BEFS

FAO'S BEFS BIOENERGY & FOOD SECURITY APPROACH

Implementation Guide

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INTRODUCTION

Sustainable energy, energy that is accessible, cleaner and more efficient, is key to achieving economic development and poverty reduction targets.

Currently nearly one in five people around the world do not have access to modern energy services and approximately three billion people rely on wood, coal, charcoal or animal waste for cooking and heating. This is a major barrier to eradicating poverty. Under the Sustainable Energy for All initiative of the UN Secretary General, action is being mobilized to achieve universal access to modern energy services by 2030, improve energy efficiency and increase the share of renewable energy in the global energy mix. In 2011, this share was about 19%, of which 9.3% was traditional biomass, e.g. fuelwood, crop residues and animal dung (REN21, 2013)[1].

Developing and emerging economies are confronted with a two-fold energy challenge: expanding access to energy, and promoting the transition to sustainable, low-carbon energy systems.

A key element in this challenge is to identify the most promising domestic renewable energy resources and implement policies to promote their sustainable development.

Compared to other renewable energy sources, bioenergy potentially offers many advantages if properly managed. These include renewed investment in the agriculture sector, rural development opportunities, job creation, and increased energy security and access. However, concerns have been raised about the economic viability as well as the environmental and social sustainability of bioenergy systems.

A clear understanding of the linkages between bioenergy production and use, sustainability and food security is needed in order to inform the development and implementation of bioenergy policies that contribute to both energy and food security in a sustainable manner.

1 The full reference for this source can be found at http://www.ren21.net/Portals/0/documents/Resources/GSR/2013/GSR2013_lowres.pdf

In order to support countries in the decision-making process related to sustainable bioenergy development, FAO has developed a support package that addresses two key questions:

1) WHAT TO DO?
i.e. which steps should a country undertake in order to promote the development of a sustainable bioenergy sector?

2) HOW TO DO IT?
i.e. how can the aforementioned steps be implemented?

The UN-Energy Decision Support Tool for Sustainable Bioenergy Development (DST) provides a 'Roadmap to Sustainable Bioenergy' describing the 'What to do'

This document provides a detailed description of the Bio-energy and Food Security (BEFS) Approach, which comprises a set of tools and guidance for Sustainable Bioenergy Assessment and Planning.

What to do	A Roadmap to Sustainable Bioenergy **UN-Energy Decision Support Tool for Sustainable Bioenergy Development (DST)**
How to do it	Sustainable Bioenergy Assessment and Planning **FAO's Bioenergy and Food Security (BEFS) Approach**
	Impact Monitoring, Evaluation and Response **Global Bioenergy Partnership (GBEP) Sustainability Indicators**

COMPLEMENTARY INITIATIVES

The **UN-Energy Decision Support Tool for Sustainable Bioenergy Development (DST)** was developed jointly by FAO and UNEP under the framework of UN-Energy, which is the United Nations' mechanism for inter-agency collaboration in the field of energy. The DST is a web-based tool that provides step-wise guidance to decision makers for the definition of a bioenergy strategy and for the approval or licensing of investments. One of the main resources identified in the DST that can inform and support the implementation of these steps is the BEFS Approach with its various tools.

The Global Bioenergy Partnership (GBEP) was established in 2006 in order to support the implementation of the 2005 Gleneagles Plan of Action calling for "biomass and biofuels deployment, particularly in developing countries where biomass use is prevalent."

The three priority areas of GBEP are facilitating sustainable development of bioenergy through the development of indicators; raising awareness through high-level dialogue; and building capacity. Concerning the first priority area, in November 2011 GBEP Partners agreed on a set of 24 voluntary sustainability indicators for bioenergy. Elements of the BEFS Approach have been integrated in the GBEP indicators and used for capacity building activities. Conversely, the GBEP indicators relevant for food security have also been included in the BEFS Approach under the Impact Monitoring, Evaluation and Response component.

HOW TO USE THE BEFS IMPLEMENTATION GUIDE

The objective of this document is to assist stakeholders, primarily policymakers, who wish to develop bioenergy options that safeguard food security.

The guidance in this document is based on FAO's Bioenergy and Food Security Approach (BEFS).

The document provides a succinct description of the various components, tools and guidance of the BEFS Approach, illustrating how they can be used to inform and support sustainable bioenergy assessment and planning.

THROUGH THIS DOCUMENT STAKEHOLDERS SHOULD BE ABLE TO:

- Identify the relevance of the BEFS Approach to their specific national or project context and the components of the BEFS Approach that address their priorities
- Identify key stakeholders to consult and involve when addressing bioenergy and food security issues
- Define the steps required to implement the selected components of the BEFS Approach

The timeframe for implementing the BEFS Approach depends on each country's priorities, the components selected and the level of analysis.

As explained below, the BEFS Approach offers some tools and guidance which can be applied in a short period of time and others that require implementation over longer periods, depending on data availability and technical capacity.

The first section of the document provides an overview of the BEFS Approach followed by a section describing each of the specific components of the BEFS Approach, including outputs, and timing and costs of implementation. The sections that follow cover key questions addressed by the BEFS Approach, a list of stakeholders that should be consulted and involved, a few examples of BEFS' implementation and a section on facilitation mechanisms for implementing the BEFS Approach.

1.

FAO'S BIOENERGY AND FOOD SECURITY APPROACH

The BEFS Approach of FAO helps countries design and implement sustainable bioenergy policies and strategies, by ensuring that bioenergy development fosters both food and energy security, and that it contributes to agricultural and rural development in a climate-smart way.

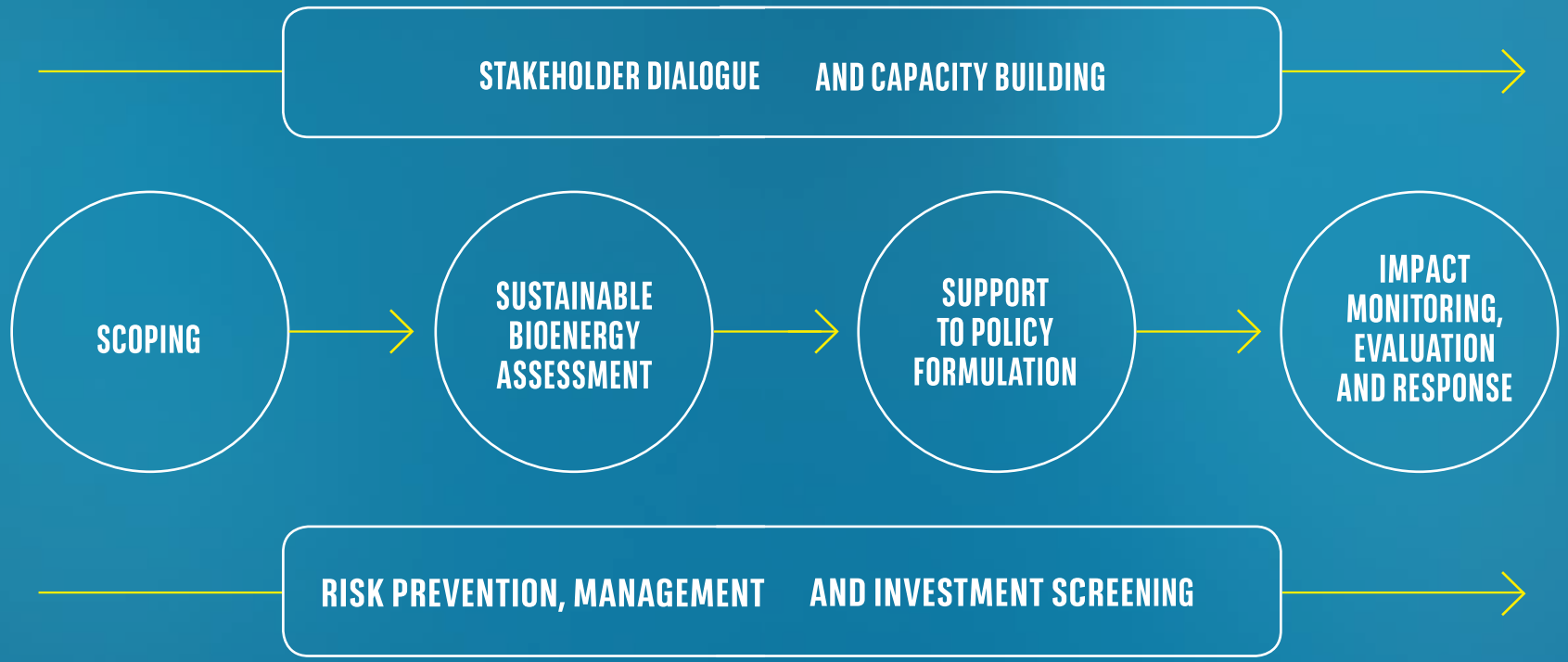
THE BEFS APPROACH COMPRISES SIX COMPONENTS (Figure 1)

- Scoping
- Stakeholder Dialogue and Capacity building
- Sustainable Bioenergy Assessment
- Support to Policy Formulation
- Impact Monitoring, Evaluation and Response
- Risk Prevention, Management and Investment Screening

Depending on the areas of interest, the level of bioenergy development, and the status of bioenergy policy formulation and implementation, countries may decide to use specific components of the BEFS Approach.

The BEFS Approach components and the related tools and guidance can be applied at national and sub-national levels (e.g. regional, district, community, etc.) and at project level as well.

FIGURE 1 THE BEFS APPROACH AND ITS COMPONENTS



2
THE BEFS APPROACH COMPONENTS
2.1
SCOPING

Given that the BEFS Approach is context specific, the initial step is to analyze the country situation and determine how the BEFS Approach can best support the country based on its needs and requirements.

THE OVERALL OBJECTIVES OF THE BEFS SCOPING ARE:

1. To form a BEFS Working Group to steer the process
2. To understand the agriculture, energy, environment, economic and development situation and the country's concerns
3. *Optional:* To formulate a BEFS Roadmap.

The scoping activities first support a multi-stakeholder dialogue on bioenergy and food security. This is done either through an existing interdepartmental, multidisciplinary body or through the establishment of a BEFS Working Group.
The working group should cover all relevant issues and disciplines such as energy, agriculture, food security, environment, economic planning and development etc. The relevant entities will be selected by the country. In a number of countries it has proven successful when the Ministries of Energy and Agriculture have jointly chaired the working group.
The working group serves as the focal point for all future BEFS activities.

The country status is described in the BEFS Country Brief.
The country may also wish to produce a BEFS Roadmap. The aim of this document is to define how the BEFS Approach can assist the country with developing sustainable bioenergy options.

THE BEFS ROADMAP OUTLINES

1. The country context
2. The scope of analysis to be carried out
3. The components of the BEFS Approach to be implemented as a result of country context and priorities
4. The estimated resource requirements.

SCOPING

CORE ACTIVITIES

- Collect background information on key energy, agriculture, climate change and food security issues and prepare the BEFS Country Brief
- Identify relevant stakeholders and the current institutional framework for decision-making on bioenergy and food security
- Establish inter-ministerial/multi-stakeholder working group(s)
- Preliminary assessment of availability and reliability of data, and identification of existing gaps

KEY OUTPUTS

BEFS Country Brief; formation of Working Group; BEFS Rapid Appraisal indications; BEFS Roadmap

TIMEFRAME

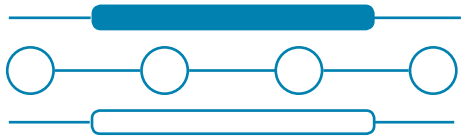
2-6 months

RESOURCES

Required expertise in international development; agricultural economics, natural resource management or closely related field.

2.2

STAKEHOLDER DIALOGUE AND CAPACITY BUILDING



Given the multidisciplinary nature of bioenergy, addressing this sector requires the participation of many and diverse stakeholders. These stakeholders often have diverging views on policy and private sector interventions and most of the time there is little or no collaboration and/or coordination among them. This may be due to a lack of understanding of the full range of issues presented by bioenergy development and the various interests at stake. The BEFS Approach promotes a broad based consultation to define bioenergy priorities at the outset and continue discussions throughout bioenergy policy and investment development. As mentioned in the previous section, this is done through either through an existing body or the BEFS Working Group.

In many developing countries the capacity to understand and manage the complex inter-linkages between bioenergy and food security, and assess the related trade-offs can still be enhanced. To address this issue, the BEFS Approach has developed training modules for various stakeholders to help increase understanding of the relationship between bioenergy and food security; to build technical skills to conduct analysis; and build the institutional framework to manage and mitigate risk as well as monitor impacts. The training is available at both policy and technical level. At the policy level, the BEFS Approach provides decision makers with a better understanding of the complex links between bioenergy and food security.

At the technical level, technical government officials and relevant stakeholders from a broad range of disciplines, including agronomy, economics, and the environment learn how to implement the BEFS Approach and use the resulting information.

The table below provides a summary of the types of stakeholders that are relevant to the bioenergy decision-making process at both national/sub-national and project levels.

TABLE 1 BEFS STAKEHOLDERS

GOVERNMENT	PRIVATE SECTOR	CIVIL SOCIETY
Energy	Feedstock Producers	Farmer Organizations
Agriculture	Fertilizer Producers and Sellers	Labour Organizations
Food Security	Feedstock Transporters	Trade Associations
Rural Development	Feedstock Processors	Land Rights Organizations
Land Planning	Fuel Transporters and Distributors	Environmental NGOs
Environment	Energy Providers	Development NGOs
Forestry	Import/Export Agencies	Fair Trade Organizations
Water Resources	Research Institutions	Community Based Organizations and Groups
Investment	Consultancy Firms	Community Members and the Public
Trade	Financial Institutions	
Finance		
Statistics		

STAKEHOLDER DIALOGUE AND CAPACITY BUILDING

CORE ACTIVITIES

- Support inter-institutional dialogue across key government actors and across other relevant stakeholders
- Conduct training activities

KEY OUTPUTS

Support policy dialogue between key stakeholders using the evidence/information generated by the implementation of the BEFS Approach

RESOURCES

A country-based consultant to facilitate the institutional dialogue and key experts to run the capacity building trainings

2.3

SUSTAINABLE BIOENERGY ASSESSMENT

Bioenergy policy formulation should be evidence based. This evidence is provided by the Sustainable Bioenergy Assessment which is conducted based on the BEFS Analytical Framework.

The BEFS AF (see Figure 2) starts with the definition of the Country Context. This is followed by three areas of analysis for the whole biofuel supply chain, namely Natural Resources, Techno-economic Analysis and Socio-economic Analysis.

The Natural Resource analysis includes a Biomass Potential Assessment. The Techno-economic and Socio-economic analyses address technology requirements, production costs, smallholder inclusion, job creation and investment requirements.

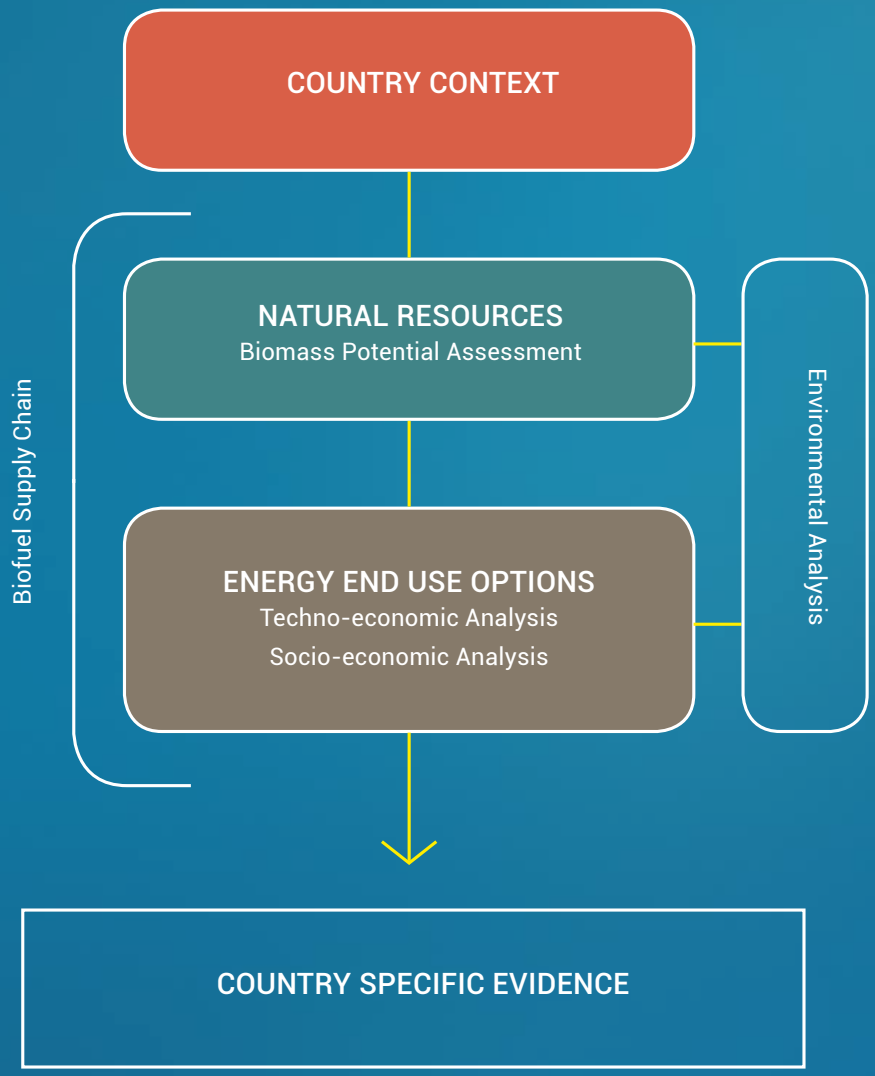
Food security considerations and sustainability dimensions are interwoven throughout the BEFS Analytical Framework. With regards to food security, current and planned uses of biomass for non-bioenergy purposes are subtracted from the amount of feedstock potentially available for bioenergy production. This is done to minimize the competition with food, feed and other uses. With regards to food access, smallholder inclusion in the bioenergy supply chain is addressed and options for income and employment generation are assessed. Concerning sustainability, all three pillars (environmental, social and economic) are addressed. In the Biomass Potential Assessment, protected areas are excluded and priority is given to intensification of agricultural production. In addition, current and planned uses of residues, including for soil management, are excluded. Economic and social sustainability cover issues related to the economic and financial viability of the various biofuel pathways, smallholder inclusion and job creation, among others.

The BEFS Approach includes two sets of methodologies and tools to conduct a sustainable bioenergy assessment based on the BEFS AF: the BEFS Rapid Appraisal and the BEFS Detailed Analysis.

The **BEFS Rapid Appraisal** provides a preliminary indication of the sustainable bioenergy potential of the country.

The **BEFS Detailed Analysis** provides more accurate results to inform policy making. If the Detailed Analysis is preceded by the BEFS Rapid Appraisal, this allows to conduct a more targeted in-depth analysis.

FIGURE 2 THE BEFS ANALYTICAL FRAMEWORK



KEY QUESTIONS

ADDRESSED UNDER THE SUSTAINABLE BIOENERGY ASSESSMENT COMPONENT.

What can bioenergy be used for?
*What **development objectives** can it contribute to:*
Energy security?
Rural development?
Poverty reduction?
Food security?
*What are the **concerns**?*
*What are the **tradeoffs**?*

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*How will **agriculture markets** evolve and what are the likely impacts of bioenergy developments on these?*

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*How can bioenergy feedstock production represent an opportunity for **rural development** and **poverty reduction**?*

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*Which **crops** that could be used for bioenergy production can be grown in the country under the prevailing **agro-ecological conditions**?*

What is the current domestic production of these crops?

*How much could be produced through an **intensification** of agricultural production?*

*Where could crops for bioenergy be produced without encroaching on **protected areas** or adversely affecting **biodiversity**?*

What land is best to use ?

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*Is it feasible to **increase agricultural production** to meet the demand for food and bioenergy?*

How could this be done sustainably?

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*Can there be a **sustainable expansion** of the agricultural area, taking into consideration competing demands for land, especially for food production and biodiversity conservation?*

How much residue from current agricultural and forestry production is available to produce bioenergy, taking into account existing uses?

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*Which bioenergy **processing technologies** and **end use options** are viable in the country?*

*How will biofuel developments affect **water resources**?*

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*Can **smallholders** be involved in bioenergy production without compromising profits?*

How does the cost of bioenergy compare with alternative energy sources in the country?

*Can domestically produced bioenergy be **cost competitive** on the international market?*

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*Which feedstocks, management practices and processing technologies can deliver the largest **greenhouse gas emission savings**?*

Are these in line with the requirements of importing markets?

*What are the likely **trade-offs** in choosing a particular bioenergy development pathway?*

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*Which are the **key food crops**?*

Have the prices of the key food crops changed?

Which household groups' food security is at risk?

Which are the vulnerable household groups?

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*What is the **employment generation potential** of bioenergy development?*

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*How could bioenergy development affect the **profitability of different crops** at farm level?*

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*What could be the resulting changes in **farmers' production choices**?*

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*To what degree could bioenergy development contribute to **energy access**?*

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*How could **access to land** by local communities be affected by bioenergy development?*

2.3.1

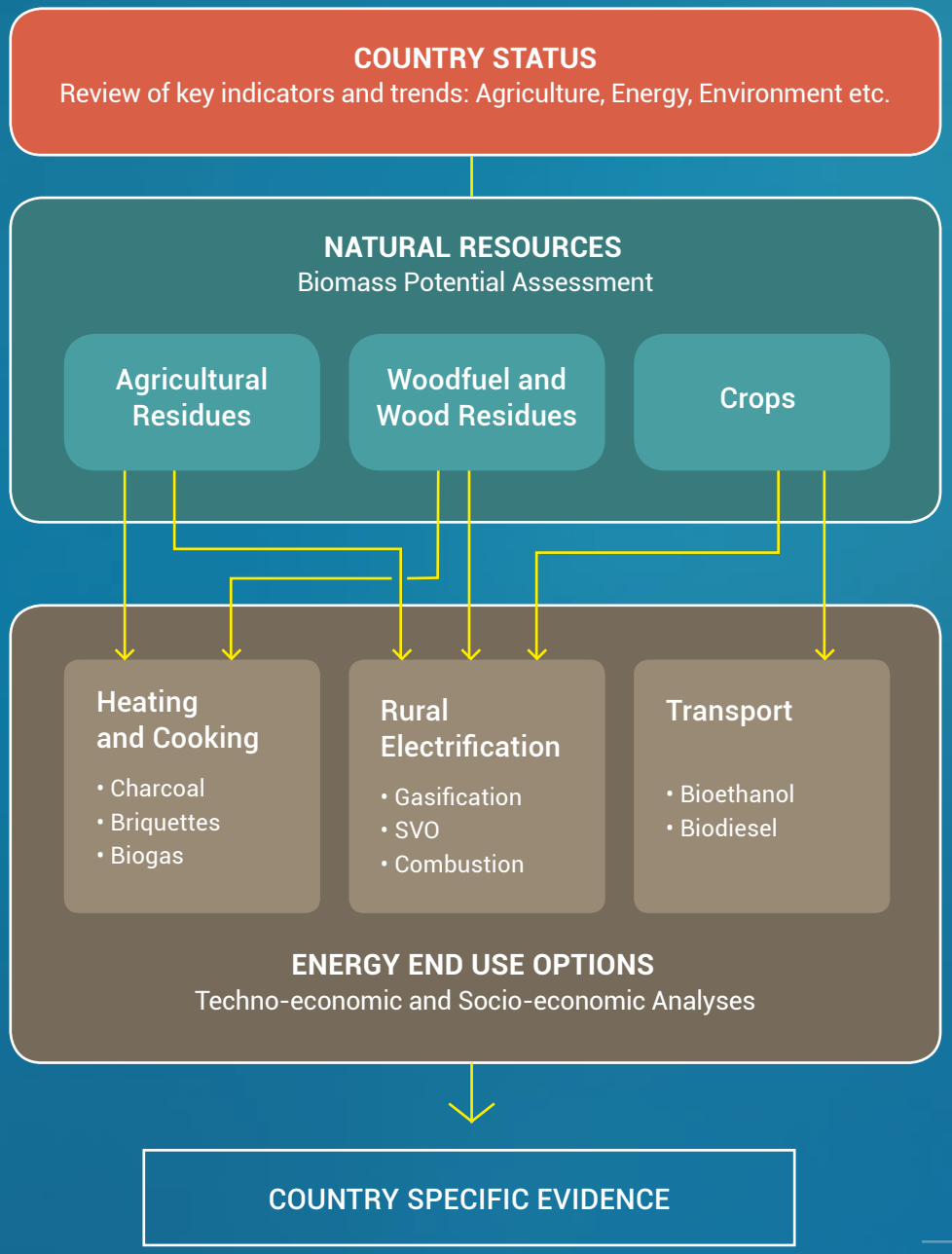
BEFS RAPID APPRAISAL[2]

The BEFS Rapid Appraisal (RA) consists of a set of easily applicable methodologies and user-friendly tools which allow countries to get an initial indication of their sustainable bioenergy potential and of the associated opportunities, risks and trade-offs.

The BEFS RA covers the whole biofuel supply chain from feedstock production to processing plant gate. In the case of electricity, distribution is addressed as well. It considers all bioenergy options including solid, liquid and gaseous biofuels and covers the following energy end uses: heating and cooking, rural electrification and transport. Feedstock options investigated comprise agriculture residues, fuelwood and wood residues, and crops.

2. BEFS Rapid Appraisal, http://www.fao.org/energy/befs/rapid-appraisal/en/

FIGURE 3 THE BEFS RAPID APPRAISAL



THE BEFS RA COMPRISES THE FOLLOWING MODULES:

Country Status

This module covers key environmental and socio-economic indicators, the identification of main food staples and cash crops, along with energy production and demand (household level, transport sector, industry).

Natural Resources

Biomass Potential Assessment

Feedstock options are selected and the availability of the selected feedstock for bioenergy is assessed. The output is an initial indication of quantities of feedstock available from crop and livestock residues, forestry and residues, as well as crops. Profitability of different crops is also taken into consideration.

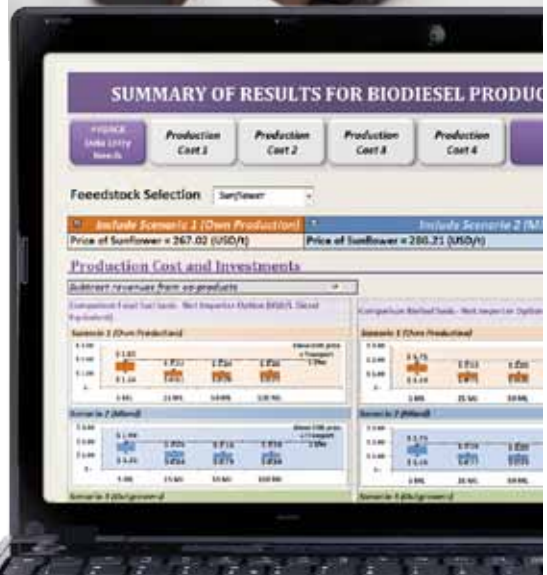
Energy End-use Options

Techno-economic and Socio-economic Analyses

The energy end use options that the country is interested in are selected and analysed.

The Rapid Appraisal covers the following energy end use options:

- **Heating and Cooking**
  Charcoal, Briquettes, and Biogas
- **Rural Electrification**
  Gasification, Straight Vegetable Oil (SVO) and Combustion
- **Transport**
  Bioethanol and Biodiesel



A techno-economic and socio-economic analysis is conducted for each of these options.

The techno-economic analysis covers: technology aspects, economic profitability and financial viability.

The socio-economic analysis covers labour implications and smallholder inclusion.

For each option considered, feedstock requirements are checked against the outputs of the Biomass Potential Assessment.

Based on the results of the techno-economic and socio-economic analyses, the preferred options for heating and cooking, rural electrification and transport are screened against the Country Status.

In summary, the tools of the BEFS RA assist policy makers / technical officers in:

- Outlining the country energy, agriculture and food security context;
- Outlining the sustainable bioenergy options of interest;
- Obtaining initial estimates of which sustainable bioenergy supply chains are viable in the country, based on economic profitability, financial viability, investment requirements, labour implications and smallholder inclusion; and
- Identifying options of interest that require more in-depth analysis, e.g. through the BEFS Detailed Analysis.

BEFS RAPID APPRAISAL

CORE AREAS OF ASSESSMENT

COUNTRY STATUS

Key environmental and socio-economic indications, the definition of the main food staples and cash crops in the country, the current energy balance and current energy uses

BIOMASS POTENTIAL ASSESSMENT

Feedstock options are selected and the availability of the selected feedstock for bioenergy is assessed

TECHNO-ECONOMIC AND SOCIO-ECONOMIC ANALYSES

Bioenergy end use options are selected. Analysis on technology aspects, economic profitability and financial viability, GHG implications, labour implications and smallholder inclusion for each option considered

KEY OUTPUTS

Initial estimates of which sustainable bioenergy supply chains are viable in the country and indication of options of interest that require more in-depth analysis, e.g. through the BEFS Detailed Analysis

TIMEFRAME

6 months

RESOURCES

Experts in the technical disciplines related to the tools, with country-based support

http://www.fao.org/energy/befs/61325/en/

2.3.2

BEFS DETAILED ANALYSIS

The **BEFS Detailed Analysis** covers four main areas: Diagnostic Analysis; Natural resources Analysis; Techno-economic and environmental analysis, and Socio-economic Analysis.

The **Diagnostic Analysis** examines trends in domestic agricultural markets and domestic food security.

The **Natural Resource Assessment** covers crops, forestry and water.

- **Crops**: This allows stakeholders to identify the areas suitable for bioenergy crop production under different agricultural production systems and levels of inputs. Land is assessed for its suitability for production of the selected crops by taking into account climate, soil and site-specific conditions. Filters are used to exclude areas not appropriate for agriculture (forests, protected areas, inhabited areas and infrastructure corridors) and considering competing uses of land, such as food production, pastures and meadows, land requirements of non-agriculture sectors. Overall this allows stakeholders to structure or revise their land-use planning, while accounting for future bioenergy developments and safeguarding food production and supply.

- **Forestry**: This uses the Woodfuel Integrated Supply/Demand Overview Mapping model (WISDOM), which is a spatially explicit analysis of the supply and demand of fuelwood, forest harvesting residues and wood processing residues. The same methodology is used for assessment and mapping of crop residues. The result is an integrated module, based on the supply-demand balance, through which the priority areas for intervention are identified.

Water: The Analytical Framework considers water analyses to assess the implications of water in bioenergy development both at product level and basin level. The tools used are the water footprint and the Water Evaluation and Planning system (WEAP).

The **Techno-economic** and **Environmental Analyses** generate information on bioenergy production costs and the impact that different bioenergy production pathways have on GHG emissions.

- The **bioenergy production costs** are based on biomass feedstocks, fuel type and different production technologies. Within the analysis, scenarios are identified to determine type and amount of fuel, feedstock, conversion technologies, and who is to supply the feedstock (e.g. smallholders/outgrowers, commercial estates or a mix of both). The technology selection is based on the country's technology capacity, human skills, and access to inputs required in bioenergy production.

- The **GHG analysis** defines the GHG balance for the production of biofuels based on the scenarios identified in the production cost analysis. In the case of liquid biofuels, the analysis accounts for impacts related to potential direct land-use changes and crop-to-crop changes. The analysis also account for the GHG emissions from the processing of biomass to biofuel, and from the transportation of the biomass from field to plant and of the biofuel from plant to market. The analysis allows to identify the bioenergy production pathways that can deliver the largest greenhouse gas emission reductions.

The **Socio-economic Analysis** addresses the economy-wide impacts and includes a household food security and vulnerability analysis as well.

- **Economy-wide impacts**: This allows to define the impacts of developing a bioenergy sector on the economy as a whole including labour, growth and poverty impacts. The analysis builds on the results of the Techno-economic Analysis, bringing them into a nation wide model. The structure of the model includes a detailed breakdown of the agricultural sector and of the other sectors of the economy. Biofuel scenarios differ according to their production technologies and strategies, namely feedstock, scale of feedstock production and intensive versus extensive strategies. The model assesses whether the implementation of a new sector, such as bioenergy, can be beneficial for economic growth and poverty reduction. The analysis can be very helpful in giving policy-makers a sense of how particular bioenergy investments will affect broader development objectives outside of the biofuels sector itself (e.g., national economic growth, household incomes, etc).

- **Household Food Security and Vulnerability Analysis**: This is based on household level survey data and can assist policymakers in understanding which segments of the population could be vulnerable to price changes in the country. The analysis provides evidence that allows to differentiate households by typology when considering specific safeguard programmes.

BEFS DETAILED ANALYSIS
CORE AREAS OF ASSESSMENT

DIAGNOSTIC ANALYSIS
Agricultural Outlook of the country

NATURAL RESOURCES ANALYSIS
Availability of suitable land, water and residues for bioenergy production

TECHNO-ECONOMIC AND ENVIRONMENTAL ANALYSES
Production costs of different biofuel feedstocks, technologies and supply chains with and without smallholders, and greenhouse gas emission reduction potential

SOCIO-ECONOMIC ANALYSIS
Impacts of bioenergy development on the domestic economy (e.g. GDP, employment, poverty) and identification of the vulnerable household groups

KEY OUTPUTS
Generation of data and detailed analysis of key BEFS issues identified in the Scoping phase

TIMEFRAME
Approximately 12-18 months

RESOURCES
Experts in the various areas of analysis included in the BEFS AF

2.4

SUPPORT TO POLICY FORMULATION

The BEFS Approach can support both policy formulation and revision, based on the context and priorities of each country. The BEFS Approach supports the policy process at three levels:

Firstly, a review of the existing policy and legislative framework is conducted, in order to determine whether such framework is suitable for promoting sustainable bioenergy development, or whether revisions and integrations are needed.

Secondly, the evidence generated by the implementation of the BEFS RA and/or of the BEFS Detailed Analysis informs and supports the decision-making process.

Specifically, this process is supported through the analysis of the environmental, economic and social impacts of bioenergy in the context of specific national and local conditions and through continued consultation with relevant stakeholders.

Thirdly, the implementation of the Impact Monitoring, Evaluation and Response component of the BEFS Approach can lead to the identification of negative impacts caused by bioenergy development. This process can inform the revision of existing bioenergy policies. For instance, incentives can be put in place to promote the implementation of good practices that can mitigate, all else equal, the negative impacts that have been identified.

SUPPORT TO POLICY FORMULATION

CORE ACTIVITIES

- Coordination of seminars/ roundtables with national experts both at the technical and policy levels to discuss results generated by the implementation of the BEFS tools
- Review of the regulatory framework for bioenergy, including agriculture, food security, energy; and the identification of existing gaps
- Consultation with a wide range of stakeholders for feedback
- Technical support for Ministerial and Parliamentary discussions

KEY OUTPUTS

Bioenergy and Food Security Policy

TIMEFRAME

6-12 months

RESOURCES

Legal and technical experts

2.5

RISK PREVENTION, MANAGEMENT AND INVESTMENT SCREENING

Bioenergy development may create both opportunities and risks. In order to ensure that the development of the bioenergy sector fosters both food and energy security and that it contributes to agricultural and rural development in a sustainable way, the risks need to be properly identified, prevented and managed.

Through the BEFS Sustainable Bioenergy Assessment, it is possible to design a bioenergy sector where the risks are minimized and the opportunities maximized.

In addition, BEFS has compiled a set of good practices, guidance and policy instruments that can be implemented in order to prevent and manage both environmental and socio-economic risks in bioenergy development.

In particular, the BEFS Approach includes[3]:

- **Good environmental practices** that can be implemented by bioenergy feedstock producers in order to minimize the risk of negative environmental impacts from their operations, and to ensure that bioenergy contributes to climate change mitigation while safeguarding and possibly fostering food security;
- **Good socio-economic practices** that can help minimize the risks and increase the opportunities associated with bioenergy operations; and
- Short **guidance on tenure related issues** in the context of bioenergy development, at both national and project levels; and
- **Policy instruments** that can be used to require or promote good practices in bioenergy feedstock production and to discourage bad practices.

The Bioenergy and Food Security (BEFS) Approach also includes a web-based tool that can provide a preliminary indication of potential risks and benefits for food security from agricultural/bioenergy investments. (http://www.fao.org/energy/befs/operator-tool/en/)

The tool, which is available in English, French and Spanish, can be used by national and local authorities to screen proposed investments; by development banks in the evaluation of investment proposals; and by investors as an ex-ante self-assessment tool.

The BEFS Operator Level Tool consists of three parts:

1. Change in the supply of food to the domestic market;

2. Resource availability and efficiency of use;

3. Physical displacement, change in access to resources, compensation and income generation.

Each part includes indicators addressing key environmental and socio-economic dimensions relevant for food security. For each indicator, benchmarks and thresholds are provided.

Based on these and on the information entered by the users of the tool, a score is then assigned to each indicator:

- Potential Benefit for Food Security;
- No Significant Influence on Food Security; and
- Potential Risk to Food Security.

The BEFS Operator Level Tool is linked to FAO databases such as FAOSTAT. The tool builds upon key international references such as the Global Bioenergy Partnership (GBEP) Sustainability Indicators for Bioenergy, the FAO Voluntary Guidelines on the Responsible Governance of Tenure, and the International Finance Corporation (IFC) Performance Standard 5 on Land Acquisition and Involuntary Resettlement.

3 http://www.fao.org/energy/befs/78917/en/

2.6

IMPACT MONITORING, EVALUATION AND RESPONSE

Bioenergy development, through its environmental and socio-economic impacts, may have positive or negative effects on food security. For this reason, once the bioenergy sector is in place, it is important to monitor, evaluate and respond to the impacts of bioenergy on food security at both national and project levels.

The identification of what impacts are particularly important to monitor will depend on the results of the BEFS Scoping and of the Sustainable Bioenergy Assessment, as well as on the specific situation and concerns of each country.

The Global Bioenergy Partnership (GBEP)[4] has developed a set of 24 voluntary sustainability indicators for bioenergy, based on inputs from a broad range of partners, including FAO and the BEFS team. Among these indicators, those most relevant for food security are:

- Indicator 8
Land use and land-use change related to bioenergy feedstock production;
- Indicator 9
Allocation and tenure of land for new bioenergy production;
- Indicator 10
Price and supply of a national food basket;
- Indicator 11
Change in income;
- Indicator 12
Jobs in the bioenergy sector;
- Indicator 14
Bioenergy used to expand access to modern energy services; and
- Indicator 23
Infrastructure and logistics for distribution of bioenergy.

In order to assess impacts, it is first necessary to collect baseline data along the key indicators for the specific country context; then to analyze and evaluate the data collected along each indicator to determine relevant and targeted policy responses.

At project level, the web-based BEFS Operator Level Tool can support the monitoring of the environmental and socio-economic impacts of land-based agricultural/bioenergy investments, with a focus on food security.

In addition, the BEFS Approach includes a range of possible responses to address the impacts of bioenergy on food security at both national and project levels.

4 http://www.globalbioenergy.org/

IMPACT MONITORING, EVALUATION AND RESPONSE

CORE ACTIVITIES

- Identify whether there is an existing monitoring framework and if so where improvements may be necessary
- Incorporate relevant GBEP indicators into national policy framework
- Identify baseline data available for each relevant indicator, and potential gaps
- Collect baseline data and establish monitoring plan including roles and responsibilities for collection, analysis, and reporting
- Establish a timeframe and allocate budget for implementation of monitoring plan and response actions

KEY OUTPUTS

Impact Monitoring and Evaluation Framework including indicators, timeframe, and responsibilities

RESOURCES

Multidisciplinary team of technical consultants (depending on indicators selected), with 15-25 working days for each indicator

3

EXAMPLES OF BEFS APPROACH IMPLEMENTATION

The BEFS Approach has been developed to be flexible and adaptable to the specific country context and to the stakeholders interested in implementation. Below are three examples of how the BEFS Approach has been applied in different contexts.

PERU

BEFS COMPONENT
Sustainable Bioenergy Assessment

KEY FACTORS
Peru has established a regulatory framework for renewable energies which promotes the use of biomass for energy generation. In this context, the analysis was extended beyond the production of feedstock for liquid biofuels to consider alternative bioenergy sources using residues from the agriculture and forest sector. A detailed assessment was possible, given available quality data and high level of capacity of in-country partners.

KEY OUTCOMES
Many of Peru's regions have important volumes of sustainable woody biomass and residues that could potentially be used to provide local energy solutions in rural areas. There is a high potential for energy generation from agricultural residues as well, but supporting policies are needed. Further analysis at the sub-national level is required to determine what proportion of this biomass would be feasible to use for energy generation in each region.

National and regional policies to promote high density forest or shrub plantations for energy used are required for areas that exhibit wood fuel supply and demand balance deficits, especially in the poor areas of the Sierra region. Attention needs to be given to better enforce existing regulations, especially those addressing deforestation.

In addition, with the emergence of the bioenergy sector specific policies to protect the natural resource base and vulnerable households will be required. Policies should also be promoted to support small farmers in benefitting from the market opportunities that arise from bioenergy development.

The Sierra region emerges from the BEFS analysis as having quite limited bio-physical suitability for bioenergy. Significant bioenergy opportunities are unlikely to develop in this poor region of Peru. Given the divergence in growth rates among the three main regions (Sierra, Costa and Selva) of Peru, bioenergy should be part of a broader rural development plan that promotes other activities to redress some of these regional inequalities.

SIERRA LEONE

BEFS COMPONENTS

BEFS Scoping and Support to Policy Formulation

KEY FACTORS

There was growing interest from private sector investors but with no policy on bioenergy in place, nor coordination among stakeholders on the various objectives and interests at stake. At the same time, the country has a complex land tenure system; high food insecurity; and very low access to energy.

KEY OUTCOMES

Creation of BEFS-WG, definition of short and longer term strategy to respond to urgency, identification of legislative gaps, and finally Guidelines for Agriculture and Bioenergy Investment incorporating community concerns. The final document was the result of considerable stakeholder consultation on country specific good practices and institutional mechanisms to enhance the sustainability of agricultural and bioenergy investments.

INDONESIA

BEFS COMPONENT

Impact Monitoring, Evaluation and Response

Assessment of the effects of bioenergy use and production on the price and supply of a food basket (GBEP Indicator 10) in Indonesia.

KEY FACTORS

Indonesia has experienced a fast and significant increase of domestic biodiesel production and use since 2006, mainly driven by private investments. However, only little information was available then. Palm oil-based biodiesel was the main bioenergy feedstock in Indonesia and the country was the second largest biodiesel exporter in the world. There was uncertainty related to the impact of bioenergy production on price and availability of food basket items, particularly rice and cooking oil, as well as lack of information and analysis on the historic and future origin of the bioenergy feedstock. The ambitious biofuel targets recently introduced are expected to increase domestic biodiesel use 10 fold by 2020. An analysis of the potential effects on the price and supply of food basket items should be carried out.

KEY OUTCOMES

Creation of a Working Group of national and international experts that reviewed and verified publicly available databases, retrieved and analyzed further updated information on bioenergy production and use: A Causal Descriptive Assessment of biodiesel feedstock provenance was applied to the case of Indonesia and a System Dynamics model was elaborated and used to assess the effect of domestic demand of crude palm oil (CPO) for biodiesel on the supply and price of CPO and competing crops in the country.

Lastly, a quantitative analysis using the AGLINK-COSIMO model producing an assessment of the change in national and international market prices for vegetable oil by 2020 according to the proposed energy policy of Indonesia was carried out.

One of the main results of the analysis indicated that, as of 2012, the Indonesian bioenergy sector does not seem to have had a significant direct impact on the price and supply of national food basket items. This information is contributing to shaping sustainable bioenergy policies in Indonesia.

4

BEFS IMPLEMENTATION FACILITATION

The BEFS Approach can be implemented directly by governments, civil society organizations and other stakeholders. If necessary, FAO can facilitate the implementation of the BEFS Approach through the BEFS Help Desk.

The Help Desk includes a network of regional Focal Points to ensure that guidance, tools, capacity building strategies, and project formulation methods of the BEFS Approach are accessible and replicable in any country.

Stakeholders interested in FAO support in implementing the BEFS Approach should:

- Explore the materials available on the **BEFS website** for full reports, tools, and further guidance, http://www.fao.org/energy/befs/en/
- Contact the Help Desk at BEFSsupport@fao.org with the following information:
  - o Concept Note with the BEFS Approach components for implementation
  - o Type of support sought from FAO
  - o Key implementing agency
  - o Timeframe for implementation

FAO will respond to Help Desk inquiries with direction on the type of support sought.

In addition, FAO will connect interested parties with regional, sub-regional, and where possible, in country experts to facilitate BEFS implementation.

4.1

EXAMPLES OF FAO BEFS IMPLEMENTATION MECHANISMS

FAO TECHNICAL COOPERATION PROGRAMME[5]

OBJECTIVE
FAO's technical cooperation program was launched in 1976 as a way to make FAO's technical competence available, upon member country's request. The aim is to provide quick impact technical support.

WHO CAN APPLY
Priority is given to Least Developed Countries, Low-Income Food Deficit Countries, Land-Locked Developing Countries, Small-Island Developing States, and projects with high catalytic potential.
A formal request by the government of member countries must be submitted to FAO to begin the TCP process.

CATEGORIES OF SUPPORT
All areas under FAO's strategic objectives and mandate can be supported by TCP funds.

DURATION
The maximum duration is 24 months.

RESOURCES AVAILABLE

TCPF:
Maximum US$200,000 per biennium, fully managed by the FAO Representative

TCP:
Maximum budget of US$500,000, approved at the Regional Office level
Global Environment Facility:

GLOBAL ENVIRONMENT FACILITY:

WHO CAN APPLY?
FAO can assist member countries with mobilizing financing from the Global Environment Facility, as one of the ten agencies through which countries can request GEF funds.

CATEGORIES OF SUPPORT
There are six focal areas under which GEF support can be sought _ biodiversity, land degradation, climate change, sustainable forest management, international waters, and persistent organic pollutants - plus two specific funds supporting adaptation to climate change. BEFS areas of technical analysis could qualify under climate change, biodiversity, sustainable forest management and/or land degradation depending on the specific activities proposed.

RESOURCES AVAILABLE
GEF provides grant funding (with co-financing (1:4 ratio) requirements) from several thousand dollars to several million dollars, including:

- Full Sized Projects:
  Over US$1 million
- Medium Sized Projects:
  Up to US$1 million
- Enabling Activities[6]:
  From US$200,000 - US$500,000 depending on focal area
- Programmatic Approach:
  Depends on number of projects linked and counterparts engaged

5 Further information is available FAO Technical Cooperation Program, 'Guidelines for National Stakeholders', http://www.fao.org/tc/tcp/pdf/TCP-Guidelines-National-english.pdf

6 Enabling activities can include helping countries prepare national inventories, strategies, action plans, and reports under various conventions.

5.

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DEFINITIONS

BIOENERGY
All energy derived from biofuels.

BIOFUELS
Fuel[s] produced directly or indirectly from biomass.
Fuel is defined as an energy carrier intended for energy conversion.

BIOMASS
Material of biological origin excluding material embedded in geological formations and transformed to fossil.

ENERGY SECURITY
Energy security refers to the uninterrupted availability of energy sources at an affordable price.

FOOD SECURITY
Food security exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life (World Food Summit, 1996).

Food security comprises four dimensions:

1) Food availability
The availability of sufficient quantities of food of appropriate quality, supplied through domestic production or imports;

2) Food access
Access by individuals to adequate resources (entitlements) for acquiring appropriate foods for a nutritious diet;

3) Food utilization
Utilization of food through adequate diet, clean water, sanitation and health care to reach a state of nutritional well-being where all physiological needs are met;

4) Food stability
To be food secure, a population, household or individual must have access to adequate food at all times. They should not risk losing access to food as a consequence of sudden shocks (e.g. an economic or climatic crisis) or cyclical events (e.g. seasonal food insecurity).

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