Food Security and Pro-Poor Perspectives for Bioenergy Development

The Bioenergy and Food Security Project

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Bioenergy and Food Security (BEFS) Project
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Content of presentation

- The BEFS Project
- The BEFS Analytical Approach
- BEFS in Tanzania

Objectives of BEFS

Objective

Mainstreaming **food security concerns** into national and sub-national assessments of bioenergy potential

Phases

1. Develop an **analytical framework** and give guidance to assess the bioenergy and food security nexus
2. Assess **bioenergy potential** and food security implications
3. Strengthen institutional capacities, exchange knowledge, pilot sustainable and food-secure bioenergy projects and **influence policies**

Country driven approach

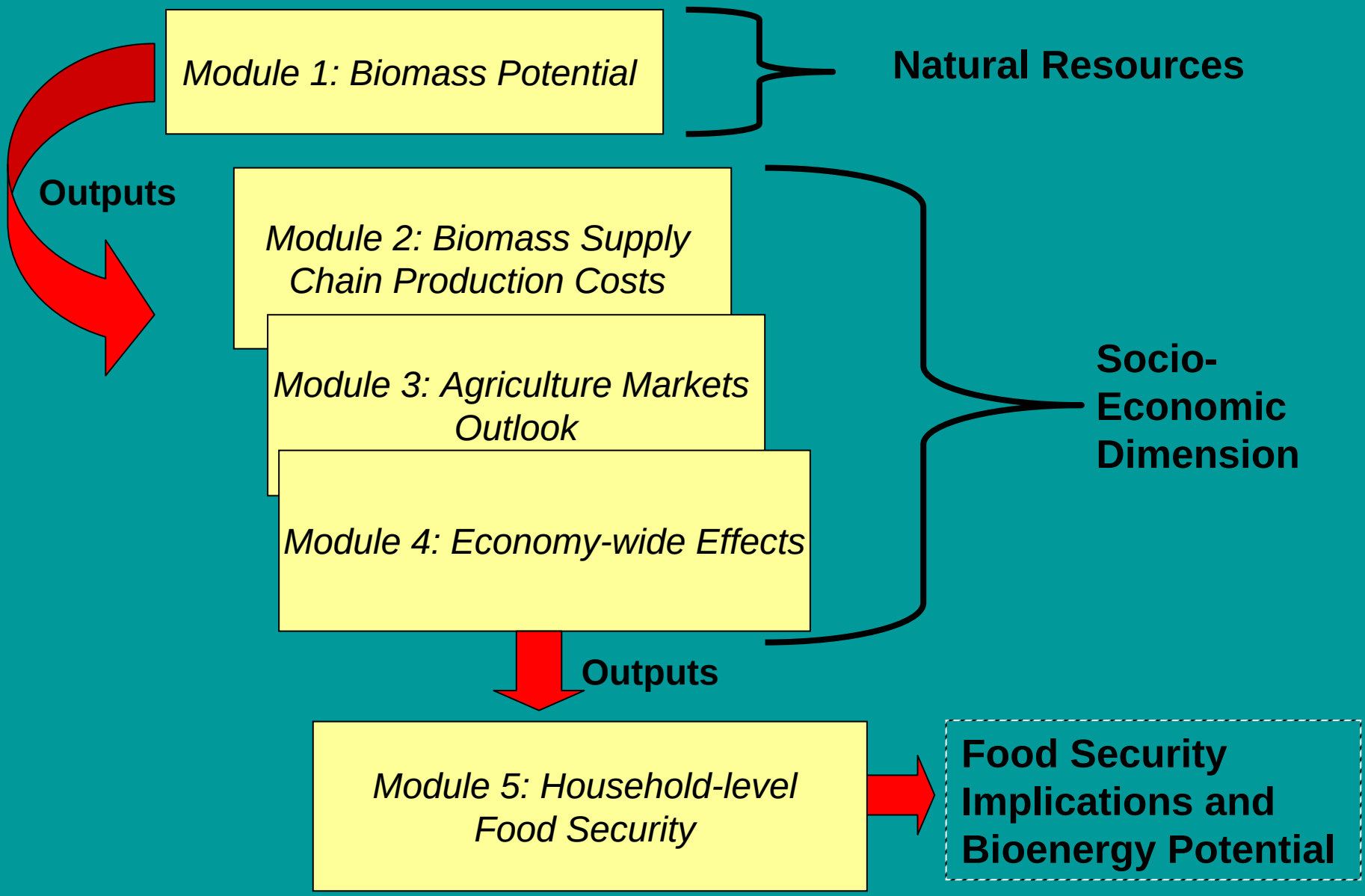
Country teams

- Peru
- Tanzania
- Thailand and Cambodia

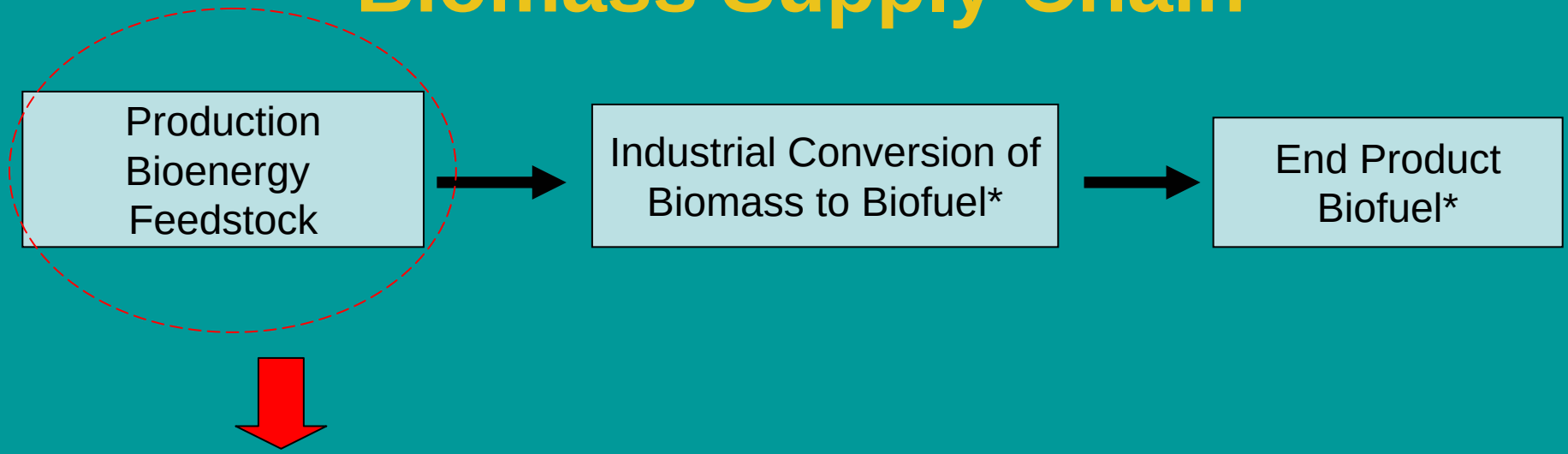
BEFS Analytical Framework

- Currently phase 2: application of **country specific** data in Analytical Framework
- Country specific **scenario development**
- Scenario defines input of the **5 modules** of the Analytical Framework

The Flow of the Analysis



Biomass Supply Chain



Natural Resources constraints to biomass production based on:

Biophysical characteristics:

- Land suitability
- Land availability
- Water availability

Agricultural production:

- Farming practices
- Level of technology

Module 1: *Biomass Potential*

Objective: determination of potential biomass feedstock production given biophysical, environmental & agricultural management factors

- **Determine the land suitable** for production of a specified bioenergy feedstock under rain-fed and irrigated conditions (Agro-Ecological Zoning (AEZ) approach, based on agro-climatic and agro-geographic criteria)
- Evaluate **optional production systems** in terms of inputs, practices, and technologies that may contribute to improve the yield in a sustainable manner (based on agronomic parameters)
- Estimate of **land available** for bioenergy production (by subtracting forest areas, protected areas, build-up areas, etc.)
- Assess **current land use** of suitable areas (to evaluate possible competition with food production)
- Analyse **land administration and governance** on suitable land

Module 2: *Biomass Supply Chain Production Costs*

Objective: calculation of the biomass supply chain production cost

Based on:

- **Cost of biomass production** (USD per ton of crop) for the production that is biophysically and technically feasible, as defined in module 1, under the various production systems
- **Cost of the industrial processing** of 'biomass to biofuel' (USD per liter) based on existing and potential industrial technology efficiencies
- **Cost for logistics on handling**
  - Feedstock (infrastructure, equipment, labour, collection, storage, pre-processing and transportation from the field to processing centres)
  - Processed biofuel (pre-processing (blending), transportation, dispensing)

Module 3: *Agriculture Markets*

Objective: Projects biomass and bioenergy production under various economic and technological assumptions

Based on OECD-FAO AGLINK-COSIMO model, which:

- Provides mathematical representations of national and global **agricultural markets**
- Produces an equilibrium solution of the **market outcomes** based on the supply and demand system
- Shows **changes in production** shares of different agricultural commodities resulting from biofuel demand
- Investigates the implications of **biofuel policies**, namely regulations, subsidies and taxes, and their impact on markets and biofuel production

Module 4: *Economy-wide Effects*

Objective: evaluation of the implications of bioenergy production for all domestic sectors of the economy

Based on a country-specific **equilibrium model** linked to the GTAP global model, which:

- **Assesses changes** in incomes, welfare, prices and output in all sectors of the economy as a result of the additional production of biomass
- Allows to analyze the links between agricultural and energy markets
- Examines the potential role of **subsidies**, carbon credit, fossil fuel tax, etc. on biomass use, **land use patterns**, and **inter-market effects** through prices domestically and (when cross-border trade occurs) internationally

Module 5: *Household-level Food Security*

Objective: analysis of the effects of changes in domestic prices and income due to variation in bioenergy production, on national and household level food security

Based on:

- **Household level food security** (based on household level data of Household Budget Survey Tanzania)
- Other components:
  - **Labor** markets
  - **Price** transmission
  - **Cost-benefit** analysis

Context in Tanzania

Economy

- Dependant on **agriculture** (45 percent of GDP in 2005)

Poverty

- **High poverty** level (44 percent undernourished 2001-2003)

Energy

- **Energy supply mix** (IEA, 2004):
  - 90 percent from biomass, mostly wood (charcoal)
  - 7 percent imported petroleum and electricity supply (Hydro, gas, diesel and coal)
- **Access to electricity**
  - 10 percent of Tanzanian households
  - 2 percent of households in rural areas
- **Fuel price**
  - Increase of almost 100 % over the past two years
  - Impact on food prices due to transport over long distances

Bioenergy context in Tanzania

Type of feedstock

Bioethanol

- Sugarcane
- Sweet sorghum
- Cassava
- Sisal

Biodiesel

- Jatropha
- Palm oil
- Sunflower
- Castor bean

Biogas

- Organic and crop residue
- Woody biomass
- Sisal
- Fishing industry wastes

Wood fuel

- Indigenous species
- Wattle
- Eucalyptus

Bioenergy context in Tanzania

Production / farming system

Bioethanol

- Estate in combination with outgrower scheme
- 20-30.000 ha
- National / international

Biodiesel

- Estate in combination with outgrower scheme
- Smallholders only
- National / international

Biogas

- At municipality level
- At household level
- National

Wood fuel

- At community level
- At household level
- Estate in combination with outgrower scheme
- National / international

Bioenergy context in Tanzania

The issue of land

Bioenergy investors

- Invest in processing **plant**
- Need **certainty of feedstock** supply
- Therefore need large areas of land for **estates** to grow feedstock under own control
- Do often **not include smallholders** / outgrowers as feedstock suppliers (sugarcane or oilpalm in coast)
- Often displace smallholder farmers for estates so that they only benefit as **laborers**
- **Not “pro-poor”**

Bioenergy context in Tanzania

Pro-poor?

How could bioenergy production be pro-poor?

- Inclusion of smallholder farmers (outgrowers) in the supply of feedstock (estate *and* outgrowers)
- Linking smallholder farmers to a secure market
- Creating links to credit, agricultural inputs (fertiliser, chemicals, improved varieties) and extension services
- Ensure that bioenergy crop is produced in rotation with food crop (rotation is required for pest and disease control) or intercropping

Result is intensification of production, increased food production in parallel with cash crop production !

Bioenergy context in Tanzania

Constraints and risks

Bioenergy Regulation

- Not in place yet
- Bioenergy Task Force **developing biofuels policy** (Ministry of Agriculture, Ministry of Energy, Economic Planning and Empowerment, and other related ministries)

Constraints and Risks

- For investors: lack of infrastructure and clear guidelines
- For the poor: remoteness and geographic isolation, lack of rural infrastructure, gender, access to land

Thank you!

For further information

BEFS website

www.fao.org/nr/ben/befs

2nd Technical Consultation Documentation

ftp://ext-ftp.fao.org/nr/data/nrc