

# SCOPE Bioenergy & Sustainability

## Executive Summary

***Bioenergy & Sustainability is a collective effort with contributions from more than 130 experts from 24 countries.***

*Scientific studies were developed that assess topics ranging from land use and feedstocks, to technologies, impacts, benefits and policy.*

*They consider how bioenergy expansion and its impacts perform in the energy, food, environmental and climate security, sustainable development and innovation nexus in both developed and developing regions.*

*Authors also highlight numbers, solutions, gaps of knowledge and suggest the science needed to maximize bioenergy benefits.*

***<http://bioenfapesp.org/scopebioenergy>***



One approach to solving today's energy challenges is to use modern bioenergy practices to harness the solar energy captured by photosynthesis. Bioenergy derived from plants can play an essential role in satisfying the world's growing energy demand, mitigating climate change, sustainably feeding a growing population, improving socio-economic equity, minimizing ecological disruptions and preserving biodiversity. There is broad consensus that modern bioenergy will be necessary to achieve a low-carbon future. The idea that the large-scale use of bioenergy compromises efforts to meet these challenges is unsupported by the current scientific evidence when bioenergy practices are implemented properly.

So says the new report "Bioenergy & Sustainability", a SCOPE series assessment, led by researchers associated to the São Paulo Research Foundation (FAPESP) Programs on Bioenergy, Biodiversity and Climate Change, and developed under the aegis of the Scientific Committee on Problems of the Environment (SCOPE) and a Scientific Advisory Committee.

This report combines a comprehensive analysis of the current bioenergy landscape, technologies and practices with a critical review of their impacts. Experts from over 80 institutions contributed to the extensive evaluation of the current status of bioenergy resources, systems and markets and the potential for sustainable expansion and wider adoption of this renewable resource.

What "Bioenergy & Sustainability" proposes is not only improving energy security for over 1.3 billion people with no access to electricity and lifting rural areas out of poverty, but ultimately securing a sustainable and equitable future. The resources and technologies for the transition from fossil to renewable energy are within our reach, but achieving the critical contributions needed from modern bioenergy call for political and individual will.

The report finds that land availability is not a limiting factor. Bioenergy can contribute to sustainable energy supplies even with increasing food demands, preservation of forests, protected lands, and rising urbanization. While it is projected that 50 to 200 million hectares would be needed to provide 10 to 20% of primary energy supply in 2050, available land that does not compromise the uses above is estimated to be at least 500 million hectares and possibly 900 million hectares if pasture intensification or water-scarce, marginal and degraded land is considered. As documented in the 21 chapters of the report, the use of land for bioenergy is inextricably linked to food security, environmental quality, and social development, with potentially positive or negative consequences depending on how these linkages are managed.

Building on over 2,000 scientific studies and major assessments, this 700-page e-publication outlines how:

- Development of bioenergy can replenish a community's food supply by improving management practices and land soil quality
- New technologies can provide communities with food security, fuel, economic and social development while effectively using water, nutrients and other resources
- The use of bioenergy, if done thoughtfully, can actually help lower air and water pollution
- Bioenergy initiatives monitored and implemented, hand in hand with good governance, can protect biodiversity, and provide ecosystems services
- Efficiency gains and sustainable practices of recent bioenergy systems can help contribute to a low-carbon economy by decreasing greenhouse gas emissions and assisting carbon mitigation efforts
- With current knowledge and projected improvements 30% of the world's fuel supply could be biobased by 2050

The report's authors see both practical and ethical imperatives to advance bioenergy in light of its potential to meet pressing human needs not easily addressed by other renewable energy sources. At the same time, they acknowledge that just because bioenergy can be beneficial does not mean that it will be. Research and development, good governance and innovative



business models are essential to address knowledge gaps and foster innovation across the value chain. With these measures, the report argues, a sustainable future is more easily achieved with bioenergy than without it, and not using the bioenergy option would result in significant risks and costs for regions, countries and the planet.