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Introduction – What we do Matters!

- Projected total Bioenergy production in 2050 in EJ/year (ExaJoule $10^{18}$)
- 4 Growth Scenario's for production of bioenergy carriers
- Major role for bioenergy in Africa (Source: IEA task 40; "A bottom up assessment and review of global bioenergy potentials to 2050")
Introduction – What we do Matters!

• According to the International Energy Agency (IEA), sub-Saharan Africa will require more than $30 billion in investment to achieve universal electricity by 2030.

• What the future of energy SHOULD look like?
  Michael Liebreich, Bloomberg New Energy Finance – YouTube Febr. 18th 2014
Everest Energy

- Energy project developer and project advisor; providing operational execution of project development in a growing global mid-market segment.
- By supporting the bio-based economy, Everest Energy facilitates the growth of sustainable projects by focusing on energy efficiency and sustainable input fuels.
- Everest Energy possesses in-depth knowledge and experience in both advisory and development assignments. In these assignments we utilize a combination of industry, project financing and technical expertise.
Everest Energy

- Dual Advisory & development approach enables Everest Energy to:
  - Service its advisory clients with actual “real life” experience and,
  - Service its development clients with analytical background and content.

- EE develops:
  - well-structured and high quality projects with stable technologies and O&M,
  - local partnerships with the best-connected and most knowledgeable players,
  - structures and executes sustainable projects through leveraging our in-house capabilities.
Everest Energy

• Sustainable project development based on the “7 building blocks”. This approach allows EE to identify key risks and opportunities of bio energy projects.

• Economic, environmental and social sustainability are key to:
  – Attract project finance
  – Provide long-term project stability
**NPSB Program**

- Netherlands Enterprise Agency (*formerly NL Agency*) is the governmental executive body for programs of the Dutch Ministry of Economic Affairs and Ministry of Foreign Affairs.

- These ministries have developed 2 programs in line with UN Development Goals:
  - Goal 1: eradicate extreme poverty and hunger
  - Goal 7: ensure environmental sustainability

- The purpose of the Netherlands Enterprise Agency’s Programs:
  - Stimulate, support and facilitate sustainable biomass production projects
  - 1-DBI Program: Export from developing countries
  - 2-DBM Program: Production for local markets
NPSB Program

- 41 Bio-Energy Projects
  - Focus on Asia (12), Africa (11) and Latin America (11)
- Variety of biomass inputs:
  - Bio-residues, woody biomass and energy crops cultivated for conversion to energy.
- Outputs:
  - Solid Biomass, Liquid Biofuel or Biogas.
UMA Commercial Support Program

- In 2012-2013 Everest Energy was asked by The Netherlands Enterprise Agency to execute a commercial support program for 24 NPSB projects.
- The program enhanced the insights of the economic feasibility and scalability of these projects by improving their structure & bankability.
- Varying Project technologies, markets and local Conditions
UMA Commercial Support Program

- Increasing bankability and structure of projects through:
  - Strategic analysis; qualitative analysis
  - Business case evaluation; quantitative analysis
  - Structured investment documentation; project data to management data

<table>
<thead>
<tr>
<th>Methodology</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1- Business Case</td>
<td>Qualitative Strategic Analysis</td>
</tr>
<tr>
<td>2- Discounted Cash flow model</td>
<td>Quantitative Economic Analysis</td>
</tr>
<tr>
<td>3- Investor Documentation</td>
<td>Combination and presentation of 1&amp;2</td>
</tr>
<tr>
<td>4- Investor Criteria Analysis</td>
<td>Support Research</td>
</tr>
<tr>
<td>5- Project Results</td>
<td>Management Data</td>
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</tbody>
</table>
UMA Commercial Support Program

- Strategic Analysis of Project
  - SWOT analysis & Spider Diagram

**SWOT analysis**

**Strengths**
1. The feedstock is readily available at different locations.
2. The value of CO₂ emission rights has not been incorporated yet.
3. The government is obliged to buy produced electricity at high fixed prices.

**Weaknesses**
1. Engineering and construction are proving lengthy, diverse and costly.
2. Operational development and execution resources are required for up-scaling.
3. There is a dependency on one party as supplier and buyer.

**Opportunities**
1. Growth of the asset portfolio.

**Threats**
1. Due to competition, speed of development is important.
2. There is a dependency on one party as supplier and initiator.

**Spider diagram**

Agri residue Project X

Project X has a well-developed project with large scalability potential, converting a waste product from rice production into a useful output; electricity.

The involvement of the large agricultural company supplying the residues leads to high input availability, a strong local partner and high scaling potential.
UMA Commercial Support Program

- Business Case Analysis of a project with Discounted Cash Flow Method
UMA Commercial Support Program

- Based on the “7 building blocks” strategic analysis of the project is executed
- 48 Indicators to better be able to assess projects likelihood of success and sustained financial, social and environmental gain.
- Result in Management data to analyze current and future proposals.

<table>
<thead>
<tr>
<th>Category</th>
<th>Explanation</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project Development</td>
<td>Key-variables which need to be in place for successful project development</td>
<td>Risk free presence of feedstock, guaranteed output market, logistics,</td>
</tr>
<tr>
<td>Building Blocks</td>
<td></td>
<td>licensing, etc.</td>
</tr>
<tr>
<td>Financial Parameters</td>
<td>Standard economic measures used and understood by the global financial</td>
<td>CapEx, OpEx, DSCR, IRR etc.</td>
</tr>
<tr>
<td></td>
<td>world</td>
<td></td>
</tr>
<tr>
<td>Macro Data</td>
<td>Geo-Political and Technological data</td>
<td>Sustainability, policy support etc.</td>
</tr>
</tbody>
</table>
GBEP Sustainability Indicators

- Similar core principles of financial, social and environmental sustainability
- EE indicators focus on project-development aspects, whereas GBEP’s perspective lies more on macro (policy/sector level) indicators.
- Many overlapping indicators

<table>
<thead>
<tr>
<th>PILLARS</th>
<th>INDICATORS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental</td>
<td></td>
</tr>
<tr>
<td>1. Life-cycle GHG emissions</td>
<td>9. Allocation and tenure of land for new bioenergy production</td>
</tr>
<tr>
<td>2. Soil quality</td>
<td>10. Price and supply of a national food basket</td>
</tr>
<tr>
<td>3. Harvest levels of wood resources</td>
<td>11. Change in income</td>
</tr>
<tr>
<td>4. Emissions of non-GHG air pollutants, including air toxics</td>
<td>12. Jobs in the bioenergy sector</td>
</tr>
<tr>
<td>5. Water use and efficiency</td>
<td>13. Change in unpaid time spent by women and children collecting biomass</td>
</tr>
<tr>
<td>6. Water quality</td>
<td>14. Bioenergy used to expand access to modern energy services</td>
</tr>
<tr>
<td>7. Biological diversity in the landscape</td>
<td>15. Change in mortality and burden of disease attributable to indoor smoke</td>
</tr>
<tr>
<td>8. Land use and land-use change related to bioenergy feedstock production</td>
<td>16. Incidence of occupational injury, illness and fatalities</td>
</tr>
<tr>
<td>9. Agriculture</td>
<td>17. Productivity</td>
</tr>
<tr>
<td>10. Forestry</td>
<td>18. Net energy balance</td>
</tr>
<tr>
<td>11. Fisheries</td>
<td>19. Gross value added</td>
</tr>
<tr>
<td>12. Aquaculture</td>
<td>20. Change in consumption of fossil fuels and traditional use of biomass</td>
</tr>
<tr>
<td>13. Water quality</td>
<td>21. Training and re-qualification of the workforce</td>
</tr>
<tr>
<td>14. Coastal areas</td>
<td>22. Energy diversity</td>
</tr>
<tr>
<td>15. Wetlands</td>
<td>23. Infrastructure and logistics for distribution of bioenergy</td>
</tr>
<tr>
<td>16. Biodiversity</td>
<td>24. Capacity and flexibility of use of bioenergy</td>
</tr>
<tr>
<td>17. Biodiversity</td>
<td></td>
</tr>
<tr>
<td>18. Biodiversity</td>
<td></td>
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<td>19. Biodiversity</td>
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<td>20. Biodiversity</td>
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<td>21. Biodiversity</td>
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<td>22. Biodiversity</td>
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<td>23. Biodiversity</td>
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<td>24. Biodiversity</td>
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</tbody>
</table>
GBEP Sustainability Indicators

- Method allows for structuring and conclusions on both a project level as well as a portfolio level, in an easily understood format.
- Regional clusters of projects were analyzed.
- The diagrams show the main characteristics and the key project development indicators for the African cluster.

<table>
<thead>
<tr>
<th>Portfolio Characteristics</th>
<th>Country</th>
<th>No. Projects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location of Projects in Portfolio</td>
<td>South Africa</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Mozambique</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Mali</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Tanzania</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>5</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Technologies used in Portfolio</th>
<th>Technology Type</th>
<th>No. Projects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anaerobic Digestion</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Certification Programme</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Distillery</td>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Project Input</th>
<th>Commodity</th>
<th>No. Projects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Liquid Residuals</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Energy Crops</td>
<td>4</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Project Output</th>
<th>Commodity</th>
<th>No. Projects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biogas</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Liquid Biofuel</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Certification</td>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>
UMA Lessons Learned: Input

- Lower input security is an issue when comparing the African project cluster to the characteristics of the “high potentials” of the full program.

- The high number of projects using dedicated energy crops (like soy and cassava) increases the importance of value chain integration.

- Securing input is of key importance:
  - Engaging with smallholder organizations and local stakeholders greatly increases stability of the input.
  - Engaging with local and national policy makers for land-use planning and management, permits and licenses.
UMA Lessons Learned: Output

- Similar to input security; the output stability is a key issue.
- A stable output market is of vital importance for a project to generate cash flow and to be able to attract finance for a project.
- The regulatory framework and an enabling environment are key for the bioenergy market.

- Involve relevant policy makers, civil society and stakeholder groups to promote sustainable economic growth and improvements in social welfare that the project will generate.
- Broad support is invaluable in order to ensure that the project goals are aligned with the bioenergy policy objectives and implementation.
UMA Lessons Learned: local Stakeholders

- Strong local experience and network improves access to local partners, communities, and government support.
  - Combination of local and international partners
  - Combination of capabilities in the team
  - Experience with institutional environment, the supply and demand circumstances and the technical expertise

- Involving local stakeholders increases the chances of successfully gaining access to financial resources.

- Cross-cutting nature of bioenergy means coordination and understanding among policy makers, industry and finance is required.
Lessons Learned: Do’s & Don’ts

<table>
<thead>
<tr>
<th>Do’s</th>
<th>Attention points</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Structured Project Development is paramount for all projects.</td>
<td>• Don’t deviate from standards, use common denominators (M3, MT, etc).</td>
</tr>
<tr>
<td>• Be clear and precise with your information, opinions and project</td>
<td>• Variable upon variable presents a diffuse picture leading to high risk</td>
</tr>
<tr>
<td>strengths &amp; weaknesses.</td>
<td>perception.</td>
</tr>
<tr>
<td>• Calculate / Present a conservative case.</td>
<td>• Develop scalable projects.</td>
</tr>
<tr>
<td>• Keep the core project team small and lines short.</td>
<td>• Examine the interest of your partners and focus on that, avoid tunnel vision</td>
</tr>
<tr>
<td></td>
<td>and conflict of interest.</td>
</tr>
</tbody>
</table>
FUMA Funding Facility

• On behalf of Netherlands Enterprise Agency, Everest Energy is now tasked with development of:
  – Open ended funding facility, starting with the DBM/DBI project-base
  – Investigating barriers-to-launch and recommend solutions to launch

• Goals of the fund:
  – Provide funding for growth of renewable energy projects which help improve both sustainable as well as economic development.

• Fund Development phases:
  – **Phase 1:** Clustering of Project Portfolios based on key financial parameters, Project funding requirements and preconditions of an investment portfolio.
  – **Phase 2:** Match Portfolios with Investors: Analyse criteria for investor selection. Catalogue operational requirements of every project portfolio and investigate the potential match between portfolio requirements and investor demands.
FUMA - Lessons Learned

• Via the FUMA investigation, Everest has investigated the best ways to finance a portfolio of bioenergy projects

• Structure one’s project before approaching funders

• The most eligible sort of investors prove to be Development Banks, Development Bank Funds, Private Equity and Credit Enhancement agencies.

• Commercial (High Street Banks) have difficulty servicing the demand of bioenergy projects.

• Investors recommend to use an existing infrastructure for a new facility and work together with partners who have similar interests and goals.
  – Make optimal use of the synergies between the projects and bundle small projects.
  – Structuring project finance to a portfolio of projects with similar risk/return profiles and cash flow patterns increases financing potential
FUMA Fund Structure - Example

• Graph shows potential funding structure
• Example structure, for discussion purposes
FUMA Funding Facility & PDO
Conclusions

• Experience indicates that project development requires a specific skillset and the presence of this skillset greatly improves chances of success.

• Analyzing projects on the basis of key performance indicators gives a quick and thorough view of project’s barriers and opportunities in a comprehensive and ready to use manner for project partners, policy makers and investors alike.

• Involving national and local stakeholders will lead to increased stability of the input and output markets of the bioenergy system.

• Financiers prefer projects with larger size, for small projects bundling should be considered.

• Funding Facilities similar to the FUMA structure could provide helpful for capacity building of bioenergy in Africa.
The Way Forward

- Project Structuring is of key importance to
  - Attract project finance
  - Provide long-term project stability
- The best way of structuring small- to midsize projects is a balanced approach where all the project building blocks are well developed.
- The most eligible sort of investors for bioenergy projects prove to be Development Banks and Funds, Private Equity, Private Equity Funds and Credit Enhancement agencies.
- A Project development office greatly helps structured project development and risk management.
- For public and private investors alike, utilizing risk management tools is of key importance to properly assess high-impact projects
Contact

We invite you for an open discussion and look forward to your reply.

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Case Discussion: Project X

Introduction:

• Project X and Partner wish to combat poverty and support optimal use of farmland in Country1 and therefore developed a project for the cultivation of energy crops utilizing a pyrolysis installation.

• The pilot project started in 2010 and has resulted in the buildup of a smallholder network of X farmers currently, supported by a local extension network.

• Partner2 is a sustainable food and energy producer in Country1 and uses energy crops to produce a.o. output energy. Partner2 offers the logistical and marketing services of providing end product to buyers. Partner2 also produces the end product at their industrial site. The pyrolysis installation will be placed on the Partner2 site and will be operated by Partner2.

Based on preliminary discussions a potential cooperation between parties is investigated.
Case Discussion: Project X

Project targets Project X + Partner:

• Build up a sustainable network of X+1 smallholders producing energy crops.

• A Pyrolysis installation will be developed/installed to facilitate the smallholders. The smallholder network will receive (some form of) ownership in the energy crop processing facility.

• The project will produce a sustainable export product for/to the EU.

Targets Partner2:

• Create and maintain sustainable livelihood of smallholders, producing energy crops.

• Create and maintain a positive environmental impact.

• Generate value for the shareholders.