

## **United Nations Conference on Trade and Development**

# The Biofuels Market: Current Situation and Alternative Scenarios

This report provides a contribution to the Global Bioenergy Partnership (GBEP). It was produced with the support of the Italian Ministry for the Environment, Land and Sea.



#### **Note**

The designations employed and the presentation of the material in this publication do not imply the expression of any opinion whatsoever on the part of the Secretariat of the United Nations concerning the legal status of any country, territory, city or area, or of its authorities, or concerning the delimitation of its frontiers or boundaries.

Symbols of the United Nations documents are composed of capital letters combined with figures. Mention of such a symbol indicates a reference to a United Nations document.

Material in this publication may be freely quoted or reprinted, but acknowledgement is requested, together with a reference to the document number. A copy of the publication containing the quotation or reprint should be sent to the UNCTAD secretariat at Palais des Nations, CH-1211 Geneva 10, Switzerland.

UNCTAD/DITC/BCC/2009/1

Copyright © United Nations, 2009 All rights reserved

### **Contents**

	Foreword
	Overview
I.	The role and implications of biofuels blending targets
	A. Blending and utilization targets
	B. The impact of mandatory blending targets
	C. Alternative scenarios for mandatory blending targets or utilization mandates
	D. Concluding remarks
	References
	Greenhouse gas markets, carbon dioxide credits and biofuels
	A. GHG policies as a way to boost biofuel demand
	B. Is biofuel carbon neutral? The importance of land-use change and deforestation
	C. Expanding the carbon market to enhance the sustainability of biofuels
	D. Issues of sinks in policy discussions
	E. Concluding remarks
	References
	Commercial viability of second generation biofuel technology
1.	
	A. Cost and energy yield estimates
	B. Land area and potential for energy from biomass
	C. Scenarios for climate policy
	D. Bioenergy under a GHG mitigation scenario in the United States, with and without
	trade restrictions
	E. Where will biomass production occur?
	F. Land-use implications
	G. Long-term effects on agricultural prices and land rents
	H. Concluding remarks
	References
	Trade opportunities for developing countries
•	A. Agriculture's productive capacity: a result of natural endowments, technology and
	infrastructure
	B. Developing countries will likely be the major bioenergy suppliers
	C. Biofuels trade opportunities for developing countries: selected scenarios
	D. Assessment of the trade scenarios
	E. The potential value of biofuel imports
	F. Imports of feedstock instead of biodiesel
	G. Concluding remarks
	References
	Advanced biofuels and developing countries: intellectual property scenarios and
•	policy implications
	A. Trends in biofuels patenting
	B. Trends in funding of biofuels research and development.
	C. Biofuels intellectual property scenarios
	D. Developing countries' capacity to participate in second generation biofuels
	E. Building an innovation system for biofuels
	F. Concluding remarks
	References

VI.	Biodiesel: the potential role of jatropha					
	A. Jatropha as a feedstock for biodiesel					
	B. The biodiesel sector					
	C. Potential role of jatropha in the biodiesel sector					
	D. Outlook for large-scale production and use of jatropha					
	E. Concluding remarks					
	References					
Boxes						
1.1.	The Brazilian experience					
2.1.	Creating tradable emissions reductions					
2.2.	The competitiveness of biofuels					
2.3.	Recent developments in climate policies in the United States and Europe					
3.1.	Defining atmospheric stabilization					
4.1.	The environmental footprint of biofuels and life cycle analysis					
6.1.	Jatropha characteristics					
6.2.	Jatropha's biodiesel powering aircraft					
6.3.	Biofuels from algae: another promising source for biofuels production					
6.4.	China: investments in jatropha					
6.5.	Jatropha and the Clean Development Mechanism					
Figures						
Figures	Deletionship between and oil mice and the breek even mice of maige in the United					
1.1.	Relationship between crude oil price and the break-even price of maize in the United					
3.1.	States					
3.1.	Global biomass production across CCSP scenarios					
3.2. 3.3.	Global primary energy in the level 1 scenario.					
3.3. 3.4.	- · · · · · · · · · · · · · · · · · · ·					
3.4. 3.5.	Global primary energy in the level 3 scenario					
3.5. 3.6.	Net agricultural exports in the 167 bmt case, with and without biofuels trading					
3.7.	Indexes of agriculture output price, land price, and agriculture production in the					
3.7.	United States in the no biofuel trading scenario relative to the reference					
3.8.	Share of land devoted to biomass production in a policy case – OLSR model					
3.9.	Global land use: (a) reference case – OLSR model, (b) reference case – PCCR model,					
٥.۶.	(c) policy case – OLSR model, (d) policy case – PCCR model					
3.10.	World agricultural and food price indexes					
4.1.	Savings per km in primary fossil energy and in greenhouse gas emissions for a range					
	of biofuel pathways					
5.1.	United States biofuel patents 2002-2007					
5.2.	United States biofuel patents as compared to other renewable energy patents in 2007					
5.3.	United States biofuel patents by ownership categories, 2006-2007					
5.4.	Trends in patents filed in selected environmental technologies					
5.5.	Patenting and federal research and development					
5.6.	Venture capital/private equity investment by sector, 2000–2006					
5.7.	Scenarios and mechanisms for accessing intellectual property					
5.8.						
6.1.	Prices of vegetable oils used to produce biodiesel from 1996/1997 to 2016/2017					
Таьі						
Tables	Potential demand for otheral					
1.1.	Potential demand for ethanol					
1.2. 3.1	Estimates of the potential for energy from biomass					
7 I	ESTITIATES OF THE DOTERITAL TOLETICLEY FROM DIOMASS					

		Page
3.2.	World land area and potential for energy from biomass	32
3.3.	United States land area and potential for energy from biomass	32
3.4.	Global land area required for biomass production in CCSP scenarios	36
3.5.	United States land area required for biomass production in CCSP scenarios	36
3.6.	United States land area required for biomass production considering Congressional	
	analysis scenarios	40
3.7.	Regional second generation biomass production in the policy case	43
4.1.	Potential demand for biofuels	57
4.2.	Hypothetical imports of biofuels by the EU and the United States, from developing	
	countries	57
5.1.	Pros and cons of patent pools	77
5.2.	All Biofuels Index at Q4 2007	79
5.3.	Research and development agenda for biofuels development	83
6.1.	Typical biodiesel yields	92
6.2.	Estimated jatropha biodiesel yield per hectare.	93
6.3.	World biodiesel production	95
6.4.	Global biodiesel feedstock use	96
6.5.	Projections of use of biofuels in the EU	96
6.6.	Biodiesel that would be replaced by jatropha, by outlook and scenario	98
6.7.	Jatropha hectares required, per use and yield scenario under the OECD/FAO outlook	98
6.8.	Jatropha hectares under the FAPRI outlook for each use and yield scenario	99

#### **Foreword**

UNCTAD started working on the trade and development implications of the biofuels sector in 2005. Since then, many events have had an impact on the sector. However, the fundamentals that have pressed countries – developed and developing alike – to promote biofuels as a new or expanding component of their energy mix are still there. Oil prices, though recently decreasing, are still relatively high and extremely volatile. Present geopolitics keep the quest for enhanced energy security high on the policy agenda of many countries. The challenges that climate change and global warming represent for the sustainable development of all countries still need to be addressed through concerted and individual actions. The rural sector in most developing countries has an unprecedented need for appropriate policy measures to overcome economic stagnation. Finally, many impoverished developing countries are looking for new market openings and new investments as beneficial tools to stimulate their economic growth.

At present the biofuels sector is going through turmoil and some analysts question whether biofuels will be able to keep their promises. The eventual outcome will depend on the policies that countries have already put in place and those that may be implemented in the future.

The purpose of this volume is to present possible scenarios for the biofuels industry. Each chapter describes how the sector could evolve depending on the policy and strategies that individual countries may select. However, the assumption is that individual choices may have global impacts. Each scenario therefore tries to provide insights on the global economic, energetic, environmental and trade repercussions of specific policy developments.

The compilation of this book was made possible by the generous financial contribution of the Ministry of Environment, Land and Sea of the Government of Italy. This publication is a contribution to the programme of work of the Global Bioenergy Partnership (GBEP), initiated by the Group of Eight (G8) countries at the 2005 Summit at Gleneagles with the secretariat based in Rome at the Food and Agriculture Organization of the United Nations. UNCTAD wishes to express its thanks to the Government of Italy and hopes that additional opportunities for cooperation will materialize in the future.

Activities related to this publication were undertaken within the framework of the UNCTAD Biofuels Initiative, coordinated by Lucas Assunção. Simonetta Zarrilli was responsible for organizing the research work and for the final review and editing of the book. She was supported in these tasks by Laura Zoratto and Paola Maniga. Administrative support was provided by Lalen Lleander. The cover page was designed by Sophie Combette.

This publication provides a contribution to the analysis of a new and dynamic sector of the world economy. We hope it will encourage further research into an area where much still needs to be investigated.

Lakshmi Puri

Director, Division on International Trade in Goods and Services, and Commodities

Lakehni Puri



https://www.yunbaogao.cn/report/index/report?reportId=5\_9948



