P29 Hexagon Renewables Ltd

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RICE STRAW TO ETHANOL FUEL
PROJECT PRESENTED
BY
Dr Ikuba John Ona
*Project Director*
Hexagon Renewables Ltd

Location: RUKUBI NORTH CENTRAL NIGERIA
INTRODUCTION

- Hexagon Renewables is a Bioenergy company founded by a team of Scientists and Engineers.
- Ensure that 20% of Nigeria’s Ethanol come from non-food biomass waste by the year 2030.
Demand figure does include domestic consumption of ethanol for manufacturing of perfumes, pharmaceuticals, cosmetics, drinks, biofuels, gels for stoves, and other industrial uses.
• Nigeria’s rice production increased from 1 million tonnes to 3.5 million tonnes per annum in the last 4 years
• 5 million tonnes of waste (70% burning)
• Doma local government: 200,000 hectares of farmland
• Olam farms 6000 hectares & 3000 hectares out growers
• Potential biomass generated: 125,000 tonnes
Crescentino, Italy – World’s First Commercial Cellulosic Ethanol Plant

- Footprint of 15 Ha
- Ethanol Capacity: 40,000 MT/year
- Biomass used: 200,000 MT
- Ligno-cellulosic feedstock (wheat & rice straw, arundo donax)
- 13MW green electricity from lignin
- 100% water recycle = zero water discharge
INVESTMENT ASK

- Development Finance of USD 259,000.00 For 70% OF FEASIBILITY STUDIES for 5% Equity

- 49.74 million dollar for Plant/Machinery

- TOTAL PROJECT COST: USD100 MILLION
- IRR: 28%
- PAYBACK: LESS THAN FIVE YEARS
- $400,000.00: Invested in establishment & incorporation, sweat capital, pre-feasibility study, consultancy and travels
Proven Technology
• $200+ million invested in Proesa
  • Replicated in Brazil

Ethanol Demand
Over 200 million litres imported in 2013

Abundant Raw Materials

Electricity Generation
• 13 MW of Electricity Generated
  • Sale of 4-5MW to partners

Nigerian Biofuel Policy
• E10 mandate
  • Guaranteed Off-take
Local Community Cooperative

Equity Partner Investors

Technical Partners / Beta Renewables

Favorable Investment Climate for Biofuels

Nassarawa State Govt

Federal Tax Incentives

Financing

Sustainable Raw Material Sourcing

Guaranteed Demand / Alternative Markets

Industrial Farms

Sustainable Communities Collection

over 1,000 new jobs

Local Farms

Local Community

Community Cooperative

28% IRR

5MW Clean Energy to Grid

National Refineries

Retail Potential
Project Development Team

Dr Christopher Ibenegbu
Technical Director

Dr John Ona
Project Director

Mr Attah Ochoga
and
Mr Aaron Ona
Chartered Accountants

Mr Dave Ijwo
Operations and Logistics Strategy

Dr Hezekiah Ogo
Process Engineer

Mr Adinya Uji
Business Liaison/Community Engagement
Proesa™: Key Advantages

Financial
- Lower capital: simpler process and equipment
- Cash cost of fermentable sugars at ~10¢/lb*
- Cash cost of ethanol of <$1.50/USG ($0.40/L)*
- Cost-effective at modest scale
- Lignin provides power for plant

Flexibility
- Feedstock-independent: energy crops, agricultural wastes, woody biomass, bagasse
- Deployable worldwide

Competitive and attractive economics without subsidies
* excluded capital costs
ISBL: Inside the battery limit
OSBL: Outside the battery limit
<table>
<thead>
<tr>
<th>Risk Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Technology Risk</strong></td>
<td>• Beta Renewables in Partnership with Novozymes for ongoing research and commitment to improve technology</td>
</tr>
<tr>
<td><strong>Ethanol Price</strong></td>
<td>• Landing cost and transport to Northern Nigeria gives ethanol prices up between USD3.00-5.60 per gallon in Northern Nigeria. Current low international prices of ethanol has not changed the current price in Nigeria</td>
</tr>
</tbody>
</table>
| **Biomass Supply/Agricultural Risk: Drought or Flood** | • Develop a community collection scheme that involves community leaders from over 200,000 hectares  
• Technology also uses other biomass materials: Bagasse  
• Develop alternative biomass sourcing from grasses and bagasse outside Nassarawa State |
<table>
<thead>
<tr>
<th><strong>GOVERNMENT POLICY</strong></th>
<th>Imported fuel is mixed with 3-5% Ethanol already. Alternative market for bioethanol based cooking gels remains an alternative.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SECURITY</strong></td>
<td>No Boko haram activity in region. Closest Boko haram attack is at least 500km away. Olam Nigeria Ltd have a USD100 million investment in this community.</td>
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<tr>
<td>Project Component description</td>
<td>Estimated Cost USD</td>
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<tr>
<td>-------------------------------------------------------------------</td>
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<tr>
<td>Feasibility, Consultancy and Seed Capital</td>
<td>1,000,000.00</td>
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<tr>
<td>Land acquisition, Development etc</td>
<td>1,500,000.00</td>
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<tr>
<td>Civil works and Building</td>
<td>1,500,000.00</td>
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<tr>
<td>Plant Machinery and Equipment (ISBL)</td>
<td>70,000,000.00</td>
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<tr>
<td>Auxiliary and Ancillary Facilities (OSBL)</td>
<td>20,000,000.00</td>
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<tr>
<td>Initial Licensing Fees</td>
<td>1,000,000.00</td>
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<tr>
<td>Working Capital (cost of Enzymes, Straw Etc)</td>
<td>5,000,000.00</td>
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<tr>
<td><strong>TOTAL</strong></td>
<td><strong>100,000,000.00</strong></td>
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<tr>
<td>Year</td>
<td>REVENUE</td>
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<tr>
<td>------</td>
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<tr>
<td>1</td>
<td>37.58</td>
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<td>2</td>
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<td>3</td>
<td>41.276</td>
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</table>
DEVOLPMENT FINANCING OF USD 259,000.00 FOR 70% OF FEASIBILITY STUDIES

- 49.74 million dollar for Building the Plant /Machinery

IRR: 28%
PAYBACK : FIVE YEARS
EXIT: Phased Buy out by Ethanol based company/IPO Offer
## Timeline

<table>
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<tr>
<th></th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
<th>2018</th>
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<tbody>
<tr>
<td><strong>A. Corporate Governance &amp; Establishment</strong></td>
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<tr>
<td>- Corporate Structure for take-off Established</td>
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<td><strong>B. Business Planning and Strategy</strong></td>
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<tr>
<td>- Feasibility Established</td>
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<tr>
<td>- Operations &amp; Business Planning Complete</td>
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<td>Δ</td>
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<tr>
<td><strong>C. Project Financing</strong></td>
<td>Δ</td>
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<td></td>
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<tr>
<td>- Seed Capital Secured</td>
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<tr>
<td><strong>D. Construction of Plant</strong></td>
<td></td>
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<td>Δ</td>
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<tr>
<td>- Plant opens for business</td>
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CONCLUSION

• This project will be the **first commercial cellulosic plant** in Africa and leveraging on the success of the PROESA Technology

• GranBio commissioned another 82 million litre plant in Alagos Brazil (Oct 2014)
  ▪ Fuyang Bioproject China -2016
  ▪ Canergy California-2016
  ▪ Alpha North Carolina-2016

• **Nigeria needs 300 million litres to meet current needs. This will increase to about 1.2 billion litres** of ethanol per annum.
Thanks For Listening

Hexagon Renewables Ltd

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