



**THE GLOBAL BIOENERGY
PARTNERSHIP SUSTAINABILITY
INDICATORS FOR BIOENERGY
FIRST EDITION**

EXECUTIVE SUMMARY

The Global Bioenergy Partnership Sustainability Indicators for Bioenergy

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Dear readers,

Modern bioenergy presents great opportunities for sustainable development and climate change mitigation, but it brings challenges too, some of international relevance. In light of this, international cooperation is essential for building consensus on how to measure success in bioenergy and building capacity to help implement successful solutions. The Global Bioenergy Partnership (GBEP) has proved that a voluntary partnership of developed and developing countries and international organizations, informal enough to allow open discussion yet formal enough to yield meaningful results, is an effective and innovative vehicle for coordinated progress towards low-carbon, sustainable development. This report is the result of the hard work and dedication of many individuals and experts from GBEP Partners and Observers, working with and supported by the GBEP Secretariat. We would like to take this opportunity to recognize the efforts made by all those who have contributed to the successful completion of this report and to thank them for their commitment in preparing an invaluable tool for officials and scientists to use.

In developing countries, switching from traditional to modern bioenergy can reduce death and disease from indoor air pollution, free women and children from collecting fuelwood and reduce deforestation. It can also cut dependence on imported fossil fuels, improving countries' foreign exchange balances and energy security. Furthermore, bioenergy can expand access to modern energy services and bring infrastructure such as roads, telecommunications, schools and health centres to poor rural areas. In such areas, bioenergy can increase the income of small-scale farmers, alleviating poverty and decreasing the gap between rich and poor. In urban centres, using biofuels in transport can improve air quality.

For developed countries, where the focus is on reviving economic growth and mitigating climate change, bioenergy can stimulate a green recovery, generating more jobs and fewer greenhouse gas emissions than fossil fuels. It can breathe life into rural economies and diversify energy supply.

However, if not sustainably produced, bioenergy can place extra pressure on biodiversity, scarce water resources and food security. If land use is not well planned and enforced, increased deforestation, loss of peatlands and land degradation can occur and lead to an

overall negative impact on climate change. Where land tenure is insecure, communities can be displaced and lose access to land and other natural resources.

The 24 sustainability indicators for bioenergy and their methodology sheets presented in this report are intended to provide policy-makers and other stakeholders with a tool that can inform the development of national bioenergy policies and programmes, monitor the impact of these policies and programmes, as well as interpret and respond to the environmental, social and economic impacts of their bioenergy production and use.

We believe this is a fundamental tool to facilitate sustainable development and climate change mitigation. We encourage you to use it.



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Mariangela Rebuá
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Acknowledgements

In June 2008, the Global Bioenergy Partnership (GBEP) established the GBEP Task Force on Sustainability to promote sustainable production and use of bioenergy. The Task Force, under the leadership of the United Kingdom until October 2010 and of Sweden after that, has developed a relevant, practical, science-based set of measurements and indicators that can inform policy-makers and other stakeholders in countries seeking to develop their bioenergy sector to help meet national goals of sustainable development.

This report was developed by the Partners and Observers of GBEP, under the able chairmanship of Kieran Power (United Kingdom) and Sven-Olov Ericson (Sweden) supported by the GBEP Secretariat (Maria Michela Morese, Jonathan Reeves, Alessandro Flammini, Ylenia Curci and Marco Colangeli), and with the valuable contribution of the Task Force sub-group leaders – Environmental sub-group co-led by Germany and UNEP; Social sub-group led by FAO; and Economic sub-group co-led by IEA and UN Foundation.

GBEP would also like to express its appreciation to all the experts that actively and generously contributed to the development of this report.

Preface

On 11 May 2006, 10 nations and 7 international organizations signed the Terms of Reference to create the Global Bioenergy Partnership (GBEP) and begin to implement the wish expressed by G8 Leaders in the 2005 Gleneagles Summit Action Plan to support “biomass and biofuels deployment, particularly in developing countries where biomass use is prevalent.” As of December 2011, GBEP includes 23 Partner countries and 13 Partner international organizations, along with 23 countries and 11 international organizations that participate as Observers.

Partner countries: Argentina, Brazil, Canada, China, Colombia, Fiji, France, Germany, Ghana, Italy, Japan, Mauritania, Mexico, Netherlands, Paraguay, Russian Federation, Spain, Sudan, Sweden, Switzerland, United Rep of Tanzania, United Kingdom and United States of America.

Partner international organizations: Economic Community of West African States (ECOWAS), European Commission, Food and Agriculture Organization of the United Nations (FAO), Inter-American Development Bank (IDB), International Energy Agency (IEA), United Nations Conference on Trade and Development (UNCTAD), United Nations Department of Economic and Social Affairs (UN DESA), United Nations Development Programme (UNDP), United Nations Environment Programme (UNEP), United Nations Industrial Development Organization (UNIDO), United Nations Foundation, World Council for Renewable Energy (WCRE) and European Biomass Industry Association (EUBIA).

Observer countries: Angola, Australia, Austria, Cambodia, Chile, Egypt, El Salvador, Gambia, India, Indonesia, Kenya, Lao People’s Dem Rep, Madagascar, Malaysia, Morocco, Mozambique, Norway, Peru, Rwanda, South Africa, Thailand, Tunisia and Viet Nam.

Observer international organizations: African Development Bank (AfDB), Asian Development Bank (ADB), Economic Commission for Latin America and the Caribbean (ECLAC), European Environment Agency (EEA), Global Environment Facility (GEF), International Fund for Agricultural Development (IFAD), International Renewable Energy Agency (IRENA), Organization of American States (OAS), West African Economic and Monetary Union (UEMOA), World Bank and World Business Council on Sustainable Development (WBCSD).

The Partnership is currently chaired by Corrado Clini, Minister for the Environment Land and Sea, Italy, and co-chaired by Mariangela Rebuá, Director of the Department of Energy, Ministry of External Relations, Brazil. They are supported by the GBEP Secretariat, hosted at FAO Headquarters in Rome.

Executive summary

The Global Bioenergy Partnership (GBEP) has a clearly defined mission: to promote the wider production and use of modern bioenergy, particularly in the developing world where traditional use of biomass is prevalent. Exactly how modern bioenergy is developed, deployed, and used is a decision that individual countries will make according to their domestic needs and circumstances. The Partnership established the Task Force on Sustainability to promote the sustainable production and use of bioenergy. The Task Force has developed a science-based, technically sound, and highly relevant set of measurements and indicators that can inform policy-makers and other stakeholders in countries seeking to develop their bioenergy sector to help meet national goals of sustainable development.

This report presents 24 indicators of sustainability regarding the production and use of modern bioenergy, broadly defined. These indicators were developed to provide policy-makers and other stakeholders a set of analytical tools that can inform the development of national bioenergy policies and programs and monitor the impact of these policies and programs. The indicators were developed by the Partners and Observers of GBEP and provide a framework for assessing the relationship between production and use of modern bioenergy and sustainable development. The indicators were intentionally crafted to report on the environmental, social and economic aspects of sustainable development.

The GBEP indicators are unique in that they are a product of the only multilateral initiative that has built consensus on the sustainable production and use of bioenergy among a wide range of national governments and international organizations. The indicators are meant to guide analysis at the domestic level and to inform decision-making that encourages the sustainable production and use of bioenergy as a means towards meeting national goals of sustainable development. Measured over time, the indicators will show progress towards or away from a nationally defined sustainable development path. The indicators are value-neutral, do not feature directions, thresholds or limits and do not constitute a standard, nor are they legally binding. The indicators are intended to inform policy-making and facilitate the sustainable development of bioenergy, and shall not be applied so as to limit trade in bioenergy in a manner inconsistent with multilateral trade obligations.

The benefits and challenges of bioenergy

The production and use of bioenergy is growing in many parts of the world as countries seek to diversify their energy sources in a manner that helps promote economic development, energy security and environmental quality. Modern bioenergy can provide multiple benefits, including promoting rural economic development, increasing household income, mitigating climate change, and providing access to modern energy services. On the other hand, bioenergy can also be associated with risks, such as biodiversity loss, deforestation, additional pressure on

water resources, and increased demand for agricultural inputs, land, and commodities. The evaluation of the benefits and challenges of bioenergy production and use should reflect the national context.

Encouraging all stakeholders to use the sustainability indicators

Policy-makers and other stakeholders require information in order to develop and evaluate policy decisions. GBEP encourages all stakeholders, including public officials, technical experts, farmers, producers, and civil society, to use this set of indicators in a holistic and inclusive manner as a framework for planning the sustainable production and use of bioenergy. This set of indicators can empower policy-makers and other stakeholders to take into account the economic, environmental, and social aspects of modern bioenergy that are the most relevant for their domestic needs and circumstances. The indicators are objective, technically sound, value-neutral metrics that inform the policy-making process and report on the impact of policies. The indicators presented here are not themselves instruments of policy. The indicators are written so as to encourage and assist stakeholders to undertake the necessary analytical work of implementing these indicators immediately without the need for developing separate additional metrics of sustainability.

Using the indicators

GBEP prepared this report to present a set of sustainability-related themes and indicators important to consider when developing a modern bioenergy sector. The report provides relevant background in Chapter 2 on how the indicators were developed and describes the three pillars of sustainable development – economic, environmental, and social – in the context of bioenergy.

Each indicator was developed with three parts: a name, a short description, and a multi-page methodology sheet that provides in-depth information needed to evaluate the indicator. The methodology sheet describes how the indicator relates to relevant themes of sustainability and how the indicator contributes towards assessing sustainability at the national level. The methodology sheets outline the approach for collecting and analyzing the data needed to evaluate the indicator and for making relevant comparisons to other energy options or agricultural systems. The methodology sheet also provides information on data limitations and highlights potential bottlenecks to data acquisition. Further the methodology sheets highlight relevant international and national processes with links to publicly available data sources in an extensive reference section. This reference section gives stakeholders, scientists and policy-makers access to a breadth of resources with which they can tailor these indicators to be domestically relevant.

The indicators are starting points from which policy-makers and other stakeholders can identify and develop measurements and domestic data sources that are relevant to their nationally

defined needs and circumstances. The GBEP indicators do not provide answers or correct values of sustainability, but rather present the right questions to ask in assessing the effect of modern bioenergy production and use in meeting nationally defined goals of sustainable development.

The following summary table presents the pillars, themes and indicator names.

PILLARS		
GBEP's work on sustainability indicators was developed under the following three pillars, noting interlinkages between them:		
Environmental	Social	Economic
THEMES		
GBEP considers the following themes relevant, and these guided the development of indicators under these pillars:		
Greenhouse gas emissions, Productive capacity of the land and ecosystems, Air quality, Water availability, use efficiency and quality, Biological diversity, Land-use change, including indirect effects.	Price and supply of a national food basket, Access to land, water and other natural resources, Labour conditions, Rural and social development, Access to energy, Human health and safety.	Resource availability and use efficiencies in bioenergy production, conversion, distribution and end-use, Economic development, Economic viability and competitiveness of bioenergy, Access to technology and technological capabilities, Energy security/Diversification of sources and supply, Energy security/Infrastructure and logistics for distribution and use.
INDICATORS		
1. Lifecycle GHG emissions	9. Allocation and tenure of land for new bioenergy production	17. Productivity
2. Soil quality	10. Price and supply of a national food basket	18. Net energy balance
3. Harvest levels of wood resources	11. Change in income	19. Gross value added
4. Emissions of non-GHG air pollutants, including air toxics	12. Jobs in the bioenergy sector	20. Change in consumption of fossil fuels and traditional use of biomass
5. Water use and efficiency	13. Change in unpaid time spent by women and children collecting biomass	21. Training and re-qualification of the workforce
6. Water quality	14. Bioenergy used to expand access to modern energy services	22. Energy diversity
7. Biological diversity in the landscape	15. Change in mortality and burden of disease attributable to indoor smoke	23. Infrastructure and logistics for distribution of bioenergy
8. Land use and land-use change related to bioenergy feedstock production	16. Incidence of occupational injury, illness and fatalities	24. Capacity and flexibility of use of bioenergy



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