Sustainable Bioenergy Development

FAO’s toolkit

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The FAO Sustainable Bioenergy Toolkit

**WHAT TO DO**

A Roadmap to Sustainable Bioenergy
FAO-UNEP Decision Support Tool (DST)

**HOW TO DO IT**

Sustainable Bioenergy Assessment and Planning
FAO Bioenergy and Food Security (BEFS) Approach

Impact Monitoring, Evaluation and Response
Global Bioenergy Partnership (GBEP) Sustainability Indicators
Linkages: Bioenergy and Food Security

Bioenergy

Food Availability (Supply)

Food Access (Income and prices)

Which options are viable?

Food Utilization (Nutrition)
Country level support and Evidence: The Bioenergy and Food Security (BEFS) Approach

- Six areas of support:

  - Stakeholder Dialogue and Capacity Building
    - Scoping
    - Sustainable Bioenergy Assessment
    - Support to Policy Formulation
    - Impact Monitoring, Evaluation and Response

  - Risk Prevention, Management and Investment Screening
Country level support and Evidence: BEFS Approach (contd.)

Stakeholder Dialogue and Capacity Building

Scoping

- Country review including stakeholder review, agriculture, energy, food security, environment context etc
- Establish or work with existing cross ministerial working group
- Identification and discussion of country needs, focus areas, concerns
- Train working group on bioenergy and food security linkages and on the BEFS Approach
- Definition and agreement of next steps
Country level support and Evidence: BEFS Approach (contd.)

- Country level evidence as basis for policy formulation process
- Two levels of analysis: initial appraisal followed by in-depth analysis
- Training of assessment methodologies
BEFS Sustainable Bioenergy Assessment

The assessment can be carried out at two levels:

- BEFS Rapid Appraisal
- BEFS Detailed Analysis

Country Context

Biofuel Supply Chain

Socioeconomic Analysis

Country Specific Evidence
Country level support and Evidence: BEFS Approach (contd.)

Stakeholder Dialogue and Capacity Building

Scoping  ->  Sustainable Bioenergy Assessment  ->  Support to Policy Formulation  ->  Impact Monitoring, Evaluation and Response

Risk Prevention, Management and Investment Screening
Some examples of implementation:

- **Africa**
  - Tanzania: Training, potential assessment, multistakeholder dialogue
  - Malawi: BEFS Working Group, Roadmap
  - Sierra Leone: BEFS Working Group, Sustainable Investment Guidelines
- **Latin America**
  - Peru: Training, potential assessment, multistakeholder dialogue
  - Colombia: GBEP indicator testing
- **Asia**
  - ASEAN: Training, potential assessment, multistakeholder dialogue
  - Indonesia: GBEP indicator testing
The BEFS Rapid Appraisal

Country Status
Review of key indicators and trends: Agriculture, Energy, Environment, etc.

Natural Resources
Agriculture Residues
Woodfuel and Wood Residues
Crops
Biomass Potential Assessment

Energy End Use Options
Energy End Use Options

Heating and Cooking
Charcoal, briquettes, biogas

Rural Electrification
Gasification, SVO, Combustion

Transport
Bioethanol, biodiesel

Techno-economic and socioeconomic analysis

Country Specific Evidence
How does the appraisal account for food security and sustainability?

• Food Security
  – Identify key food staples in the country
  – Strive for feedstock production that is additional or minimizes competition with food, feed and other current uses
  – Consider options for income generation, employment and potential tradeoffs
    • feedstock level, processing level
How does the appraisal account for food security and sustainability? (contd.)

- **Sustainability**
  - **Sustainable use of natural resources**
    - intensification of agricultural production as preferred option
    - forestland and protected areas excluded
    - current/planned uses of residues excluded
    - importance of residues for soil fertility and structure considered
  - **Economic and social sustainability**
    - competitiveness
    - financial viability
    - outgrowers’ inclusion
Coverage of the BEFS Rapid Appraisal

The whole bioenergy supply chain

FEEDSTOCK Production, harvesting, collection

TRANSPORT

BIOFUEL PRODUCTION Processing

FACTORY GATE
BEFS RA: output and interlinkages

Country status
- Key food staples, agriculture export crops, energy demand and access

Natural Resources: Biomass Potential Assessment
- Quantity of feedstock potentially available considering the country needs
- Feedstock costs for some cases

Energy end use options
- Considering the feedstock potentially available, the feedstock costs and the domestic energy requirements:
  - Production costs, investment requirements, economic profitability, labour needs, number of households supplied, etc.
Country support in Malawi

- BEFS Working Group
**Malawi – country status**

### Natural Resources, Land Use and Population

<table>
<thead>
<tr>
<th>Parameter (unit)</th>
<th>Year</th>
<th>Value (1000 ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Country area (1000 ha)</td>
<td>2009</td>
<td>11848</td>
</tr>
<tr>
<td>Land area (1000 ha)</td>
<td>2009</td>
<td>9428</td>
</tr>
<tr>
<td>Agricultural area (1000 ha)</td>
<td>2009</td>
<td>5572</td>
</tr>
<tr>
<td>Arable land (1000 ha)</td>
<td>2009</td>
<td>3600</td>
</tr>
<tr>
<td>Permanent crops (1000 ha)</td>
<td>2009</td>
<td>122</td>
</tr>
<tr>
<td>Forest area (1000 ha)</td>
<td>2009</td>
<td>3270</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Year</th>
<th>Value (1000 inhab)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total population</td>
<td>2011</td>
<td>15381</td>
</tr>
<tr>
<td>Rural population (%)</td>
<td>2011</td>
<td>79.71</td>
</tr>
<tr>
<td>Population density (inhab/km²)</td>
<td>2011</td>
<td>130</td>
</tr>
</tbody>
</table>

Source: FAO, 2013: AQUASTAT

### Economic Indicators

<table>
<thead>
<tr>
<th>Parameter (unit)</th>
<th>Year</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDP/capita, PPP (const. 2005, int. $)</td>
<td>2011</td>
<td>789</td>
</tr>
<tr>
<td>GDP per capita, PPP (current int. $)</td>
<td>2011</td>
<td>465</td>
</tr>
<tr>
<td>Agriculture, value added (% of GDP)</td>
<td>2011</td>
<td>30</td>
</tr>
</tbody>
</table>

### Energy Consumption and Energy Access

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Year</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy use (kg of oil eq. per capita)</td>
<td>2010</td>
<td>No data</td>
</tr>
<tr>
<td>Electricity consumption (kWh/capita)</td>
<td>2010</td>
<td>No data</td>
</tr>
<tr>
<td>Access to electricity (% of population)</td>
<td>2010</td>
<td>9</td>
</tr>
</tbody>
</table>

Source: World Bank, 2013: World Development Indicators

### Food Supply and Key Food Security Crops

<table>
<thead>
<tr>
<th>Rank</th>
<th>Food commodity</th>
<th>Food supply (kcal/capita/day)</th>
<th>Share in total food supply</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>maize</td>
<td>1158</td>
<td>50.0%</td>
</tr>
<tr>
<td>2</td>
<td>potato</td>
<td>195</td>
<td>8.4%</td>
</tr>
<tr>
<td>3</td>
<td>cassava</td>
<td>135</td>
<td>5.8%</td>
</tr>
</tbody>
</table>

Subtotal: 1,488.00

Total food supply: 2,318.00

Source: Food Balance Sheets, FAOSTAT

### Agricultural Trade - Key Export Crops

<table>
<thead>
<tr>
<th>Rank</th>
<th>Trade commodity</th>
<th>Export quantity (t)</th>
<th>Export value (1000 US$)</th>
<th>Export unit value (US$/t)</th>
<th>Share in total value of exports</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>tobacco</td>
<td>144,676</td>
<td>874,904</td>
<td>6,047</td>
<td>69.6%</td>
</tr>
<tr>
<td>2</td>
<td>tea</td>
<td>49,999</td>
<td>120,787</td>
<td>2,416</td>
<td>9.6%</td>
</tr>
<tr>
<td>3</td>
<td>coffee</td>
<td>901</td>
<td>5,271</td>
<td>5,850</td>
<td>0.4%</td>
</tr>
</tbody>
</table>

Subtotal: 1,000,962

Total value of export of agricultural commodities: 1,256,639

Source: Trade, FAOSTAT

Year: 2010
## Energy Balance in Malawi

- IEA data generally used but in this case missing
- Malawi Energy Balance

<table>
<thead>
<tr>
<th>Sector</th>
<th>Energy demand by fuel (TJ/year)</th>
<th>Total (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Biomass</td>
<td>Petroleum</td>
</tr>
<tr>
<td>Households</td>
<td>127,394</td>
<td>672</td>
</tr>
<tr>
<td>Industry</td>
<td>9,664</td>
<td>3,130</td>
</tr>
<tr>
<td>Transport</td>
<td>270</td>
<td>5,640</td>
</tr>
<tr>
<td>Service</td>
<td>452</td>
<td>558</td>
</tr>
<tr>
<td>Total (%)</td>
<td>88.5</td>
<td>6.4</td>
</tr>
</tbody>
</table>

* Hydro and thermal

Biomass is the main energy source, including fuelwood, charcoal and crop residues: 89 % of total
Households are the main energy consumers: 83 % of total
The BEFS Rapid Appraisal

Country Status
Review of key indicators and trends: Agriculture, Energy, Environment, etc.

• Overview information
  – Heavily dependent on agriculture, high poverty, low GDP/capita

• Food security and agriculture
  – Main food crop: Maize
  – Main ag export crop: Tobacco

• Energy and energy access
  – Heavily reliant on biomass for energy, household main consumers
Concluding remarks

• Understand the context, needs, constraints and investigate, **based** on the local **evidence**, potential viable solutions

• Central role for **smallholder inclusion** to ensure targeting poverty reduction

• **What bioenergy option** against which energy need, considering a **broader energy mix**

• **Integration is key**: Integrate food and energy systems
Thank You


PLEASE DO NOT HESITATE TO CONTACT US:

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