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INTEGRATED APPROACH FOR WELL INFORMED BIOFUELS POLICY AND BUSINESS DECISIONS

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PRESENTATION OUTLINE

- BACKGROUND
- INTEGRATED SUSTAINABLE FRAMEWORKS
- INTEGRATED ASSESSMENT RESULTS FOR POLICY AND BUSINESS DECISIONS MAKING
- CONCLUSIONS

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BACKGROUND

- Various and complex factors influence policies and business decisions required for biofuels implementation strategies
- On one hand, policy makers are keen to make sure sustainability issues to include economic , environmental/ecological and social are comprehensively covered.
- On the other hand, stakeholders including private sector involved in biofuels value production chain require reasonable return on investment and incentives to leverage competitiveness with gasoline and diesel fuels

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BACKGROUND

- Trade off between the two groups is possible, as long as both policy and business interests and aspirations are taken into account but based on well informed d ecision making framework.
- Well informed decisions which take account of both interest groups are possible through use of an integrated approach which avoids emotional decisions.
- The approach should take account of economic/financial, social and environmental considerations including life cycle analysis for both bio ethanol and biodiesel.

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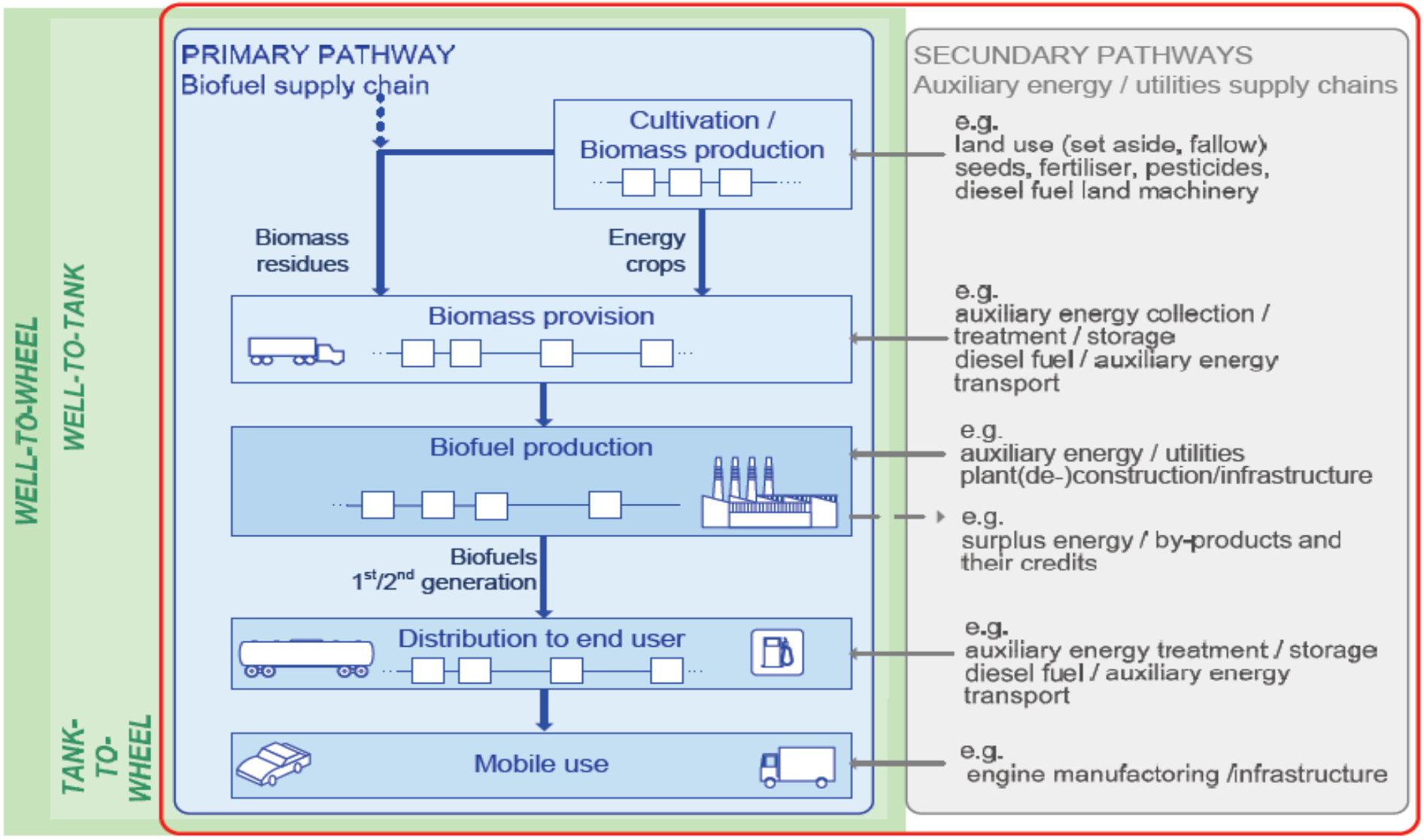
BIOFUELS PATHWAY-WELL-TO-TANK



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INTEGRATED SUSTAINABLE FRAMEWORKS

- An attempt has been made to undertake such assessments through development of a preliminary Integrated Decision Support Tool.
- The Tool has been developed for ICS-UNIDO in conjunction CEEEZ with technical support from the Germany Biomass Research Institute (DBFZ) .
- The proto type tool provides financial assessments, life cycle analysis, social assessment and multi criteria analysis.
- The financial assessment module of the package assesses biofuels unit production cost, NPV, IRR, and Cash flow.
- Lifecycle analysis package accounts for energy consumption and associated GHG Emissions.

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INTEGRATED SUSTAINABLE FRAME-WORKS –DST for BIOFUELS

- Attainment of sustainable biofuels industry requires assessment to determine the extent to which biofuels are carbon neutral and competitive with fossil fuels hence the need for Decision Support Tool (DST)
- Advantages of DST:
  - Assist decision makers in assessing and adopting of sustainable approaches e.g regarding efficiency, environmental safety, and economics
  - Creates awareness towards issues of sustainability
  - Contribute to optimise existing practice

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DECISION SUPPORT TOOL

Fully developed DST encompasses the following:

- Economic issues for both (biomass & biofuels production),-IRR, NPV, Payback period, Unit production cost influenced by the cost of feedstock, costs related to plant investments (depreciation), and operations and maintenance costs (repair and maintenance, raw materials and labour costs).
- Technical-
  - Biofuel-(energy content, non renewable energy consumed, availability, carbon residue, sulphur, content, viscosity, density, efficiency
  - Biofuel-energy and chemical consumptions, emissions coefficints (process and consumables), efficiency, by-products/residuals amount, product/by-products
  - Feedstock - type and amount, proporties(moisture content, oil content, lignocellulose content, other

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DECISION SUPPORT TOOL

- Social-
  - employment generation, incomes and related industry support,
  - Other social aspects of the complete cycle(Well-to-tank), which are of interest to both , policy makers and business stakeholders
- Environment-
  - **Lifecycle analysis and Life Cycle Inventory (GHG, PED)**
  - Such as smog precursors (NOx, VOC,),
  - Resource depletion (energy, water, materials),
  - Acid rain (SOx, NOx, HNO3, H2SO4, H2S, NH3),
  - Climate change (CO2, CH4,NOx, CFC),
  - Eutrophication (phosphates, nitrates),
  - Human and environmental toxicity and other effects (particulates, residual solid waste
- Multi criteria analysis-to establish environmntal benign and econmic efficiency

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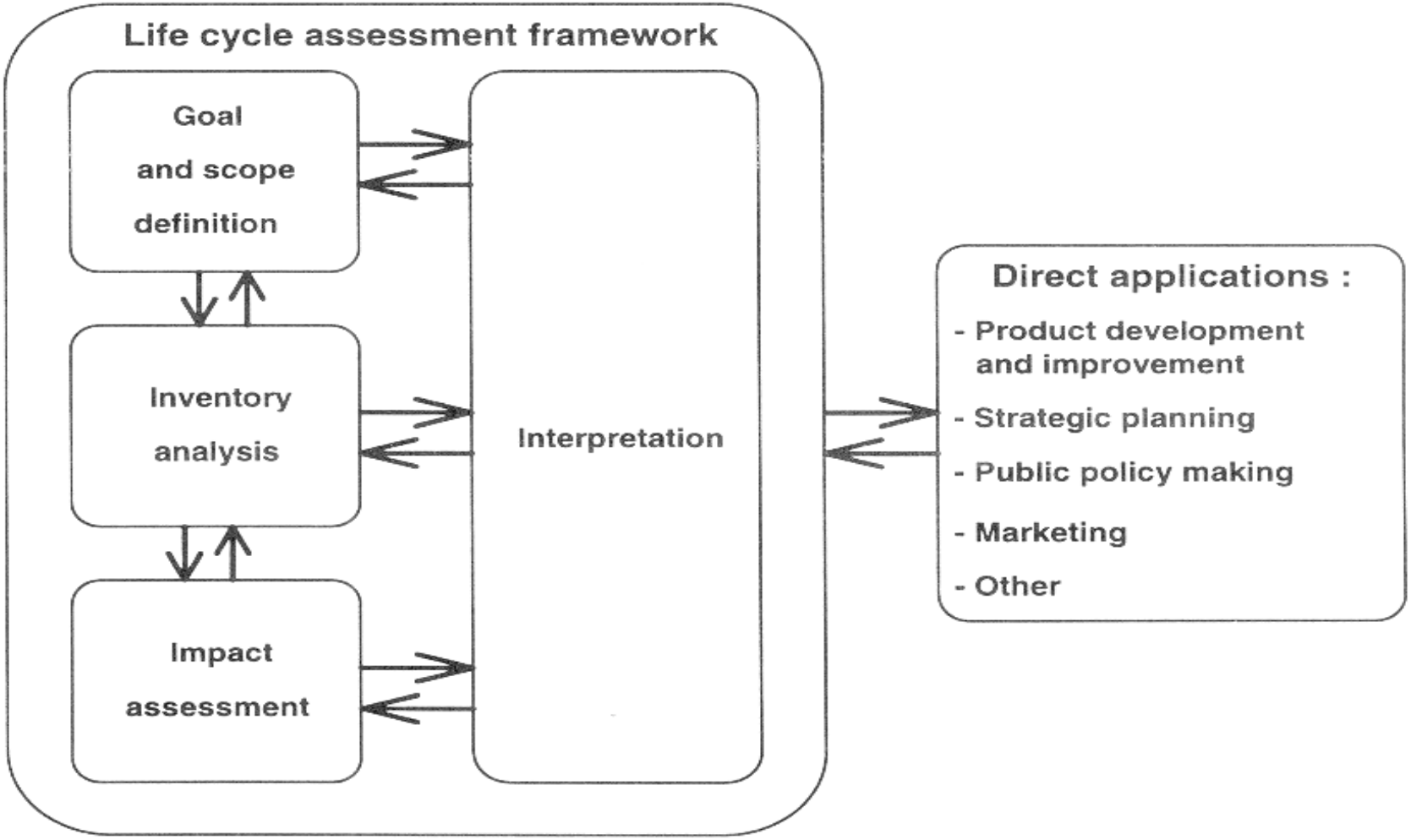
LIFE CYCLE INVENTORY



CEEEZ INTEGRATED ASSESSMENT RESULTS

- The Integrated Decision Support Tool was used to assess economic performance of the use of different feed stocks on biofuels production costs for both ethanol and biodiesel based on Southern Africa experience and circumstances, on one hand, and their competitiveness in relation to gasoline and diesel prices at different international crude oil prices, on the other.
- The Tool also assessed energy and GHG balances, and employment levels for two scenarios related to bioethanol and biodiesel production.
- The bioethanol scenario had a typical production capacity of 20 million litres per annum from sweet sorghum, sugarcane, and maize feed stock, with an investment cost of US$15 million.

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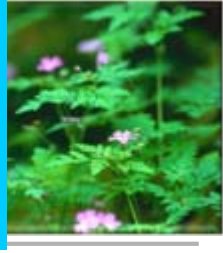
INTEGRATED ASSESSMENT RESULTS



- The biodiesel scenario had a production capacity of 50,000 tonnes per annum with an investment cost o US$25 million.
- This and other related data were fed into the Tool to assess unit production cost for both bioethanol and biodiesel scenarios.
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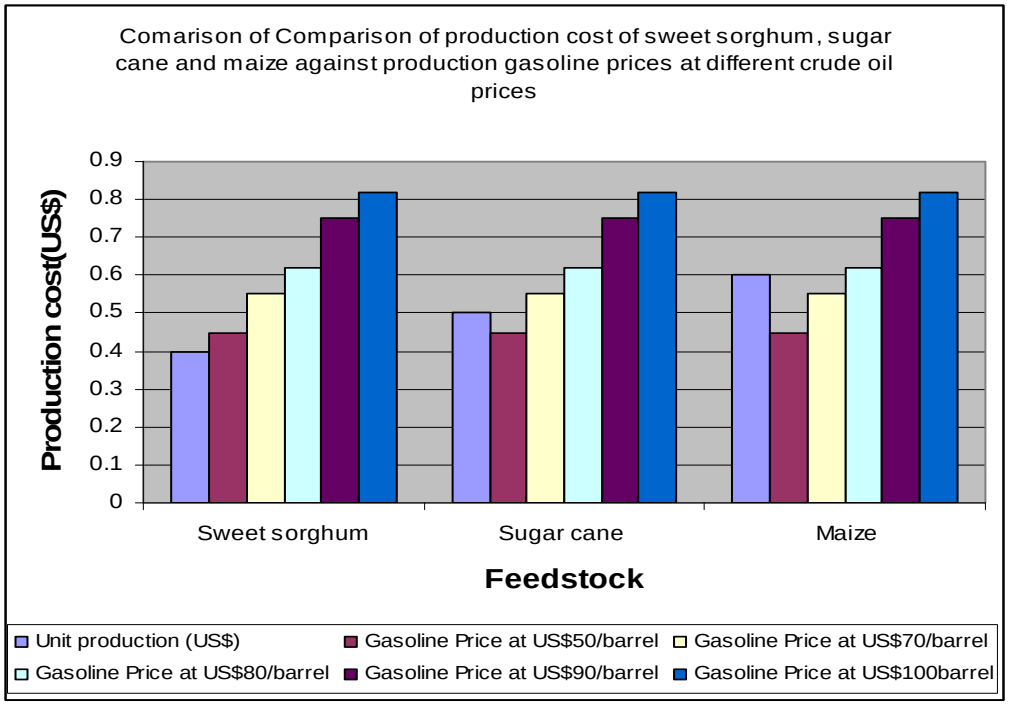
INTEGRATED ASSESSMENT RESULTS - BIOETHANOL

- The Tool was also used for assessing energy and GHG balances, and employment levels for biodiesel
- Based on selected feed stocks from a Southern African perspective, an analysis was undertaken to asses production cost of selected feed stocks (sweet sorghum, sugarcane and maize) based on resource and cost requirements for these feed stocks.



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INTEGRATED ASSESSMENT RESULTS - BIOETHANOL

- From the results displayed, unit production cost of sweet sorghum, sugarcane and maize have been calculated at US$Cents 40,50 and 60 per litre, respectively.
- In terms of competitiveness, sweet sorghum is competitive at more than US$50/ barrel, sugarcane at more than USD$60/ barrel, and maize at more that US$80/ barrel.
- Above US$80/barrel, Sweet sorghum, sugarcane, and maize are generally competitive, with sweet sorghum and sugarcane having an edge over maize.
- However, in terms of land requirements, to produce 20 million litres of bioethanol per annum from maize requires 24,000 ha of land as compared to 5,000 ha for sweet sorghum and sugarcane.

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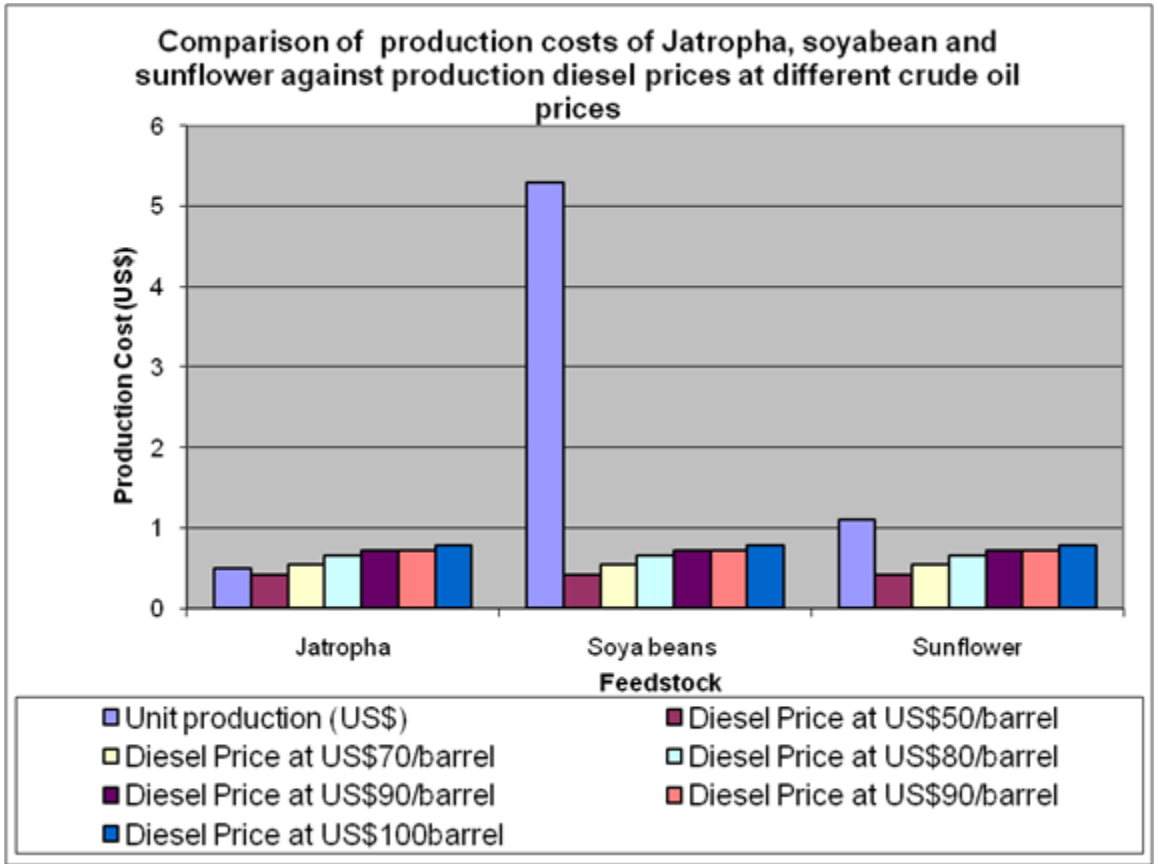
INTEGRATED ASSESSMENT RESULTS FOR POLICY AND BUSINESS DECISIONS MAKING -BIODIESEL

- A similar analysis was undertaken for biodiesel to asses production costs of selected typical feed stocks (jatropha soya beans and sunflower) based on resource and cost requirements for these feed stocks



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INTEGRATED ASSESSMENT RESULTS -BIODIESEL

- From the results displayed, unit production costs for jatropha, soya beans and sunflower have been calculated at US$0.50, 5.30, and 1.10 per litre, respectively.
- In terms of competitiveness, only jatropha is mostly competitive at more than US$60/barrel , and to a lesser extent sunflower at slightly more than US$100/barrel.
- However, soya beans has been found to be totally uncompetitive at US$5.30 per litre, mainly due to low oil content and high of raw material. In terms of land requirement, jatropha require 44,000, soya beans 124,000 and sunflower 57, 000 hectares to produce 50,000 tonnes of biodiesel per annum.
- Apart from being competitive in production costs, jatropha also requires less land compared to sunflower and worst of them all soya beans.

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SUMMARY OF THE ASSESSMENT

TECHNICAL		
Biomass production	Units	Indicators
Feed stock type	-	Jatropha
Total area cultivated	Ha	50,000
Yield per hectare	Tonne/ha	4
Annual yield	Tonne/ annum	200,000
Biofuel production/process		
Biofuel type	-	Biodiesel
Annual production	Tonne/annum	50,000
Energy efficiency	%	41
Conversion rate	Kgbm/kgbf	4

ECONOMIC		
Specific biofuel production cost	US$/L	0.5
ENVIRONMENTAL		
GHG Emissions	Kg CO2 /t biofuels	38.35
Primary energy demand	GJ/t biofuel	3336.11
SOCIAL		
Employment creation	No	50,054

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CONCLUSIONS

- Although it is still a long way to develop a comprehensive integrated Decision Support Tool, an attempt has been made to use this approach to at least evaluate some selected indicators from economic, environmental and social considerations on which basis policy making and business decisions can be made without necessarily resorting to emotional decisions.
- Work on the Tool is continuing to enable all relevant indicators identified in this paper are included.
- Biofuels competitiveness mainly depends on international crude oil prices and related gasoline and diesel production costs.

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CONCLUSIONS

- For bioethanol, an international crude oil price of less than US$50/barrel, and for biodiesel less than US$6/barrel, bioethanol and biodiesel are uncompetitive and would require special incentives to make them attractive to business stakeholders.

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END OF PRESENTATION

THANK YOU

END OF PRESENTATION