

Preliminary economic assessment of micro-distilleries in Brazil

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Introduction

- ✓ Preliminary economic assessment based on primary data
- ✓ Uncertainties on industrial parameters (few measurements)
- ✓ Industrial process not optimized

Objective: Considering micro-distilleries in different contexts



Related papers to LACAf - I

Paper #3

Key points in the selection of the sugarcane ethanol production model: scale of distillery and mechanization level

Paper #5

The good and bad of small scale biofuel production in developing countries

Paper #6

Assessment of different biofuels production chain alternatives

Considered scenarios

Scenario	Industry	Agricultural	Ethanol price
Ref.	Large scale	Large farm (SP)	Producer price (SP) <i>(0.55 USD/L)</i>
1	Micro-distillery	Small holder farm (SP)	Producer price (SP) <i>(0.55 USD/L)</i>
2	Micro-distillery	Small holder farm (SP)	Fuel station (SP) <i>(0.82 USD/L)</i>
3	Micro-distillery	Small holder farm (RS)	Fuel station (RS) <i>(1.23 USD/L)</i>

Industrial key assumptions for large scale ethanol plant

Scale of the distillery	TC/year	2,000,000.00
CAPEX	Million US\$	188
Hydrous ethanol yield (93°GL)	L/TC	82.4
Jobs on industry	-	160
Mean salary	US\$/month	1680.00
Wood consumption	m ³ /TC	0
Yeast consumption	g/TC	0
Electricity consumption	kWh/TC	0
Sugarcane price	US\$/TC	25.53

Industrial key assumptions for micro-distillery

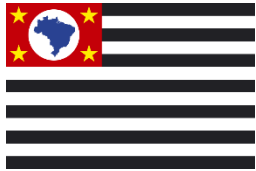
Scale of the distillery	TC/year	3,000
CAPEX	US\$	114,000.00
Sugar extraction efficiency	%	84.7
Fermentation efficiency	%	85.0
Distillation efficiency	%	89.6
Hydrous ethanol yield (93°GL)	L/TC	64.3
Jobs on industry	-	3
Mean salary	US\$/month	727.00
Wood consumption	m ³ /TC	0.43
Yeast consumption	g/TC	71.4
Electricity consumption	kWh/TC	68

Key assumptions – sugarcane in small holder farm in RS



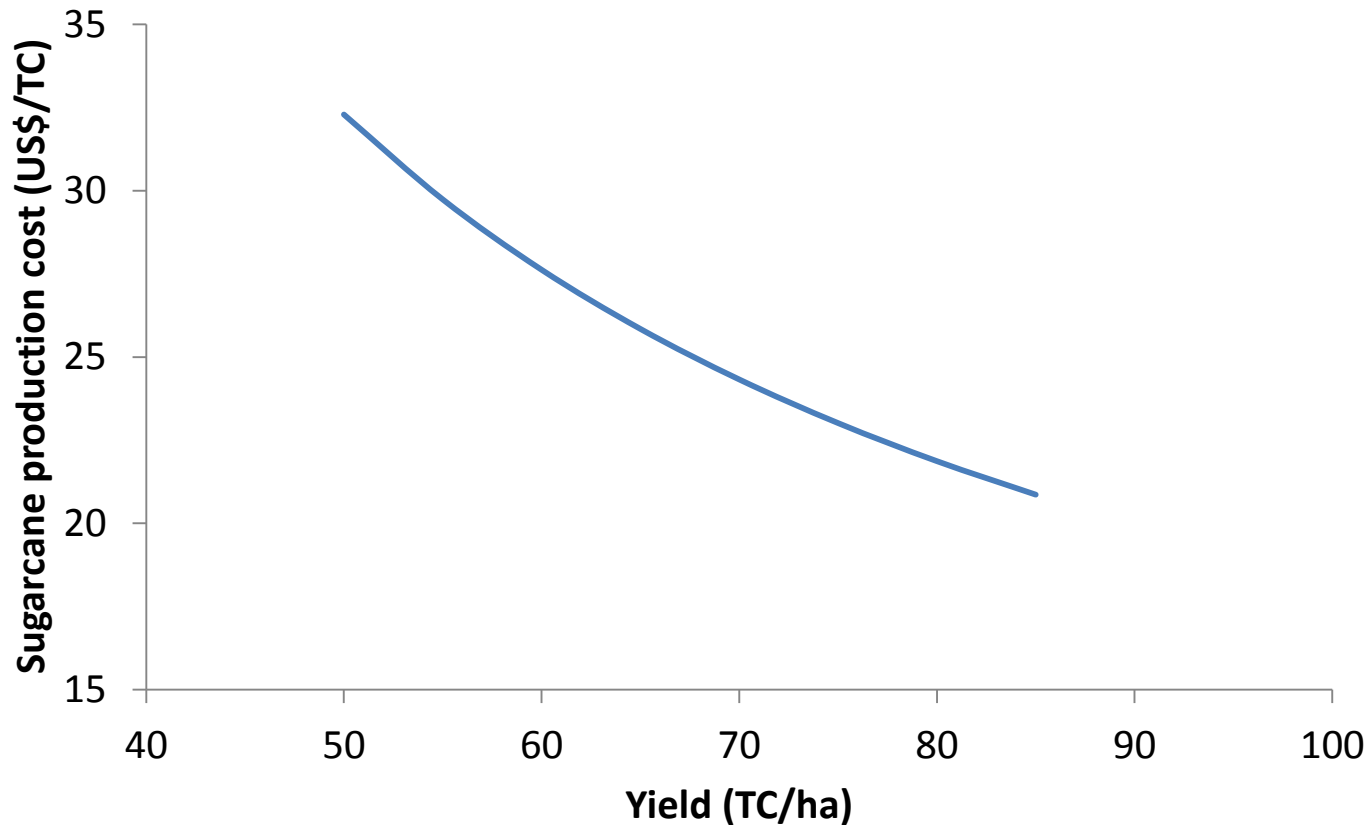
Manual planting		
Manual harvesting (green cane)	TC/day	3
Yield	TC/ha.yr	65
Sugarcane transport	km	15
Longevity	years	5
No industrial residues recycling		
Land cost	US\$/ha.yr	218
Jobs	Person-day/ha.yr	28
Sugarcane cost	US\$/TC	28,05

Key assumptions – sugarcane in small holder farm in SP



Manual planting		
Manual harvesting (burnt cane)	TC/day	8
Yield (high standard)	TC/ha.yr	81
Sugarcane transport	km	15
Longevity	years	5
No industrial residues recycling		
Land cost	US\$/ha.yr	391
Jobs	Person-day/ha.yr	16
Sugarcane cost	US\$/TC	21,66

Sugarcane production cost – small farm SP



Considered scenarios

Industry	Agricultural	IRR	NPV	CAPEX MUS\$	Annual ncome (US\$)
Large scale	Large farm (SP)	11.5%	-11,832,000.00	188.2	54,727,674.56
Micro-distillery	Small holder farm (SP)	-	-964,960.00	0.114	-105,754.19
Micro-distillery	Small holder farm (SP)	-1%	-158,746.00	0.114	10,357.72
Micro-distillery	Small holder farm (RS)	42.9%	524,512.00	0.114	108,502.22

Key assumptions allowing economic return (IRR=MARR) for micro-distillery in SP

Scale of the distillery	TC/year	3,000
Industrial investment	US\$	75.000
Hydrous ethanol yield (93GL)	L/TC	75
Jobs on industry	-	3
Mean salary	US\$/month	727.00
Wood consumption	m ³ /TC	0.43
Yeast consumption	g/TC	71.4
Electricity consumption	kWh/TC	68
Sugarcane cost	US\$/TC	15.9
Ethanol price	US\$/L	0.68

Conclusions and next steps

- ✓ It is very unlikely that micro-distilleries achieve economic viability;
- ✓ Diversification of product mix can help the economic sustainability of micro-distilleries: cachaça, raw sugar, livestock integration (bagasse), straw, ethanol for cooking;
- ✓ Improve parameters used in economic assessment;
- ✓ Environmental assessment using LCA;
- ✓ Evaluating micro-distilleries in different contexts.

Thank you!!!

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