



UNITED NATIONS

# Sustainable Bioenergy: A Framework for Decision Makers

Widening Access

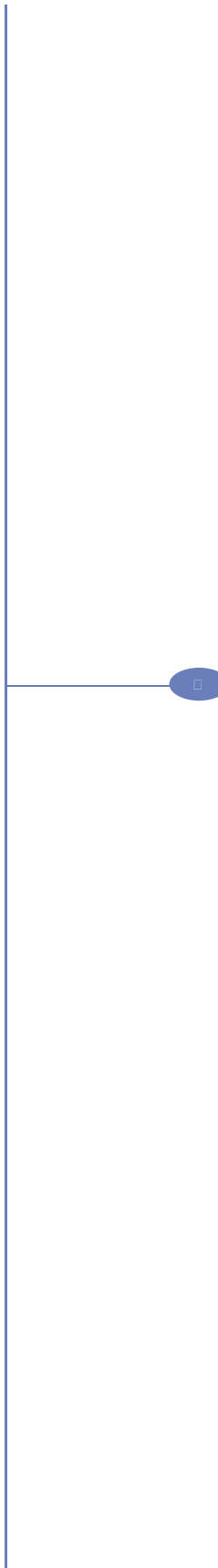
ENVIRONMENTAL SUSTAINABILITY

Food Security

Overcoming Challenges

RURAL DEVELOPMENT

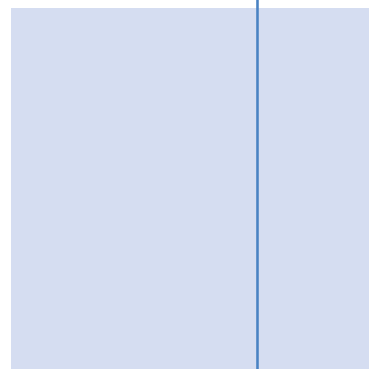




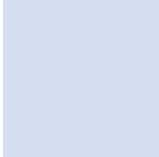








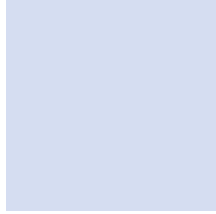




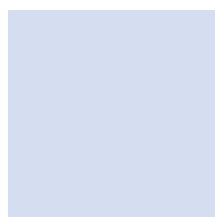












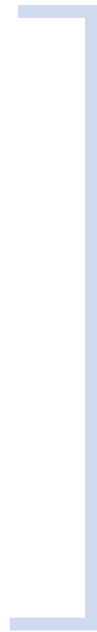
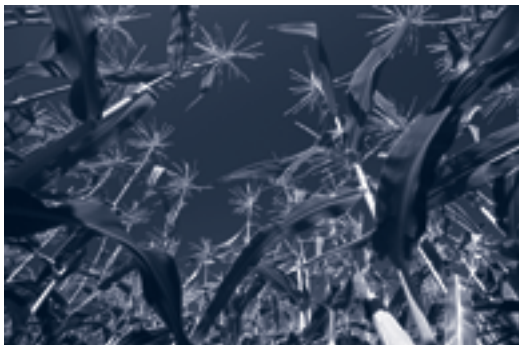






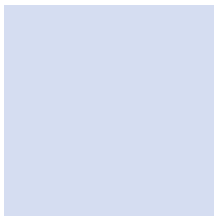






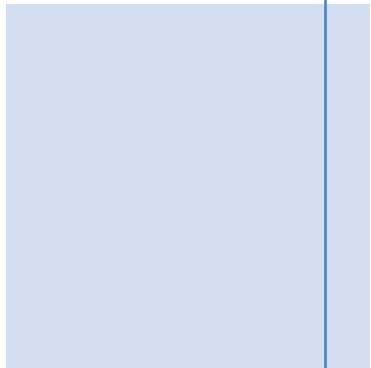














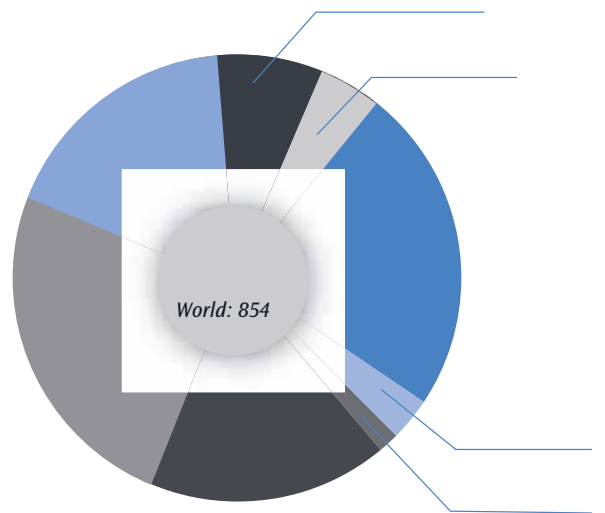




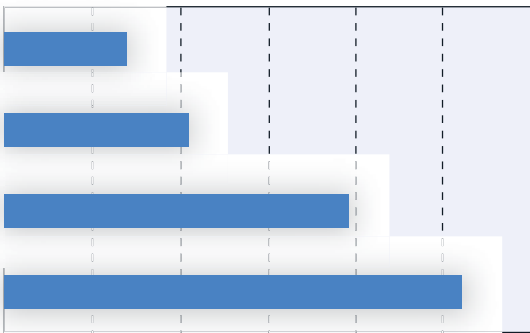




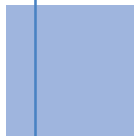




*Figure 2. Agricultural Employment and Undernourishment (2001–03)*





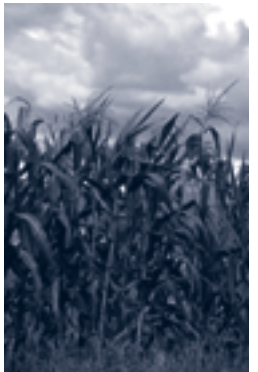




*Table 2. Impact of Increased Ethanol Content on CO and HC Emissions*



*Sergie V. Bajay et al., "Energy from Biomass in Brazil," in Frank Rosillo-Calle, Sergie V. Bajay, and Harry Rothman, eds., Industrial Uses of Biomass Energy (London and New York: Taylor & Francis, 2000)*









- *The International Bioenergy Partnership (IBEP) seeks to ensure the delivery of sustainable, equitable, and accessible bioenergy sources and services in support of sustainable development, energy security, poverty reduction, and climate change mitigation;*
- *The Global Bioenergy Partnership (GBEP) has the mandate of facilitating a global political forum to promote bioenergy and to encourage the production, marketing, and use of green fuels, with particular focus on developing countries;*

- *The BioFuels Initiative of UNCTAD was conceived to offer a facilitating hub for biofuels programmes already under way in a number of institutions. It aims to provide access to sound economic and trade policy analysis, capacity-building activities, consensus-building tools, and assessments of the potential of individual developing countries to engage in the emerging biofuels market;*
- *The Global Village Energy Partnership (GVEP) has been supporting and helping developing countries set up energy action plans and assisting with the associated studies and demand analyses. It has also started to provide financial support, capacity building, and technical assistance to energy SMEs in developing countries.*

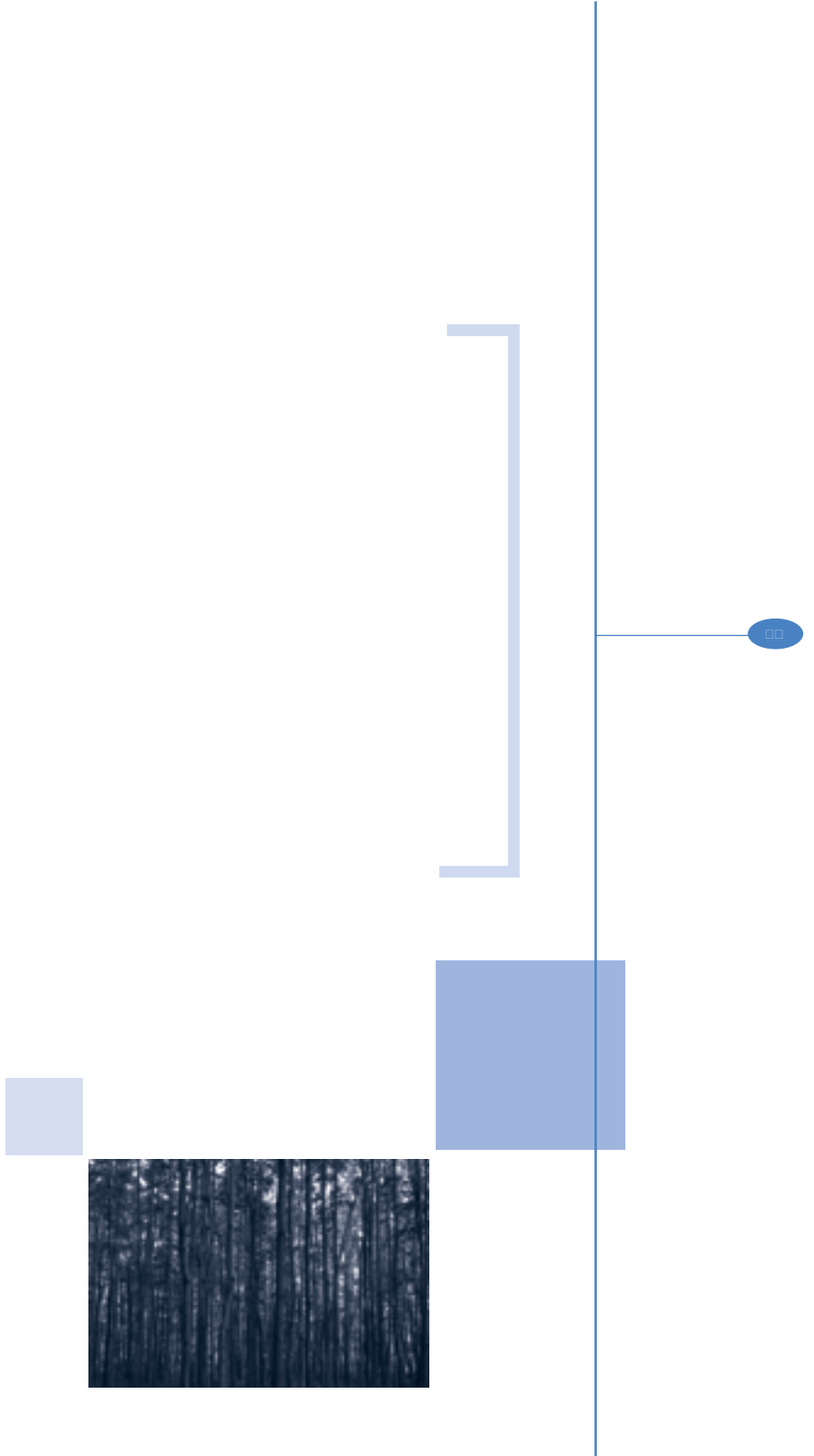






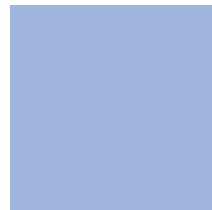












- *Current production of agricultural products with bioenergy potential, as well as assessment of possible energy use and expansion of production;*
- *Current land uses, obtained with the help of surveys, mapping, and GIS;*
- *Production potential in rehabilitated marginal and degraded lands;*
- *Alternative uses of feedstock as well as current demand and uses of agricultural and forestry residues and by-products; and*
- *Availability of water and other resources.*

- *Availability and accessibility of modern technologies for bioenergy conversion and use;*
- *Life-cycle analysis methodology and tools to assess bioenergy systems, including their economics, energy balance, carbon flows, and leakage effects.*



- *Key stakeholders in national bioenergy efforts;*
- *Information generation and flow among these varying sectors;*
- *Capacities related to each stakeholder to help promote information flow, capacity building (see below), and courses and curricula.*
- *Risks to food security of various bioenergy scenarios and possible ways to avert them;*
- *Positive impacts of expanded bioenergy due to diversification, new rural infrastructure, and jobs;*
- *Potential benefits or harm to affected populations;*
- *Present and future prices, markets, and subsidies;*
- *Potential export markets for possible surpluses;*
- *Impacts of second-generation systems on the structure of agriculture;*
- *International cooperation opportunities in bioenergy production and trade.*
- *Type of bioenergy and technology;*
- *Costs across the supply chain: raw material production or gathering, processing, transport, and infrastructure modifications (if any);*
- *Value of by-products;*
- *Local costs of alternative energy sources;*
- *Opportunity costs of land, labour, and water used;*
- *Monetizing environmental externalities.*
- *Bioenergy's viability as an energy option and its present role in the national energy balance;*
- *Future role of bioenergy under various scenarios;*
- *Technological options in those scenarios;*
- *Knowledge and expertise available in the coun*

- *Bioenergy's role in energy-efficiency policies;*
- *Costs and prices of biomass-based energy carriers;*
- *Current taxation and subsidy situation in light of future bioenergy scenarios.*

- *Economic and social costs and benefits of different types of support: subsidies, import tariffs and other import restrictions, and consumption mandates;*
- *Magnitude and types of subsidies: tax reduction, tax credits, loan guarantees, subsidised credits, income tax reduction, tax holidays, and cash subsidies linked to production levels;*
- *Net loss in government revenue and what other government programmes will be cut as a result, where additional taxes may be levied to offset the loss in revenue, and alternative uses of government subsidies;*
- *Impact of a consumption mandate on domestic fuel prices in times of supply shortage due to weather- or pest-related crop failures;*
- *Welfare impact if energy prices rise as a result;*
- *Economic and social benefits of increased bioenergy production and/or consumption as a result of government support.*

- *Integration of bioenergy development into existing rural development policies and programmes;*
- *Number of jobs to be created under the various*

*bioenergy scenarios;*

- *Quality, safety, and health characteristics of these new jobs;*
- *Impact on rural development (determined by establishing baselines and indicators);*
- *Incorporation of these indicators into wider efforts to assess sustainability of bioenergy activities;*
- *Monitoring and assessment of new investments due to bioenergy expansion.*

- *Protecting small-scale farmers from loss of land due to pressures from large-scale producers;*
- *Respect for and protection of land tenure rights;*
- *Use of "informed decision-making" and full participation of stakeholders when determining land-use changes;*
- *Assessing existing land-use policies in light of potential expanded bioenergy use.*

- *Impact assessments;*
- *Emissions monitoring and reduction;*
- *Biodiversity protection;*
- *Water use management;*
- *Soil health maintenance.*

- *Agro-industry, which will gain in importance as it transitions to providing energy in addition to food and feed;*
  - *Forestry industry, which will gain new markets, new value-creation opportunities for its wastes and low-value timber, and enhanced scrutiny as forests are more intensively managed;*
  - *Energy industry, including established electricity and fuel providers who are central to energy distribution, as well as large-scale investors in new energy and fuel generation capacity;*
  - *Small- and medium-sized enterprises, which will be critical to the achievement of development goals associated with bioenergy provision.*
- *Identifying bioenergy needs in the specific country context;*
  - *Identifying where the R&D community in the country has comparative advantage;*
  - *Ranking priorities so as to bring online as rapidly as possible those technology options with the greatest environmental and social benefits, as well as the best chances of becoming commercially competitive;*
  - *Identifying policy needs and areas for policy research.*
- *Identifying bioenergy options suitable for the country and ranking them in order of greatest environmental and social benefits and potential commercial competitiveness;*
  - *Identifying R&D needs for both policy and technology innovations*
  - *establishing normative and legislation frameworks;*
  - *Formulating projects, which are critically important at this stage in the development of bioenergy. On-the-ground experience in a variety of contexts and the dissemination of lessons learned are necessary to foster the sustainable growth of these industries;*
  - *Developing intersectoral cooperation among all sectors involved and affected by bioenergy.*
- *Carrying out policy research for bioenergy, including appropriate forms of government support, identification of barriers to uptake, and policy response to the barriers;*
  - *Identifying areas of unique interest in the developing-country context (for example, use of straight plant oil in stationary engines in remote*

- *areas for electricity generation) and funding R&D, as appropriate;*
- *Facilitating collaboration among researchers nationally and internationally.*
- *Reducing border barriers to imports of technologies and materials needed;*
- *Tapping into modern technology information sources.*
- *Rural organization members and farmers/producers;*
- *Policy makers;*
- *Investors and financiers;*
- *The public and consumers;*
- *Academic and research communities;*
- *Entrepreneurs;*
- *NGOs.*
- *Managerial skills;*
- *Technical skills;*
- *Trade-related issues;*
- *Marketing and public outreach;*
- *Negotiation and investment.*
- *Financial schemes at various levels, including for small-scale producers;*
- *Utilizing micro-finance and other innovative mechanisms;*
- *Providing public sector loan guarantees and other risk-mitigation mechanisms to enable more private investment in new technologies;*
- *Enabling public-private partnerships.*
- *Identify, develop, and monitor the qualitative and quantitative implications of expanded bioenergy development for key sectors, including agriculture, industry, health, environment, and trade;*
- *Promote international research on the social, scientific, technological, economic, policy, and environmental issues guiding bioenergy development;*
- *Encourage additional research and greater sharing of technology development by the concerned stakeholders, including private sector entities, and making greater use of existing international consultative arrangements, including the Consultative Group on International Agricultural Research;*
- *Promote the sound development and coordination of current information systems on bioenergy;*
- *Encourage the Parties to the Conventions on Biological Diversity and on Combating Desertification to consider opportunities for sustainable cultivation and utilization of energy crops;*



- *Establish internationally agreed standards and other certification models for production, conversion, use, and trade of bioenergy systems to protect both society and the environment;<sup>xxxix</sup>*
- *Develop sustainability criteria and analytical tools to be mainstreamed into projects and programmes;*
- *Establish methodologies under the Kyoto Protocol's Clean Development Mechanism for the assessment of bioenergy systems, including second-generation technologies; and*
- *Promote international transfer of technologies, expertise, and experience in bioenergy between all countries, in both the industrialised and developing worlds.*



World Energy Outlook 2006

Energy for Sustainable

Development,

Energy and Health

Fuel for Life: Household

Agência

Estado de

Brasil,

Minas,

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African Review of Business

and Technology,

Advancing Bioenergy for Sustainable Development. Guideline for Policy makers and Investors. Volumes I, II, and III

Daily Times Malawi

An Overview of Sugarcane Cogeneration in Six Central American Countries

Environmentally Compatible Biomass Potential from Agriculture

Bioenergy Primer. Modernized Biomass Energy for Sustainable Development

World Ethanol & Biofuels Report,

Biofuels for Transport: Global Potential and Implications for Energy and Agriculture

Energy Policy,

The Pilot Analysis of Global Ecosystems: Forest Ecosystems.

World Ethanol & Biofuels Report

The Energy Challenge for Achieving the Millennium Development Goals

Energy Policy

Global Change Magazine for Schools

Crops and Drops: Making the Best Use of Water for Agriculture

Philippine Daily Inquirer,



, *The Emerging Biofuels Market:  
Regulatory, Trade and Development Implications*

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*Navigating the Numbers: GHG Data and Climate  
Policy*  
IPCC Third  
Assessment Report, *Climate Change 2001: Mitigation*

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□ *Climatic Change*, □

*Biofuels for Transport: An  
International Perspective*

□ *Potential for Biofuels for  
Transport in Developing Countries*


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*UN-Energy is the principal interagency mechanism in the field of energy that helps ensure (a) coherence in the UN system's multi-disciplinary response to WSSD; and (b) collective engagement on non-UN stakeholders.*



UN-Energy seeks to structure the approach to the current discussion on bioenergy. "Sustainable Bioenergy: A Framework for Decision Makers" is the contribution of the UN system to the issues that need further attention, analysis and valuation, so that appropriate trade-offs can be made and both the energy needs of people met and the local and global environment adequately protected.