Kakira overview
Sugar – from juice to the bag

SUGAR CANE → MILL → PROCESS HOUSE → SUGAR

BAGASSE → MILL

JUICE → MILL

WATER → MILL

MOLASSES → MILL

SUGAR → BAG
Cogeneration process

Cogeneration of Electricity

POWER for Mills

SUGAR CANE

BAGASSE

JUICE

WATER

MILL

PROCESS HOUSE

SUGAR

MOLASSES

POWER TO GRID

TURBO GENERATOR SET

LP STEAM

BOILER

HP STEAM
Cogeneration of Electricity

2007 High Pressure Boilers (2x 50T/h 45 bar 510°C)
Cogeneration of Electricity

2007 High Pressure Boilers (45 bar 510°C)
Cogeneration of Electricity

2013 High Pressure Boiler (160t/h, 67bar, 515°C)
Distribution Control System (2014-15)
### Kakira : Overview

- **10.5 month crushing season**

<table>
<thead>
<tr>
<th></th>
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<th></th>
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</thead>
<tbody>
<tr>
<td><strong>Factory Capacity</strong> TCD</td>
<td>3,500</td>
<td>6,000</td>
<td>7,200</td>
<td>7,200</td>
</tr>
<tr>
<td><strong>Cane supply</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Nucleus</td>
<td>60%</td>
<td>40%</td>
<td>35%</td>
<td>35%</td>
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<tr>
<td>Farmers</td>
<td>40%</td>
<td>60%</td>
<td>65%</td>
<td>65%</td>
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<tr>
<td>No.</td>
<td>3,700</td>
<td>6,500</td>
<td>9,000</td>
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<tr>
<td>Total TC</td>
<td>650,000</td>
<td>1,500,000</td>
<td>2,000,000</td>
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<tr>
<td><strong>Sugar</strong> TS</td>
<td>62,000</td>
<td>140,000</td>
<td>180,000</td>
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<tr>
<td><strong>Electricity Generation</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>In-House MW</td>
<td>4</td>
<td>10</td>
<td>18</td>
<td>18</td>
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<tr>
<td>Grid MW</td>
<td>-</td>
<td>12</td>
<td>32</td>
<td>32</td>
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<tr>
<td>Total MW</td>
<td>4</td>
<td>22</td>
<td>50</td>
<td>50</td>
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<tr>
<td><strong>Molasses</strong> TM</td>
<td>24,000</td>
<td>55,000</td>
<td>74,000</td>
<td>74,000</td>
</tr>
<tr>
<td><strong>Ethanol</strong> litres</td>
<td>-</td>
<td></td>
<td>-</td>
<td>19,800,000</td>
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</table>
Cogeneration of Electricity

Production of ‘green’ Electricity

<table>
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<tr>
<th>Year</th>
<th>MW</th>
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<tbody>
<tr>
<td>1990-91</td>
<td>1.2</td>
</tr>
<tr>
<td>1995-96</td>
<td>2.7</td>
</tr>
<tr>
<td>2000-01</td>
<td>3.9</td>
</tr>
<tr>
<td>2005-06</td>
<td>5.5</td>
</tr>
<tr>
<td>2009-10</td>
<td>12</td>
</tr>
<tr>
<td>2014-15</td>
<td>32</td>
</tr>
<tr>
<td></td>
<td>50</td>
</tr>
</tbody>
</table>
Ethanol
2015/6 expansion, value addition

Sugar Cane → Mill → Process House → Sugar, Molasses
Bagasse → Mill → Process House → Sugar
Juice → Process House → Molasses
Ethanol Production Process

MOLASSES 74,000 tonnes

MASH

FERMENTATION

CO₂

DISTILLATION

DEHYDRATION

RAW ALCOHOL

RECTIFICATION

EXTRA NEUTRAL ALCOHOL

BIO-ETHANOL

DEHYDRATION

BIO-COMPOST

BMV

CANE FILTER MUD

BIO-METHANATION

STEAM

ELECTRICITY

TURBO-ALTERNATOR

BOILER

BIO-GAS
Kakira Distillery: August-2016

Alcohol Storage Section

Water Treatment

Fermentation Section
Kakira Distillery: August-2016

- Distillation
- Instrumentation
- DCS Building
- Cooling Tower
Kakira Distillery : Bio-Composting

Bio-Composting Aero-Tiller
Kakira Distillery: Oct-2016
Kakira Distillery : Oct-2016
Kakira Distillery : Oct-2016

Distillery DCS Room
Ethanol Distillery

**Product market**

* Fuel-Grade Anhydrous Alcohol [AA – 99.6%] for blending with petrol
  - Spark-ignited petrol engines operate well with up to max 15% ethanol (E15) and 85% regular petrol.

- **Uganda consumes 660 million litres of petrol/year, with growth of 10% p.a.**

- **For E10, potential demand of 66 mio litres of AA / year**
Ethanol Distillery

Product market:

* Fuel-Grade Anhydrous Alcohol
* For 5% ethanol blending with petrol –
  volume of ethanol required = 33 million litres/yr
* This volume of ethanol can be easily provided by:
  Kakira (20 mio l/y) + SCOUL Lugazi (12 mio l/y).
* Foreign exchange savings USD 20 million/year (@ $0.06/litre)

Government decisions required:

- Legislation for mandatory blending
- Roll-out strategy –
  - National blending v/s regional blending v/s selected petro-product distribution companies [PDC]
  - Allocation of storage tank facilities – national v/s PDC
Ethanol Distillery

Product market

Extra-Neutral Alcohol [ENA] for potable spirits

Uganda Market: Present local consumption demand
3 million Litres / month = 36 million Litres / year
Local demand growth rate 14% per year.

Only one producer SCOUL - Lugazi
Plant capacity = 35,000 Litres / day
⇒ 11 million Litres/year

ENA imports ⇒ 24-26 million Litres / year

In addition - there is a significant demand in neighbouring countries: Kenya, S Sudan, DR Congo.
Ethanol Distillery

Product market

[*] Ethanol Fuel for clean Cook Stoves

Uganda Market: The main source of energy used by Ugandans for cooking is currently charcoal and fuel-wood.

Uganda deforestation:
- 1990 – 2000 = 1.76% (86,500 Ha p.a)
- 2000 – 2005 = 2.13%

Immense potential to introduce ethanol cook stoves.
Ethanol Distillery

Product market

- Ethanol Fuel for clean Cook Stoves

- Family friendly
- Comfortable indoor use
- Simple storage requirements
- Not Pressurised - no explosion risk
Ethanol Distillery

Product market

* Ethanol Fuel for clean Cook Stoves

Government approvals required:

- Approval of a denatured ethanol cooking-fuel standard
- Explicit exemption of "denatured industrial ethanol for cooking fuel purposes" from general Ethanol excise tax
- Reduction of import tariffs on clean cook-stoves (this concession covers many stoves, including Ethanol stoves) from 25% to nil (0%) or only 10%
- Removal of 18% VAT on clean cook-stoves
Saraya Manufacturing (U) Ltd
Ethanol-based Hand Sanitisers
Kakira Overview 2016

Ethanol Distillery
- 20,000,000 Litres

BioGas Plant
- 9,900,000 m³

Sugarcane Plantation
- 14,000 Ha
- 21,000 Ha

Sugar Processing
- 180,000 TS
- 74,000 TM

Co-Generation Electricity Total 50 MW

Uganda Grid 30 MW

Bio-Compost
Ash
Molasses
Filter Cake
Bagasse

Power

Cane
Madhvani Group
pioneering innovation
in the developing world...

Web-site
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