Biofuels: What is needed

- **An in-depth understanding** of the situation and related opportunities and risks as well as synergies and trade-offs;
- **Implementation of good practices** by investors/producers in order to reduce risks and increase opportunities;
- **An enabling policy and institutional environment** to promote the implementation of good practices;
- **Appropriate monitoring and evaluation** of impacts and performance of good practices and policy responses
- **Political will, capacities and good governance** to implement the above

FAO's Sustainable Bioenergy Support Package

Examples of good practices

- Agro-ecological zoning
- Outgrower schemes
- Integrated food energy systems

Sometimes **interesting to combine them**



Example of good practice: Integrated Food Energy Systems – Two types

Type 1:

Optimising land use efficiency of food and energy production on the same land

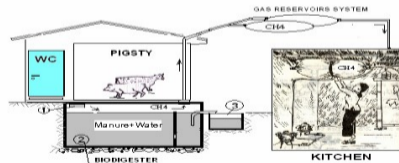
Agroforestry system in the Maldives



Type 2:

Biomass use optimisation through recycling of all by-products

Pig-biogas system - Vietnam



The challenge is to scale up good ones



IFES analytical framework

- **Analyzing the socio-cultural context:** Understanding the farmers' perspective through Rapid Rural Appraisal methodologies
- **Assessing sustainability:** Strengthening the evidence base through an indicator-based framework
- **Assessing replicability:** Analyzing the enabling environment through a comprehensive checklist



Examples of Outgrower Schemes for Biofuels

From food crops



Jatropha in Sri Lanka

Palm oil in Tanzania



From energy crop



Addressing competing use of residues

- **At territorial level** – The BEFS-RA module on residues – EXCEL tool using local or default values
- **At Farm level**: Energy module of the FarmDesign optimization algorithm to assess tradeoffs in use of resources in farming systems (with Wageningen)



BEFS Operator Level Food Security Assessment Tool

Key environmental and socioeconomic issues to consider in assessing operator level impacts on food security:

- 1. Change in the supply of food** (crops and livestock) to the domestic market
- 2. Resource availability and efficiency of use** (land, water and fertilizers)
- 3. Land and income displacement** and related **compensation**



FAO BEFSCI OPERATOR LEVEL FOOD SECURITY ASSESSMENT

Operation Overview	
Name (Company/Sponsor/Organization)	ABC Tanzania Ltd.
Bioenergy Feedstock	Sunflower
Total hectares	15000
Latitude	-6.328125
Longitude	34.1455078125

Country: United Republic of Tanzania

Key	Potential Benefit for Food Security
	No Significant Influence on Food Security
	Potential Risk to Food Security

1. CHANGE IN THE SUPPLY OF FOOD TO THE DOMESTIC MARKET

1.1 Former/Current land-use (prior to operation)	hectares
Subsistence agriculture	2000
Commercial agriculture	7000
Livestock grazing	5000
Fallow land	3000

1.4 Change in the supply of food basket items to the domestic food market	tons
CROPS	
Cereals and tubers	2000
Sugar crops	-4200

2. RESOURCE AVAILABILITY AND EFFICIENCY OF USE

2.1 Land and/or water scarcity	No land and water scarcity
2.2 Land Use Management	Up to two practices

Crop	Land use efficiency	Fertilizer application efficiency
Sunflower	More efficient than national average	
Maize	More efficient than national average	



How to do it? GBEP Sustainability Indicators

PILLARS

Environmental

Social

Economic

INDICATORS

1. Life-cycle GHG emissions	9. Allocation and tenure of land for new bioenergy production	17. Productivity
2. Soil quality	10. Price and supply of a national food basket	18. Net energy balance
3. Harvest levels of wood resources	11. Change in income	19. Gross value added
4. Emissions of non-GHG air pollutants, including air toxics	12. Jobs in the bioenergy sector	20. Change in consumption of fossil fuels and traditional use of biomass
5. Water use and efficiency	13. Change in unpaid time spent by women and children collecting biomass	21. Training and re-qualification of the workforce
6. Water quality	14. Bioenergy used to expand access to modern energy services	22. Energy diversity
7. Biological diversity in the landscape	15. Change in mortality and burden of disease attributable to indoor smoke	23. Infrastructure and logistics for distribution of bioenergy
8. Land use and land-use change related to bioenergy feedstock production	16. Incidence of occupational injury, illness and fatalities	24. Capacity and flexibility of use of bioenergy

Agreed by 23 countries & 13 international organizations involving a total of 46 countries and 24 int. organizations



FAO's key messages on bioenergy

- **Sustainability of bioenergy is context specific.** Therefore its assessment must be based on reality not models and global studies
- **Tools and knowledge are now available** to help governments and operators reduce risks and enhance opportunities of bioenergy
- *Per se* **biofuels are neither good nor bad.** What matters is the way they are managed



Overall FAO message on Reconciling Food and Fuel

- It can be done
 - But we need to embrace complexity
 - We never said it was easy
 - But we have the knowledge and tools to do it
- So let's make it happen!**



Thank you for your attention!

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