# New Developments in Biofuels in Southern Africa

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# Introduction

- **Presentation based on draft paper: New Development on Biofuels in Southern Africa**
- **Focus of the paper on SA countries= Botswana, Namibia, Zimbabwe, Mozambique and South Africa.**
- **Focus on developments in ethanol and biodiesel; their implications on poverty alleviation, savings in foreign exchange, and impact on local environment and climate change**

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## 2.0 Why biofuels in S A?

- **Concerns about the increasing prices of fossil energy sources,**
- **Possible depletion of fossil energy sources and**
- **Concerns about environment including climate change.**
- **In addition, The Kyoto Protocol and the Johannesburg Plan of Implementation resulting from World Summit on Sustainable Development commits the southern African countries to develop biofuels and other renewable energy sources.**

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## 3.0 Policies and Targets

- **Some of these countries have draft policies (e.g. South Africa) whereas others are still doing feasibility studies for the establishment of biofuels.**
- **New institutions established (e.g. Joint implentation Committee for Biodiesel in South Africa and Namibia Interim Bio-Energy Committtee)**
- **Botswana currently undertaking a feasibility study for the development of biofuels. Potential of biofuel production and use, contraints, potential of energy crops, impact of production and use of biofuels on environment, employment and trade.**
- **In South Africa, biofuels should account for 40% of renewable energy in order to reach a target of 10 000 gwh by 2013.**
- **To achieve this target, incentives have been introduced to increase their production (Wienesse and Purchase, 2006).**

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# 4.0 Energy Plants

- Study undertaken by SADC identified suitable energy crops in the region as follows: sugar cane, soyabeans, oil palm, sunflower, sweet sorghum, jatropha, and cassava.
- Prioritisation based on potential impact of production, employment creation, energy balance (quantity used to produce a litre of biofuel), yield, food security and foreign exchange savings

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## 4.0 Energy Plants cont.

Table 1: Ranking of energy plants

| Energy Crop | Rank | Reasons |
|---|---|---|
| Sugarcane | 1 | • already grown in the SA region for ethanol production<br>• generates a lot of employment<br>• produced from a by-product of sugar, hence there is a double benefit<br>• foreign exchange benefit |
| Soya beans | 2 | • same reasons as sugarcane<br>• expanded use for biodiesel can be achieved in one season<br>• scores high for biodiesel production |
| Palm oil | 3 | • Scores high for biodiesel |
| Sunflower | 4 | • Ranked fourth because not widely grown in the region |
| Sweet Sorghum | 5 | • Ranks low because not yet commercially grown. Can be grown in drier parts of the region. |
| Jetropha | 6 | • Not yet been commercially grown, but has potential |
| Cassava | 7 | • Ranked low because it is not a major crop in the region. |

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# 5.Biodiesel

**5.1 South Africa**

- **Fuel levy reduction of 30% introduced 2003 to promote biodiesel, later increased to 40% in 2005.**
- **Tax depreciation write –off of 50:40:20 per cent over a three year period.**
- **No crops grown for biodiesel production but initiatives to plant *Jatropha curcas*.**
- **In North-West Province; there is a nursery for 400 million trees which will amount to a plantation of 45 000 ha. P500 million invested, 10 000 jobs.**

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## 5.1 South Africa Cont…

- **Sasol has expressed an interest to produce biodiesel from soya beans (Prasad and Visage, 2005).**
- **There is a suggestion that the Gvt should enforce mandatory blending on oil companies**

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## 5.2 Namibia

- **Project proposal by local company to involve local communities to grow Jatropha curcas in Kavango. 63 000 ha to be planted;**
- **Project will generate N$ 189 million or 0.5% Namibian GDP. Farmers only allowed to plant trees on land cleared before 1990 as required by Kyoto Protocol.**
- **Farmers to switch from food production to fuel production; maize and mahango not to be planted.**

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## 5.3 Zimbabwe

- **Four million Jatropha trees had been planted by 1997; amounting to 2,000 ha of plantations**

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## 6.0 Ethanol

- **Factors currently conducive to bio-ethanol production (Wienesse and Purchase, 2005):**
- **Decline in export price of sugar in real terms since 1990.**
- **Increase in the price of fossil energy sources.**
- **Financial benefits of exporting bi-ethanol higher than those of exporting sugar on the basis of the Brazilian experience**
- **Development of flexi-fuel engines which use fuel with ethanol blending of 0% to 85% or hydrous ethanol with 96% ethanol and 4% water.**
- **Still not financially viable to produce bi-ethanol**

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## 6.1 South Africa

- **Ethanol Africa launched ethanol plant, July 2006, Bothaville.**
- **Supported by stakeholders: Grain South Africa and maize farmers.**
- **Plant to start production in 2007.**
- **Produce 155 million litres of bio-ethanol from 370 000 tons to 400 000 tons of surplus maize.**
- **Ethanol Africa plans to build additional 7 plants in next 6 years**
- **Each plant will produce 500 000 litres of bio-ethanol**
- **Each plant to add 0.05% to GDP or 0.074% to planned growth of 6%.**
- **Mooted that 40% reduction in fuel levy should be extended to bioethanol**
- **A suggestion that Government should change from policy of voluntary to mandatory blending of bio-ethanol into petrol.**

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## 6.2 Zimbabwe

- Production of ethanol stopped in 1994/5 in favour of rectified spirit.

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## 7.0 Discussion and conclusion

**7.1 Employment creation**

**7.2 Food Production**

- **The increased production of biofuels may have adverse effect on food production.**
- **Competition of land for growing fuel and crops.**
- **In Namibia: Project for Jatropha plantations plans to switch the land for food production to planting of Jatropha trees.**
- **Use of cereals for ethanol may increase food shortages and increase prices, particularly if population continues to increase and yields in food production do not improve (Worldwatch Institute, 2006).**
- **Use of maize for bi-ethanol production in the USA increased the price of tortilla, the basic staple in Mexico.**
- **If Biofuels can be produced from organic wastes and residues: food production will not be adversely affected.**

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**7.3 Reduction of greenhouse gases**

- **In SA biofuels are promoted because of the global drive to reduce greenhouse gases.**
- **On the basis of studies which did life cycle assessment of the impact of biofuel programmes in USA and Europe, not evident that there are substantial savings in the emission of ghgs.**
- **According to Brown (2006), the savings in ghgs from biofuels could be smaller than expected as most studies do not take into consideration all data on $CO_2$ and $N_2O$ emissions; and they usually assume that the by-products are used to displace other production.**
- **What matters is not just the savings in ghgs, but also assessment of additional emissions from land clearing for the growing of biofuels. (Brown, 2006).**
- **Forests are better sinks than agricultural fields**
- **The ploughing of the land creates $CO_2$ and $NO_2$ emissions which need to be taken into consideration.**

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## 7.4 Concluding Remarks

- Developments point to increasing interest in the development of biofuels.
- Need to have environmental standards to guide development and use of biofuels
- Need to use by-products of food crops and residues for production of biofuels
- Need to use marginal land for planting of energy crops

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| Country | ENERGY CROP(Yield in 000mt) | | | | | | |
|---|---|---|---|---|---|---|---|
| | **Palm oil** | **Sunflower** | **Soyabean** | **Maize** | **Sorghum** | **Sugarcane** | **Cassava** |
| Angola | 280 | 11 | | 510 | | 360 | 5,600 |
| Botswana | | 7 | | 10 | 32 | | |
| DRC | 1,150 | | 14.6 | 1,155 | 54 | 1,787 | 14,951 |
| Lesotho | | | | 150 | 46 | | |
| Madagascar | 21 | | 0.05 | 349.7 | 1 | 2.460 | 2,191 |

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| Country | ENERGY CROP (Yield in 000mt) Cont… | | | | | | |
|---|---|---|---|---|---|---|---|
| | **Palm oil** | **Sunflower** | **Soyabean** | **Maize** | **Sorghum** | **Sugarcane** | **Cassava** |
| Malawi | | 3.7 | | 1,733 | 45 | 2,100 | 2.559 |
| Mauritius | | | | 0.19 | | 5,200 | 0.13 |
| Mozambique | | 6.3 | | 1,248 | 314 | 400 | 6,150 |
| Namibia | | 0.05 | | 33 | 6 | | |
| South Africa | | 675.5 | 220 | 9,737 | 449 | 19,095 | |
| Swaziland | | | | 70 | 0.6 | 4,500 | |
| Tanzania | 65 | 28 | 2.1 | 2,800 | 650 | 1,800 | 6,890 |
| Zambia | | 10 | 15 | 1,161 | 19 | 1,800 | 950 |
| Zimbabwe | | 8 | 84 | 1,000 | 80 | 4,100 | 190 |
| **TOTAL** | **1,516** | **749.6** | **335.8** | **19,957** | **1,697** | **43,602** | **39,441** |

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