



BEFS

Bioenergy and Food
Security Projects

Integration of Smallholders in the Production of Sunflower Biodiesel in Tanzania

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Outline

- FAO's Bioenergy and Food Security Approach- The Bioenergy Assessment
- BEFS in Tanzania
- The Sunflower Biofuel production study
 - Overview
 - Scenarios
 - Results
- Recommendation and Conclusions

BEFS Approach the Bioenergy Potential Assessment

The Bioenergy assessments aims to generate information to support countries develop evidence-based. The assessment consist of:

- 1. Diagnostic analysis**
 - Agricultural outlook
- 2. Natural resource analysis**
 - Land assessment
 - Water resource management
 - Woody biomass and residues
- 3. Techno-economic analysis**
- 4. Socio-economic analysis**
 - Economy-wide impacts
 - Household food security & vulnerability



BEFS Approach: Techno-economic Analysis

The objective of the techno-economic analysis is to help countries understand if:

- **bioenergy can be produced competitively**
- **if biofuels can be profitable with smallholders participation**

It does this by developing cost profiles for different production scenarios that are designed based on:

- 1) selection of feedstock origin
- 2) bioenergy processing configurations



BEFS in Tanzania

BEFS was implemented in Tanzania to assist the government in their biofuel policy development.

The land assessment studied the suitability for the following bioenergy crops:

Ethanol : sugar cane, sweet sorghum, and cassava

Biodiesel: Oil Palm and sunflower

The results of this analysis illustrated a high agro-climatic and soil suitability for sunflower. Based on this a techno-economic analysis to assess biofuel production potential from this crop was proposed.



Tanzania Sunflower Biofuel production study

The objective was to assess if biofuel namely straight vegetable oil and biodiesel produced from sunflower could be cost competitive with the participation of smallholders as feedstock providers.



Tanzania Sunflower Biofuel: Scenarios and Assumptions



Scenario	Origin Feedstock	Biofuel Processing	Co-products
1	Smallholder 100%	SVO 500,000 liters/year Mechanical Press	Sunflower meal
2	Smallholder 100%	Biodiesel 500,000 liters/year Mechanical Press	Sunflower meal Low quality glycerol
3	40% smallholder 60% estate	Biodiesel 22 Million liters/year Batch reactor/solvent extraction	Sunflower meal Low quality glycerol
4	40% smallholder 60% estate	Biodiesel 44 Million liters/year- 50% edible oil Batch reactor/solvent extraction	Sunflower meal Co-generation Low quality glycerol

Assumption: Paid price to smallholder 307US\$/ton at factory gate and cost of estate production 212 US\$/ton.



Tanzania Sunflower Biofuel: Results

Co-products	Scenario 1	Scenario 2	Scenario 3	Scenario 4
<i>US\$ cost production per liter at factory gate</i>				
Without	1.07	1.30	1.23	1.09
With (Min)	0.95	1.16	1.14	0.93

Assumption paid prices for co-products:

- Meal = 57 US\$/ton
- Glycerol = 200 US\$/ton
- Electricity = 25.5 cents per kWh

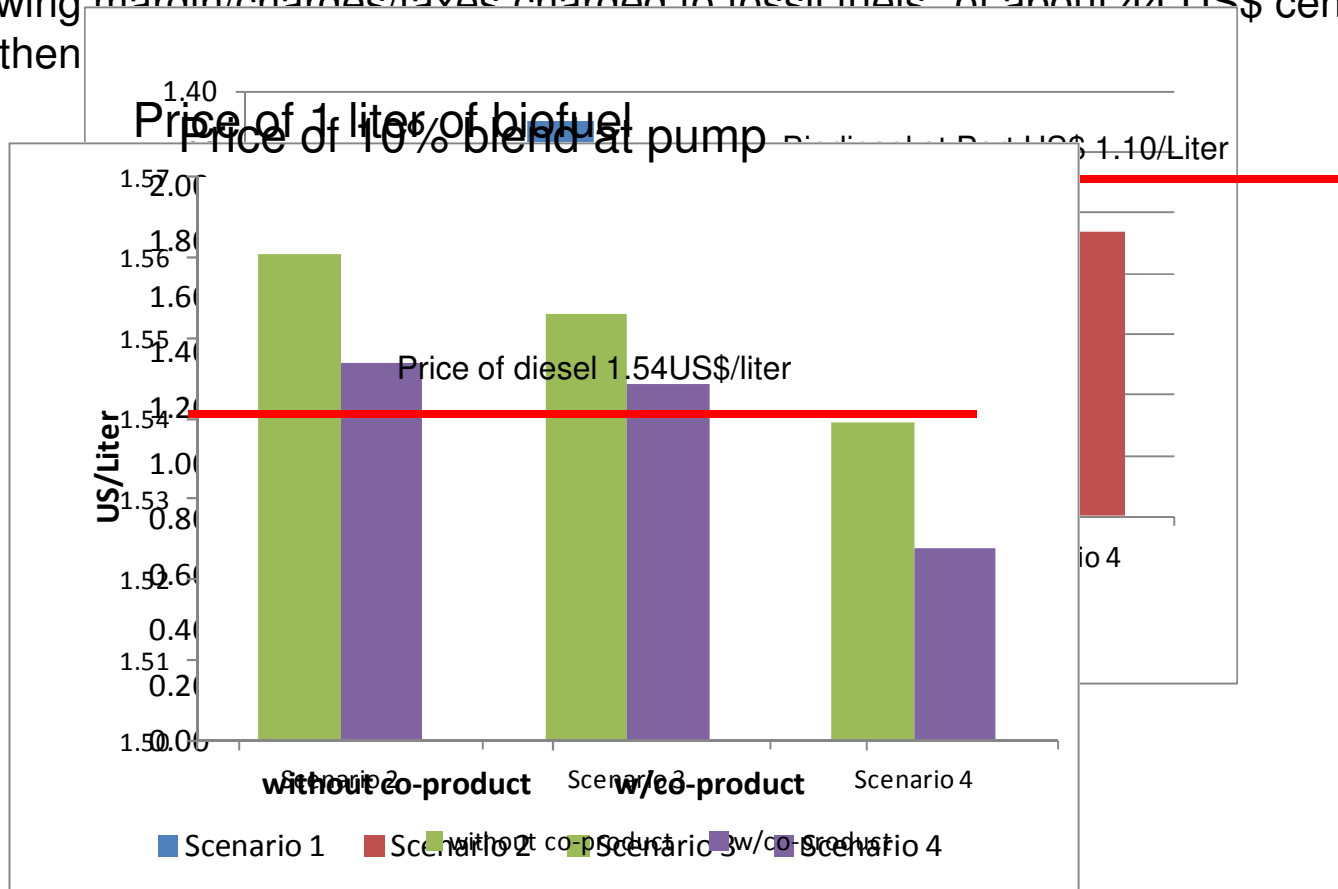
Tanzania Sunflower Biofuel: How can the results be used to inform policy?



Domestic market:

How does the SVO and Biodiesel compete with diesel in the country?

What is a potential sale price? Based on Energy and Water Regulatory Agency the following margin/charges/taxes charged to fossil fuels* of about 44 US\$ cents per liter then



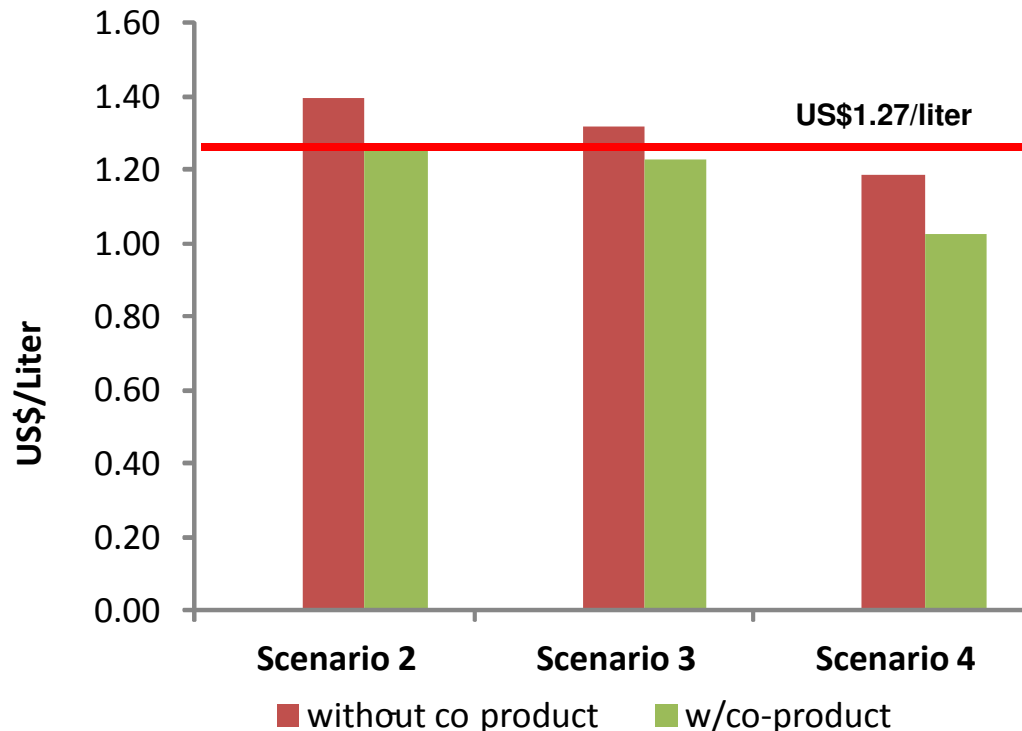
*These included: authorized profit margin US\$0.09; Taxes to Fossil fuels US\$0.35; Transportation fuel to market US\$0.01 per liter.



Tanzania Sunflower Biofuel: How can the results be used to inform policy?

Biodiesel export market to EU

At port: Production cost + shipping (0.09 cents/liter)



Tanzania does not have to pay import tariff therefore:

- ❖ For scenarios 2 and 3 profit margin are negative or negligible- not competitive
- ❖ For Scenario 4 profits are positive best option is when co-products are considered.



Tanzania Sunflower Biofuel: Conclusions

The production of small-based SVO to supply local needs i.e. electric generators could be feasible under some circumstances, particularly if the revenue of co-products is made possible and if productivity gains are achieved.

The production of Biodiesel could be competitive both at national and international market for scenario 4 when co-products are considered.

The production of Biodiesel for scenario 4 could be competitive with national biodiesel market prices if the government decides to forgo partially or completely fuel taxes.

Feedstock price is critical to the cost competitiveness, if prices were higher than assumed then neither of the scenarios will be competitive.

The estimated price for 10% blend if all taxes are levied to biodiesel, is around the same prices as 1 liter of biodiesel at the pump.

Conclusions



Key message on **biofuels**

Per se **biofuels** are neither good nor bad...

....what matters is the way they are managed



THANK YOU!

<http://www.fao.org/bioenergy/foodsecurity/befs>

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