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Bioenergy & Sustainability: bridging the gaps

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Foreword

SCOPE Bioenergy & Sustainability Contributors

Acknowledgments





Foreword

The development of modern high efficiency bioenergy technologies has the potential to improve energy security and access while reducing environmental impacts and stimulating low-carbon development. While modern bioenergy production is increasing in the world, it still makes a small contribution to our energy matrix.

At present, approximately 87% of energy demand is satisfied by energy produced through consumption of fossil fuels. Although the International Energy Agency (IEA) predicts that this share will fall to 75%, the total consumption of fossil fuels will continue to rise, adding another 6 Gt of carbon to the atmosphere by 2035. The consequences of this increase are worrisome.

Our oceans are being critically affected. Oceans are an important CO₂ sink and absorb 26% of the CO₂ emissions but due to accelerated acidification and rising sea surface temperatures, this capacity may be reduced. Never in the last 300 million years has the rate of ocean acidification been so high. In the last 150 years, acidity in oceans increased by 30%. The main cause are the emissions from fossil fuel burning, especially the release of CO₂.

Deforestation and land degradation also contribute to increased greenhouse gas emissions. The world's total forest area in 2010 was just over 4 billion hectares, which corresponds to an average of 0.6 ha per capita. Each year, between 2000 and 2010, around 13 million hectares of forestland were converted to other uses or lost through natural causes. The production of timber for housing or the need to make land available for urbanization, large-scale cash crops such as soy and oil palm, subsistence agriculture and cattle ranching induce deforestation. Forests are also degraded or damaged due to the soaring demand for fuelwood and charcoal for cooking and heating in developing countries that suffer from low levels of access to modern energy services. Most of the world's bioenergy is presently derived from wood burning for cooking and heating in developing countries. Such traditional uses of biomass are low in cost to the users, but their technical inefficiency results in considerable health and environmental costs while providing only low quality energy services. Many countries demonstrate that a much higher efficiency can be obtained in traditional uses commercially with sustainably managed feedstock supplies. Since bioenergy systems often operate at the interface between agriculture and forestry, they are also closely connected to the planning and governance of these sectors and of policy to conserve and manage

forests. Consequently, interdisciplinary and cross-level or horizontal studies are needed in order to define the best routes through which achieve a sustainable energy matrix.

Can modern bioenergy make a significant contribution to our energy matrix with positive contributions to the environment? What are the social, environmental and economic implications of the expansion of bioenergy in the world? How does expansion of bioenergy perform in the context of the food, energy, climate, development and environment nexus? Which are the most significant potential benefits of bioenergy production and use and how can we design implementation platforms and policy frameworks to ensure that such benefits are realized and widely replicated? What are the scientific research needs and technological development requirements needed to fill in the gaps?

To answer some of these questions, FAPESP BIOEN, Climate Change and BIOTA Research Programs led, in December 2013, a group of 50 experts from 13 countries convened at UNESCO in Paris, France, for a rapid assessment process on “Bioenergy and Sustainability” under the aegis of SCOPE. Background chapters commissioned before the workshop provided the basis for this international consultation during which crosscutting discussions focused on four themes: Energy Security, Food Security, Environmental and Climate Security, Sustainable Development and Innovation.

The resulting synthesis volume has the contribution of 137 researchers from 82 institutions in 24 countries.

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BIOEN

BIOEN, the FAPESP Bioenergy Research Program, aims at articulating public and private R&D, using academic and industrial laboratories to advance and apply knowledge in fields related to bioenergy in Brazil. Research ranges from biomass production and processing to biofuel technologies, biorefineries, sustainability and impacts.

RPGCC

The FAPESP Research Program on Global Climate Change (RPGCC) aims at advancing knowledge on Global Climate Change and guide decisions and policy in the field.

BIOTA

The BIOTA-FAPESP Program (FAPESP Research Program on Biodiversity Characterization, Conservation, Restoration and Sustainable Use), aims not only at discovering, mapping and analyzing the origins, diversity and distribution of the flora and fauna of the biomes of the state of São Paulo, but also at evaluating the possibilities of sustainable exploitation of plants or animals with economic potential and assisting in the formulation of conservation policies on remnants of native vegetation.

SCOPE

The Scientific Committee on Problems of the Environment is an international nongovernmental organization founded in 1969. SCOPE is a cross-sectoral and trans-disciplinary network, connecting experts and institutions around the world. It is recognized for its authoritative, independent and influential scientific analyses and assessments of emerging environmental issues that are caused by or impact humans and the environment. It collaborates with inter-governmental agencies such as UNESCO and UNEP and with other partners in the development of its scientific program and outreach activities.



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