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

Millions of Liters per Year

Annual Growth

87 Plants

Commercial Biodiesel Production Plants (November 14, 2006)

Source: Emerging Markets Online
World Production of Biodiesel
2005 - 2010

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

Eastern Europe & N. America – 2nd largest markets

Asia – although significant market yet, relatively small

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

Asia – will become the 2nd largest market (China, India – consumption & production)

Eastern Europe & N. America – 3rd 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)

<table>
<thead>
<tr>
<th>COUNTRY/GROUPING</th>
<th>ETHANOL</th>
<th>BIODIESEL</th>
<th>TOTAL</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>(Million litres)</td>
<td>(Mtoe)</td>
<td>(Million litres)</td>
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<tr>
<td>Brazil</td>
<td>19 000</td>
<td>10.44</td>
<td>227</td>
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<tr>
<td>Canada</td>
<td>1 000</td>
<td>0.55</td>
<td>97</td>
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<tr>
<td>China</td>
<td>1 840</td>
<td>1.01</td>
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<tr>
<td>India</td>
<td>400</td>
<td>0.22</td>
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<tr>
<td>Indonesia</td>
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<td>Malaysia</td>
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<td>0.00</td>
<td>330</td>
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<td>USA</td>
<td>26 500</td>
<td>14.55</td>
<td>1 688</td>
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<tr>
<td>EU</td>
<td>2 253</td>
<td>1.24</td>
<td>6 109</td>
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<tr>
<td>Others</td>
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<td>0.56</td>
<td>1 186</td>
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<tr>
<td>World</td>
<td>52 009</td>
<td>28.57</td>
<td>10 204</td>
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</table>
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
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 60 000 liters 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.
- Pursuing other international funds; e.g. Abu Dhabi Funds
OUTCOMES IN PICTURES
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.
OUTCOMES

Standardisation & Regulation SAZ; ZERA; EMA; NSSA; ZIE; Local Authorities; Fire Brigade; etc.
<table>
<thead>
<tr>
<th>Resource</th>
<th>Availability</th>
<th>Source</th>
<th>Estimated Quantity</th>
<th>Responsible Authority</th>
<th>Investment Capital Required</th>
<th>Official Note Acceptance Acquired</th>
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<td>*LAND</td>
<td>YES</td>
<td>NO</td>
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<td>**WATER</td>
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<td>B2;B5; B10 Targets</td>
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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!!!

Biofuels

towards a greener and secure energy future

Biofuels Life Cycle

Feedstock

End User

Transportation

Biorefinery

Distribution

Processing & Conversion