SUGARCANE POTENTIAL
Food & Energy
30 October 2013
SA Sugar Industry economic contribution

- SA sugarcane industry is
  - Diverse – agriculture, sugars (raw, refined, specialised), syrups and range of by-products
  - Internationally cost competitive, high quality producer
- Important contribution
  - Employment (particularly in rural areas)
  - Sustainable investment – agriculture and industrial
  - Foreign exchange earnings
  - Significant support industries & customers
- About 29 130 registered sugarcane growers (KZN, MPU, EC)
- Six milling companies with 14 sugar mills
- About 2.2 million tons of sugar per season
- About 60% sold in SACU; export to Africa, Asia & Middle East
- Annual estimated average direct income of R8 billion
  - R 2.5 billion from export
  - R 5.1 billion in sugarcane production (~17% of total gross value of annual field crop)
- Employment
  - Direct: ~79 000 jobs (significant portion of SA agric)
  - Indirect: Estimated ~350 000
  - Livelihood to ~1 million people (>2% of SA population)
Potential in Sugarcane Processing

**Sugarcane**

- 15% Fibre
- 15% Sugar

**Tops and leaves** not currently utilized, is about equal to sugarcane fibre

**Sugars to fuel ethanol**

**Sugar to market**

**Molasses**

**Fibre**

**Electricity & Steam**

- Currently fuel supply to match own energy use
- At high efficiency 2 to 7 times more electricity

**Other Products:** Animal feed, Paper, Chemicals

**Future** – cellulosic ethanol

**Global trends**

- Diversify product offering
- Improves revenue & cost effectiveness
- Brazil leading in ethanol
- India leading in electricity

**Sugarcane** – one of most efficient plants to convert sunlight to energy

**Season** – ethanol could extend existing 36 weeks to 40 weeks

**Water free** (blend to E10)

**Water containing** (Fuel Flex Vehicles)

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Electricity & Steam

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Other Products:
Animal feed, Paper, Chemicals

Future – cellulosic ethanol
International Industry Trends

International - Permanent Structural Change

- Worlds two largest cane producers, Brazil and India, have access to sugar, electricity and ethanol markets
- Brazil ethanol dominant (~60% of sugars to ethanol)
  - ~55% Bioethanol volume penetration in petrol pool
  - 60% growth in electricity from sugarcane over last 10 years
  - Bagasse-fuelled turbines supply ~7% of total power
  - Sugarcane industry estimates potential at 15,300 MW by 2020
- India electricity dominant
  - started in 1995
  - 2012 capacity 5 000 MW
  - 2015 target 10 500 MW
- Thailand, Mauritius, Australia, etc. transforming to co-produce sugar, ethanol and electricity

Sugar-only industries are revenue uncompetitive
South African Sugarcane Internationally Competitive

Weighted world average of nominal cane sugar (C), beet sugar and HFS(55) production costs, average 2009/10 – 2011/12

Source: LMC INTERNATIONAL 2013
Typical Conventional SA Sugar Mill

NOTE: Full Cogeneration (Combined Heat & Power) implemented as the standard
Project comprises:
• Energy efficiency modifications to Sugar Factory
• New High-Pressure Boilers + Co-generation & Condensing Turbo-alternators
• Use of sugarcane leaves to supplement bagasse fuel
Conventional sugar production with renewable electricity

Leaves

Existing sugarcane

Crusher & Diffuser
Separating fibre and sugar

Sugarcane Fibre

Power station
Sugar IPP enables new plant

Steam to plant

Grid export

Bagasse

Raw Sugar

Molasses
Industrial ethanol & Animal feed

Refinery

Raw market

Develop area under sugarcane:
land reform, small scale and Ingonyama Trust land

50%

24%

11%

85%

A mol

B mol

C mol
Sugar production - add Greenfields bioethanol plant

Leaves

Existing sugarcane

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Steam to plant

Sugar Recovery A

A mol

50%

Sugar Recovery B

B mol

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Sugar Recovery C

C mol

11%

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Raw Sugar

Molasses
Industrial ethanol & Animal feed

Grid export

Bioethanol

Greenfields

Refinery

Raw market

Fuel market

Develop area under sugarcane:
land reform, small scale and Ingonyama Trust land

Tongaat Hulett
Sugar production with Greenfields bioethanol plant and new sugar estate

- **Leaves**
  - **Existing sugarcane**
    - **Crusher & Diffuser** Separating fibre and sugar
      - Juice
      - Bagasse
        - A mol: 50%
        - B mol: 24%
        - C mol: 11%
  - **Develop area under sugarcane:**
    - land reform, small scale and Ingonyama Trust land
  - **New sugarcane estate**

- **Sugarcane Fibre**
  - **Crusher & Diffuser**
  - Juice
    - **Sugar Recovery A**
    - **Sugar Recovery B**
    - **Sugar Recovery C**
    - **Molasses** Industrial ethanol & Animal feed
    - **Grid export**
    - **Refinery**
    - **Raw market**
  - **Power station**
    - Sugar IPP enables new plant
    - **Fuel market**

- **Bioethanol**
  - **Steam to plant**
  - **Grid export**
  - **Bioethanol**
  - **Fuel market**

- **Raw Sugar**
  - **Sugar market**
  - **Grid export**
  - **Bioethanol**
SA – Renewable Energy from Sugarcane

- **Electricity – 1 000 MW**
  - 14 existing mills at full capacity
  - 1 (maybe 2) new ethanol estates and plants
  - Generation during season – “base load during peak demand”
  - Expected investment more than R20 billion by 2022
  - CO₂ reduction - >4 million ton CO₂ per annum

- **Ethanol – 600 to 1 100 million liter**
  - Full sugarcane supply ~ 25 million ton
  - Extend season by 4 weeks - increase sugarcane supply to ~28 million ton
  - 5 to 6 bioethanol plants linked to existing 14 sugar mills
  - Export Raw Sugar to Ethanol 600 - 800 million liter
  - New estates and Ethanol Mills 300 million liter
  - Expected investment more than R10 billion
  - CO₂ reduction - >1.3 million ton CO₂ per annum

- **Sugarcane main cost drivers**
  - Energy (Oil & Electricity) pricing
  - Food and Agriculture Pricing Trends
  - Currency

*Do more with the same!*
# Significant Job Creation Potential

<table>
<thead>
<tr>
<th></th>
<th>Sugarcane Industry#</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Electricity</td>
</tr>
<tr>
<td>Potential projects</td>
<td>14 cogeneration</td>
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<tr>
<td>Capacity [million litres]</td>
<td>800 – 1,000 MW</td>
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<tr>
<td>Construction Jobs</td>
<td>12,972</td>
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<tr>
<td>Operations Jobs</td>
<td>433</td>
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<tr>
<td>Agriculture</td>
<td></td>
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<tr>
<td>Increase area under cane</td>
<td>&gt;44,000</td>
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<tr>
<td>Jobs per phase</td>
<td>20,700</td>
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<tr>
<td>Total Agric. Jobs</td>
<td>20,700</td>
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</tbody>
</table>

*Irrigated area

#Estimated by Tongaat Hulett
Potential sugarcane area >200,000 ha

Genuine job creation opportunities
SA Renewable Energy getting traction

Electricity – most recent significant milestones

• Ministerial Determination & NERSA concurrence (MTRM cogeneration) – Dec ‘12
• Request For Registration & Information – July 2013
• Expect Request for Proposal (RFP) before end of Q1 2014

Ethanol

• Main challenges to bridge
  • Blending – fuel specification and logistics
  • Incentive scheme – feedstock specific; cater for risk from commodity cycle
• “Mandatory Blending Regulations” in Government Gazette (24 August ‘12)
• Implementation date 1 October 2015 in Government Gazette (30 September ‘13)
• Minister of Finance Budget Vote speech (Feb ’13) announced a fuel levy of ~4 c/l
• Biofuels Implementation Committee (chaired by DoE) functional
• Minister of Energy Target Implementation of Policy 2013
• Clarity required on challenges – commercial foundation required
Provisional IEP comments

- Tongaat Hulett willing to support with supply of modelling data
- Reference to bagasse as “waste fibre from sugarcane” is factually incorrect
  - Supply heat & power to sugar mills
  - Used in paper and animal feeds manufacturing (limited volumes)
- DoE biofuels feasibility study seems incorrect (confirmed through BIC engagement)
  - Different result from own assessment by Tongaat Hulett
  - Tongaat Hulett is also the biggest wet maize miller in Africa
  - Considering commodity cycles over adequate period - sugarcane bioethanol compares very favourable with sorghum derived
  - Hence incentive should be substrate specific to handle commodity risk
- Bioenergy potential from sugarcane seems unaccounted for on supply side
- Economic benefit from sugarcane bioenergy can easily justify price premium
Sugarcane has huge SADC Bio-energy potential

- **Scenario**: SADC E50 regime with fuel flex vehicles over next 20 years
- **Rural development**
  - 2.5 – 3.5 million hectares of crop land under sugarcane (3% - 6% of available)
- **Job creation**
  - Over 10 - 15 years can create 3 million direct jobs (1.8 million permanent)
- **Positive impact on SADC trade balance with renewable energy**
  - R 200 billion – annually earned by SADC “rural economy”
  - R  39 billion – trade balance in favour of SA with SADC (R 30 billion imported in 2011)
  - 30 billion litres of ethanol (20 billion litres of petrol equivalent)
  - 8 000 to 10 000 MW electricity
  - SA is 70% of the fuel market and 80% of the electricity market
- **Industrial development**
  - Build 100 to 120 new sugarcane mills for ethanol and electricity
  - R 20 to 30 billion annual manufacturing and service in SA to support build program
- **Reduce CO$_2$ emissions**
  - Climate Change Mitigation (15% - 35% of SA commitment)
- **Improves food & energy security**
  - Equivalent to 13 SA sugar industries
Northern SADC combined
• Production opportunity with land and water
• Scale for cost effective ethanol & electricity
• Potential to build on Brazilian example
Regional opportunity to a better future for all

• **Market access**
  • SA market big enough to allow for capital efficient factories throughout SADC
    • Both fuel ethanol and renewable electricity
    • SA Energy policy to go beyond hydro-power & natural gas import from SADC
    • Policy & Regulations not supportive of SADC bioenergy regime
  • Other SADC markets currently too small – capital inefficient factories

• **Infrastructure required**
  • Roads, bulk water supply, bulk electricity supply cannot be funded by individual projects

• **Policy & Regulation**
  • SA getting closer to creating the environment for investment in SA
  • Other SADC countries does not have a sound base for investment
  • Align SADC frameworks (Automotive, Energy, Climate, Agric, Water, Infrastructure, Funding)

• **Benefit Sharing**

<table>
<thead>
<tr>
<th>South Africa</th>
<th>Rest of SADC</th>
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<tbody>
<tr>
<td>Give</td>
<td>Give</td>
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<tr>
<td>Low risk market</td>
<td>Land</td>
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<tr>
<td>Scale</td>
<td>Rural development</td>
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<td>Economic development</td>
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<td>Jobs</td>
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<td>Low risk market</td>
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<td>Improve trade balance with SA</td>
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<tr>
<td>Gain</td>
<td>Gain</td>
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<tr>
<td>Localisation of investments</td>
<td>Economic development</td>
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<td>Service jobs</td>
<td>Jobs</td>
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<tr>
<td>Strong neighbouring economies</td>
<td>Low risk market</td>
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<tr>
<td>Spend energy account in region</td>
<td>Improve trade balance with SA</td>
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<tr>
<td>Improve trade opportunities</td>
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<tr>
<td>CO₂ emission mitigation</td>
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Tongaat Hulett
Summary

World leading sugarcane industry
• Full value – Sugar, Electricity and Ethanol
• Cost & Revenue competitive integrated sugarcane value chain
• Improved resilience - commodity cycles, weather and adaptation

Rural Development in KwaZulu-Natal and Mpumalanga
• Extensive expansion of sugarcane in previously underdeveloped areas
• Extensive Investment in Rural Economy - R23 billion to R40 billion
• Enables sustainable Land Reform

Excellent Fit with Government Policy Imperatives
• Rural development (especially communal areas)
• Creates about 40 000 to 50 000 long-term jobs
• Creates about 20 000 construction jobs
• Contributes to SA carbon emission reduction commitments

Eager to support updating of IEP
• Sugarcane bioenergy potential
• Modelling data to be supplied

Sugarcane - do more with the same!