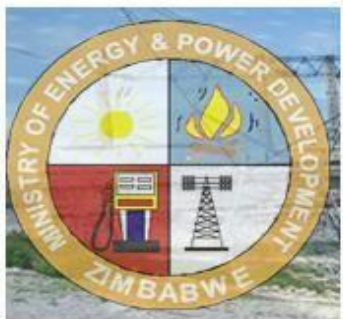




## SUSTAINABLE RURAL BIOFUEL STRATEGY IN AFRICA – ZIMBABWE CASE



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# TOOLS FOR ENHANCED BIOENERGY SUSTAINABILITY

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## ✖ Sustainability Matrix for Local Investment in Green Energy for Sustainable Development of OFF-GRID Economic Zones in Zimbabwe

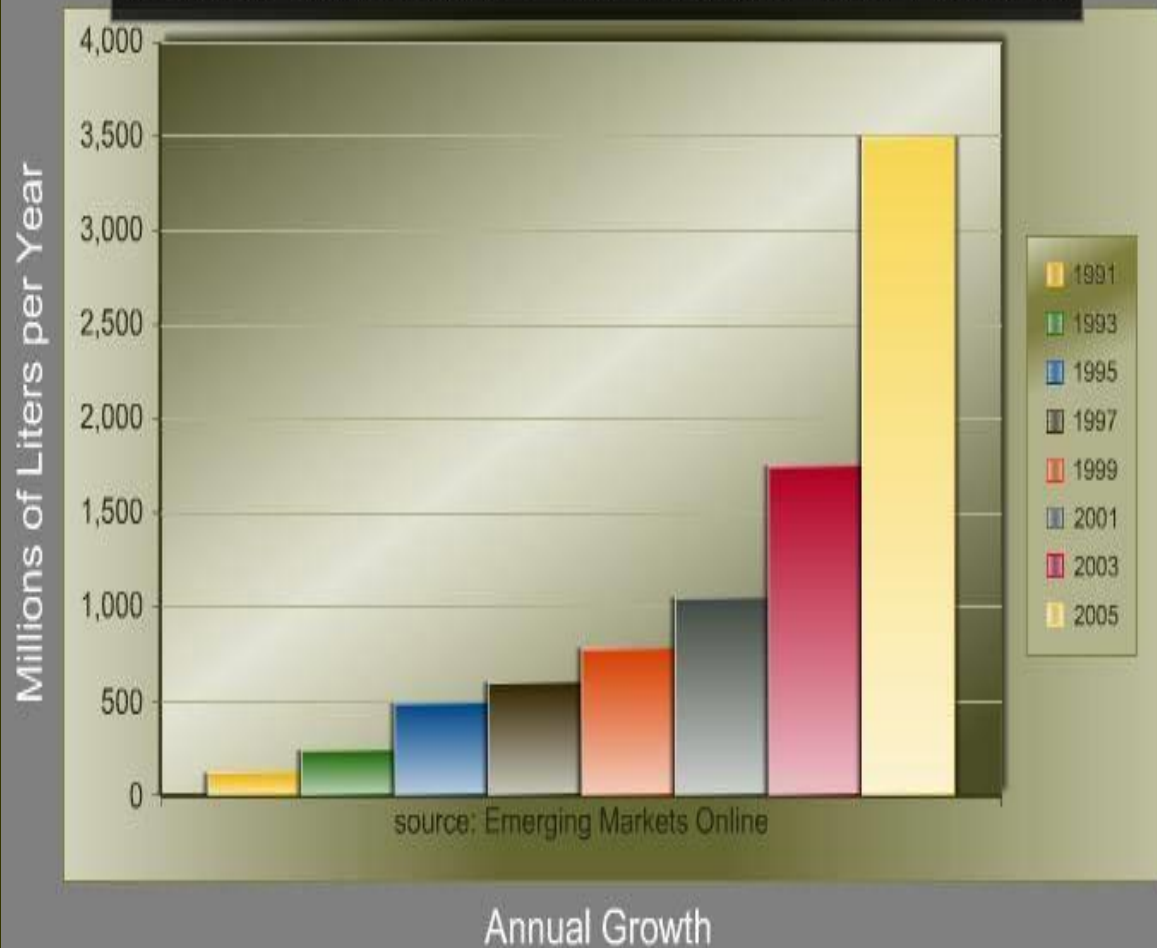
- Energy source: jatropha curcas seed
- Policies: Energy; Renewable Energy; Biofuels
- Technologies: Farming;  
Oil seed expelling & Trans-esterification;  
Power Generation & By-products;  
Socio-Economic Returns.



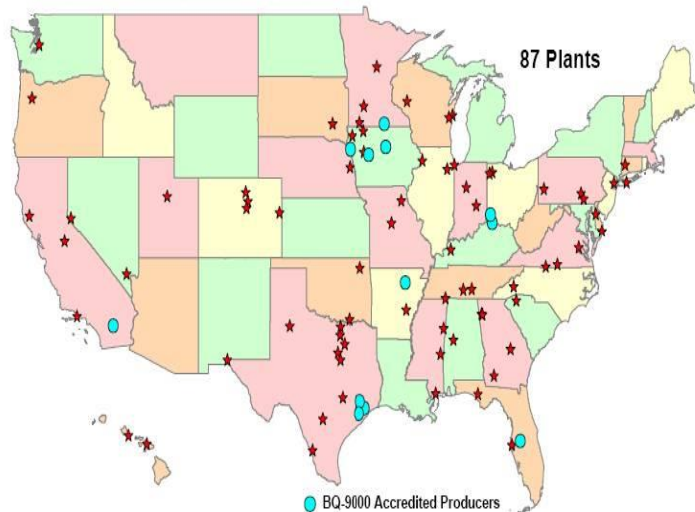
# MOTIVATIONAL STATISTICS



## World Biodiesel Production 1991-2005

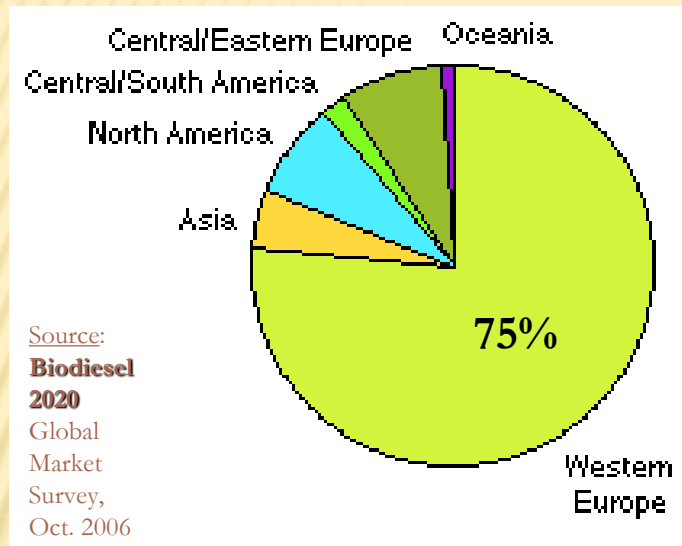


Commercial Biodiesel Production Plants (November 14, 2006)



# World Production of Biodiesel

## 2005 - 2010

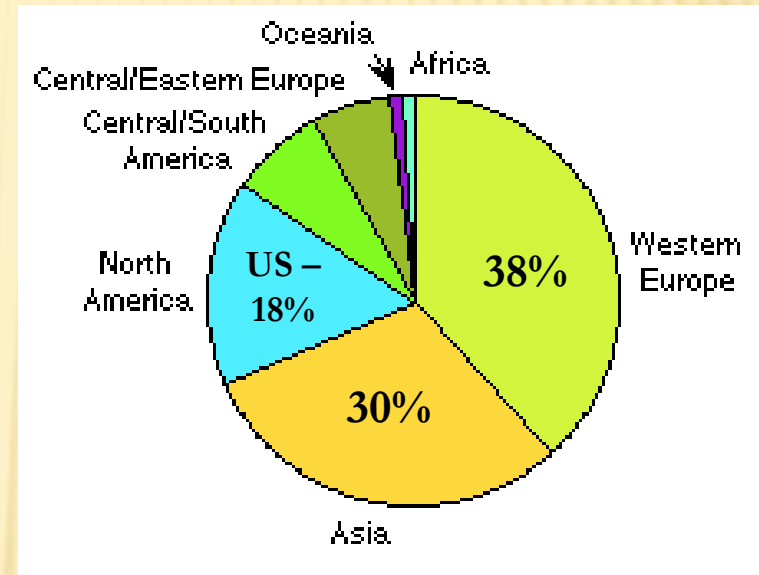


2005

**Western Europe** (D, FR, IT, UK, etc.) – main producers and consumers – 75% of world

**Eastern Europe & N. America** – 2<sup>nd</sup> largest markets

**Asia** – although significant market yet, relatively small



2010

**Western Europe** (D, FR, IT, UK) – main producers and consumers – 38% of world

**Asia** – will become the 2<sup>nd</sup> largest market (China, India – consumption & production)

**Eastern Europe & N. America** – 3<sup>rd</sup> largest markets, with US as the single largest consumer – 18% of world

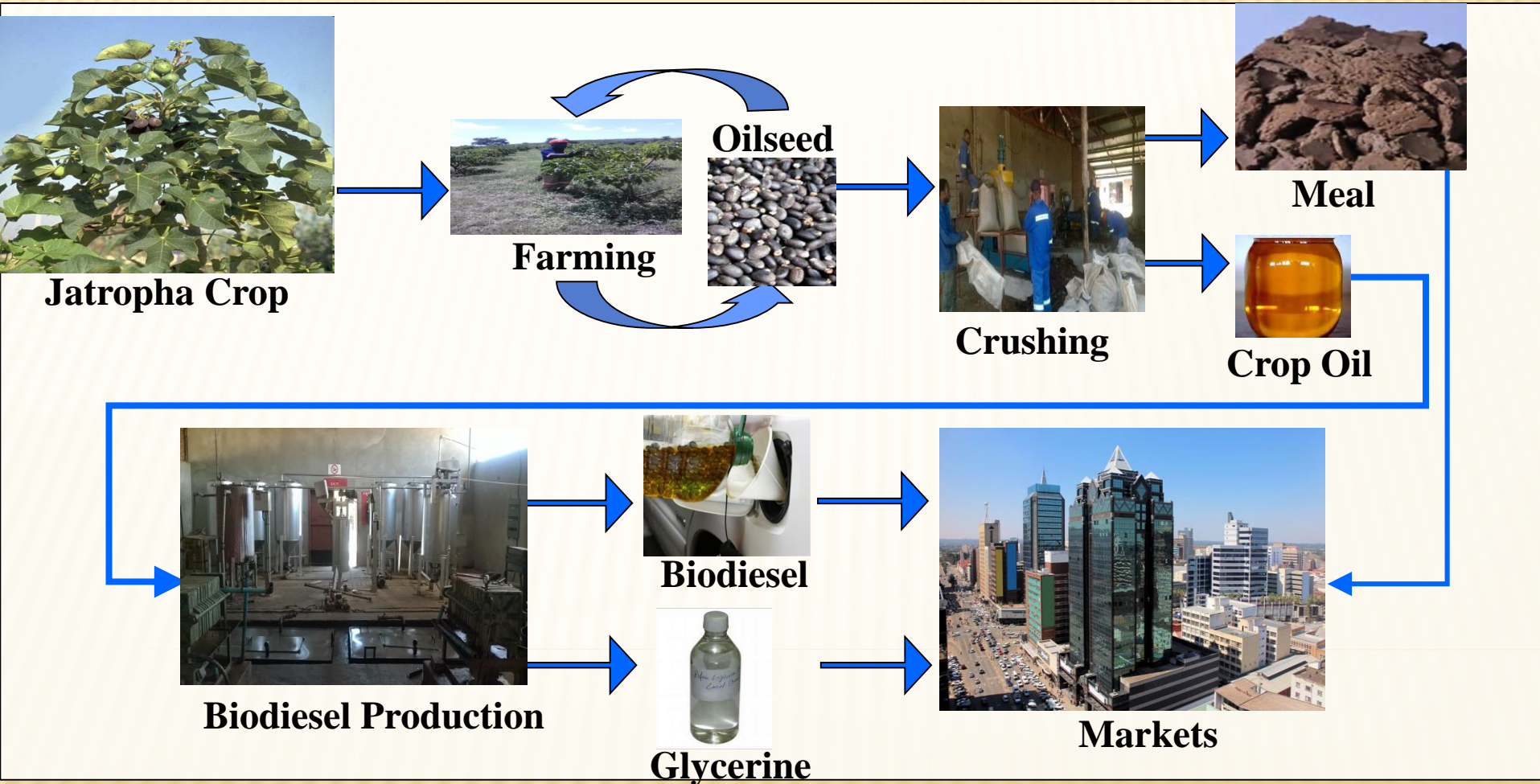
**Table 1: Biofuel production by country, 2007**

Source: [FAO](#); The State of Food and Agriculture; Biofuels: Prospects, Risks and Opportunities. (2008)

COUNTRY/ GROUPING	ETHANOL		BIODIESEL		TOTAL	
	(Million litres)	(Mtoe)	(Million litres)	(Mtoe)	(Million litres)	(Mtoe)
Brazil	19 000	10.44	227	0.17	19 227	10.60
Canada	1 000	0.55	97	0.07	1 097	0.62
China	1 840	1.01	114	0.08	1 954	1.09
India	400	0.22	45	0.03	445	0.25
Indonesia	0.00	0.00	409	0.30	409	0.30
Malaysia	0.00	0.00	330	0.24	330	0.24
USA	26 500	14.55	1 688	1.25	28 188	15.80
EU	2 253	1.24	6 109	4.52	8 361	5.76
Others	1 017	0.56	1 186	0.88	2203	1.44
<b>World</b>	<b>52 009</b>	<b>28.57</b>	<b>10 204</b>	<b>7.56</b>	<b>62 213</b>	<b>36.12</b>



# Jatropha crop & its beneficiation journey



# FEASIBILITY STUDY

## ❖ Focus areas:

- Jatropha prevalence.
- Jatropha plant populations.
- Jatropha plant current uses.
- Awareness levels in communities of the existence of the crop.
- Existence of literature on jatropha.

## ❖ Strategies:

- Awareness campaigns.
- Incentivization.
- Policy framework.
- Research & Development.
- Jatropha seed mobilisation.
- Jatropha propagation versus national fuel requirements.
- Technology development.
- Government funding.
- Access to international funding.





# IDENTIFICATION OF JATROPHA ACTIVITIES IN ZIMBABWE



- National Capital (1,686,000 in 99)
- over 200,000
- over 100,000
- over 25,000
- other main city
- other city
- Capital of province



# OUTCOMES

- ✗ Increased awareness.
- ✗ Increased seed harvesting.
- ✗ Collection of 300 tonnes of seed from 2 out of 63 districts .
- ✗ Introduction of a government purchasing price of seed of US\$0.15 per kilogram.
- ✗ Declaration of biodiesel project to National Status.
- ✗ Establishment of Special Purpose Vehicle – Finealt Engineering.
- ✗ Formulation of Policy Framework on both Renewable Energy & Biofuels.
- ✗ Significant financial support from the fiscus.
- ✗ Set targets of B5 (2020); B10 (2025); B20 (2030).
- ✗ Design & installation of pilot plant for biodiesel production of 60 000liters per month. (105Ha)
- ✗ Production of 400 bars of laundry soap per week using crude glycerine & oil.
- ✗ R&D on cake use as stockfeed for pigs through Pig Industry Board.
- ✗ R&D cake use as organic fertiliser for agriculture. (50Ha)
- ✗ Use of B100 in power generation.
- ✗ Use of B100 in vehicles for jatropha mobilisation.
- ✗ Establishment of estate 15000Ha. Intercropping.
- ✗ Registered with UNFCCC.
- ✗ Persuing other international funds; e.g. Abu Dhabi Funds



# OUTCOMES IN PICTURES.....

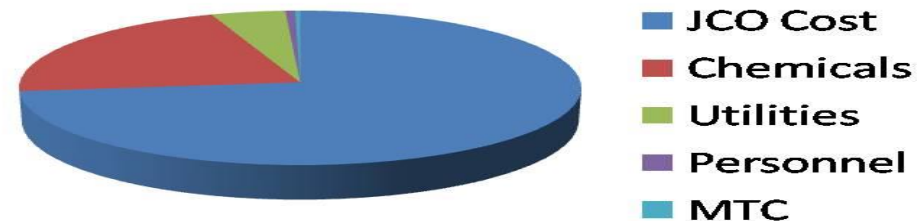




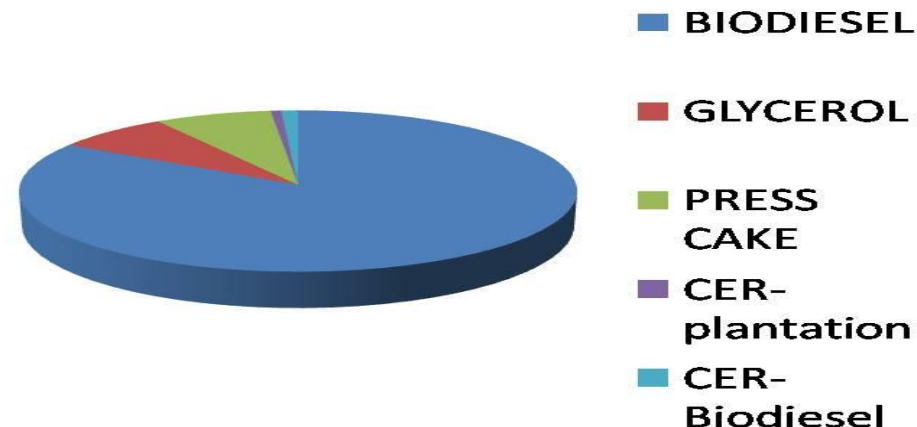
# OUTCOMES>>>>

- The cost of 1kg of jatropha seed in Zimbabwe is US\$0.15.
- Jatropha trees' production life cycle range is **30-40 years**.
- 1000 trees on a 3x3m array can be planted per hectare.
- 3 - 5 tonnes per Ha of jatropha seed is obtained seasonally, whilst >5 t is yielded from irrigated land.
- 1 tonne of jatropha seed yields 300 liters of biodiesel.
- **Glycerine** can be sold in Zimbabwe for US\$0.45 per Kg.
- 1 tonne of seedcake can be sold at US\$100.
- Jatropha oil can be used as a **kerosene substitute** for heating and for lighting.
- Bio-Diesel is sold in Zimbabwe at US\$1.10/litre.

**BIODIESEL Production Cost**



**Biodiesel Revenue Composition**



# OUTCOMES>>>>

Standardisation & Regulation SAZ; ZERA ; EMA;  
NSSA; ZIE; Local Authorities; Fire Brigade ; etc.





# SUSTAINABILITY MATRIX

[illegible]

# CONCLUSION

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- ✖ The growth, development and propagation of jatropha through intercropped estate and outgrower farming schemes that are complimented with biodiesel processing plants that promote by-product value addition is highly sustainable and makes business sense for rural communities.



I THANK YOU!!!

