

Sustainable Business

*Economic development and
environmentally sound technologies*



The Malaŵi Development Corporation (MDC) was established in 1964 – its mission to stimulate development in the agricultural, commercial and industrial sectors and in the country's mineral resources.

Acting as the engine for growth by identifying, promoting and implementing projects either through expanding businesses within its existing portfolio or in the establishment of new ventures, MDC participates through direct investment, equity or loans and in partnership with domestic and foreign private investors. But whilst economic growth is essential to Malaŵi, protecting the environment is equally important to the future of the country.

EXISTING INVESTMENTS

- The Corporation requires companies to provide goods and services whilst at the same time taking into account the need for the protection of health and the environment.
- It encourages industries that produce hazardous wastes – including damaging gases – to develop corporate strategies to manage them properly and to adopt new environmentally sound technologies.
- MDC works closely with companies researching ways of reducing the amounts of toxic pollution and by encouraging recycling and safe treatment and disposal.
- As part of the monitoring process conducted by the Ministry of Research and Environmental Affairs, MDC also ensures that environmental impact assessment studies are undertaken in all projects involving rehabilitation, diversification, restructuring and expansion.



Better hospitality at Mount Soche Hotel, owned by Tourism Development and Investment Company (TDIC). MDC holds a major interest in TDIC.

covering the protection and/or replanting of trees and the contamination of water resources are rigorously applied.

In both existing and new investments, MDC encourages the use of renewable resources – water, soils and forests – in a sustainable manner, offering support to ensure that those resources that have become degraded can be made usable once more.

Whilst it is not possible to eliminate environmental damage from pollution, MDC aims at prevention and control measures which achieve an optimum level of pollution – that is, the level where the costs are balanced by the benefits. These measures include: waste minimization through recycling processes and self-appraisal systems to assess compliance with environmental regulations, as well as environmental impact assessments of all new projects and better management of hazardous wastes.

A LEADERSHIP ROLE

MDC is playing a leadership role in protecting Malaŵi's environment in other ways: by supporting the work of environmental organizations, as a member of a government-coordinated Task Force on industry dealing with environmental protection; and by providing information to the public through the relevant organizations on the effects of environmental damage.

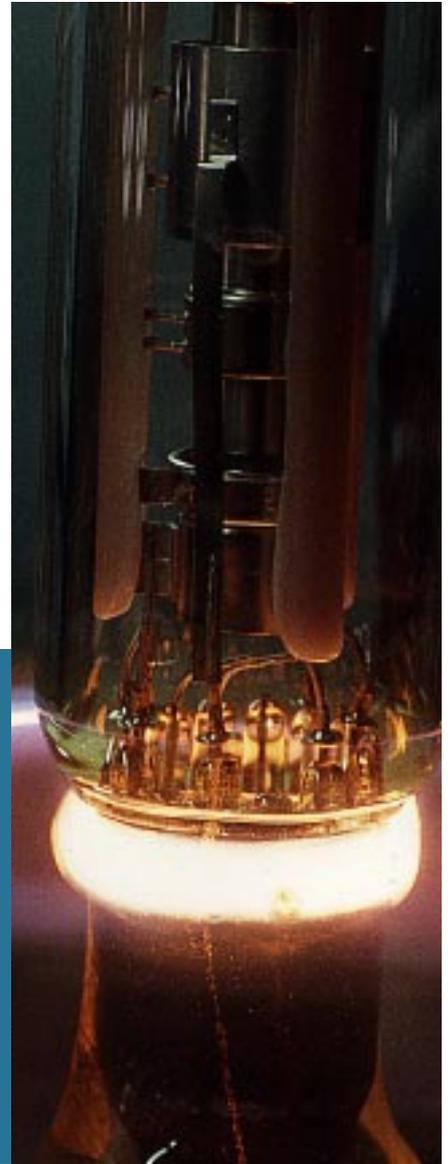
The future development of Malaŵi must be sustainable and MDC is playing its part to encourage both economic growth and the protection of the environment.

NEW PROJECTS

- In line with World Bank regulations, MDC undertakes environmental impact assessment studies of each new project, working closely with the environmental regulatory authorities in addressing industrial waste management problems.
- The Corporation is the lead agency in the building of industrial estates and factory shells in urban and semi-urban areas, thereby encouraging industrial development, supporting the government's export processing zone scheme and attracting foreign investment. It also ensures that the regulations

Sustainable Business

*Economic development and
environmentally sound technologies*



**The Regency Corporation Limited in association
with the United Nations Environment Programme**



The Regency Corporation Limited, Gordon House, 6 Lissenden Gardens, London NW5 1LX, UK
 Tel: 44 (171) 284 4858. Fax: 44 (171) 267 5505
 E-mail: info@regencycorp.com. Internet: www.regencycorp.com

Project Director
Jane Gee

Editor
Trevor Russel

Project Consultants
Khalid Amin
Philip Charles
Tunji Obasa
Brian Parrish
Brian Rollason
Richard Verden

Editing and design
Banson, London, UK

Reproduction
Lydia Litho, London, UK

Print
BPC Dunstable Ltd., Bedfordshire, UK
BPC obey both the letter and the spirit of all environmental laws and regulations, pursuing development projects to prevent pollution by reducing process emissions and materials usage and by cutting energy consumption.

Paper and board
Robert Horne Paper Co. Ltd., Buckinghamshire, UK
Cover printed on Reprise Matt Board, manufactured from a minimum of 80 per cent recycled fibre, the balance being totally chlorine free. The text is printed on Quattro Recycled Matt, manufactured from 75 per cent reclaimed fibre, 20 per cent elemental chlorine free fibre and 5 per cent mill broke. Both are National Association of Paper Merchants (N.A.P.M.) Recycled approved.

Inks
Coates Lorilleux Ltd., Buckinghamshire, UK
The inks are formulated using organic pigments chosen because of their minimal heavy metal content bound with a resin system based on a combination of naturally occurring and man-made materials. The liquid phase of the system is a carefully selected blend of vegetable oils with a minimal presence of petroleum distillate.

Laminate
Celloglas Ltd., Berkshire, UK
The cover is laminated with Clarifoil cellulose diacetate film manufactured primarily from wood pulp sourced only from managed forestry. When used with suitable adhesives it assists recycling by helping to de-ink the board without the need for chemical treatments.

Pictures
Cover/title page: main picture (cover only): Richard Jalo/UNEP; top right: Hulon K. Forrester/UNEP; below right: UNEP.
Pages: p5: UNEP; p10: Topham Picturepoint; p20: Jean Dessaints/UNEP; p36: Eva Barrett/UNEP; p45: UNEP; p51: Shihua Zhao/UNEP; p60: UNEP; p76: Johannes Gedenk/UNEP; p81: T. Porananent/UNEP; p100: Vladimir Akimov/UNEP; p111: Hulon K. Forrester/UNEP; p120: Topham Picturepoint; p125: Messmer/UNEP; p131: Richard F. Smith/UNEP; p142: Paulus Suwito/UNEP; p154: Yorinobu Nawata/UNEP; p165: Topham Picturepoint; p175: Didier Constant/UNEP; p184: Sanjay Acharya/UNEP; p192: Chen-Hsian Su/UNEP; p203: UNEP; p208: Jim T. Smith/UNEP; p219: Topham Picturepoint; p226: Ufuk Iskender/UNEP; p236: Rongrudee Vongpracharaporn/UNEP; p246: Richard Jalo/UNEP; p251: Dirk Buwalda/UNEP; p256: Rudolf Rupprecht/UNEP.

Acknowledgments
Cartermill International Limited
CRU Publishing Ltd.
Dawson UK Ltd.
Europa Publications
Financial Times Information
Frost & Sullivan Inc.
Graham & Whiteside Limited
International Water Supply Association
Marconi International Register
Marquis Who's Who
Tele-Gulf Directory Publications WLL
Utility Data Institute – The McGraw Hill Companies, Inc.

Special thanks
Regency would like to thank Jacqueline Aloisi de Lardere, Director, UNEP IE for her assistance and support of this initiative. Regency, in association with UNEP, would also like to thank the sponsors for their contribution to *Sustainable Business*.

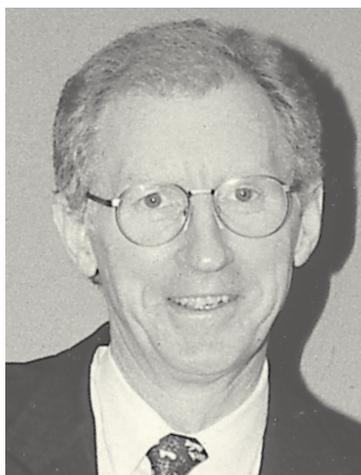
Display quotations in this book are taken from the United Nations General Assembly Special Session (UNGASS) held in June 1997 to review and to appraise the implementation of Agenda 21.

The contents of this publication do not necessarily reflect the views or policies of UNEP. The presentation of sponsoring companies, their activities and technologies listed in this publication do not imply any endorsement on the part of UNEP.

No part of this publication may be used, reproduced, stored in an information retrieval system or transmitted in any manner whatsoever without the express written permission of The Regency Corporation Limited. This publication has been prepared wholly upon information supplied by the contributors and whilst the publisher trusts that its content will be of interest to readers, its accuracy cannot be guaranteed. The publisher is unable to accept, and hereby expressly disclaims, any liability for the consequences of any inaccuracies, errors or omissions in such information whether occurring during the processing of such information for publication or otherwise. No representations whether within the meaning of the Misrepresentation Act 1967 or otherwise, warranties or endorsements of any information contained herein, are given or intended and full verification of all information appearing in this publication of the articles contained herein does not necessarily imply that any opinions therein are necessarily those of the publisher. The publisher cannot accept responsibility or liability for material provided by the corporate participants.

ISBN
09520469-7-0 Softback
09520469-8-9 Hardback
Also available in French and Spanish

© The Regency Corporation Limited 1998
All rights reserved



In view of limited global resources, an increase in the world's population, and the need for development as well as the need to protect the ecosystems that sustain the world's productive capacity, the importance of achieving environmentally sustainable forms of development is inescapable. Resource-efficient and cost-effective technologies are crucial in the quest for sustainable development. The United Nations Conference on Environment and Development (UNCED), held in Rio de Janeiro in 1992, was the first major event to highlight the fact that business and industry play a crucial role in bringing about sustainable development.

An important pathway towards sustainability for business and industry is the improvement of production systems through technologies and processes that utilize resources more efficiently and at the same time produce fewer wastes, in other words, achieving more with less. Environmentally sound technologies play a key role in improving productivity while protecting the environment. They are less polluting, use resources in a more sustainable manner, and recycle more of their wastes and products. Also important are the 'soft technologies' such as technical know-how, procedure, and organizational and managerial structure.

The central role of environmentally sound technologies in sustainable production means that governments, industry and business associations, and environmental organizations, as well as industry and business themselves, must actively promote their implementation if we are to realize

the goal of sustainability. UNEP, through its Industry and Environment Centre (IE), has for many years promoted the use of environmentally sound technologies in industry to achieve eco-efficiency and to develop cleaner and safer processes, products and services. Through its International Environment Technology Centre (IETC), it promotes the use of environmentally sound technologies for urban and waste management. UNEP is therefore pleased to have been associated with this publication which highlights the efforts of many companies.

UNEP hopes that *Sustainable Business* will help guide business and industry to incorporate environmentally sound technologies into their daily business and production activities and encourage governments and local authorities to favour the use of such technologies. It is only by efficiently using and re-using the resources we have that we can even begin to hope for a sustainable future.

**Jacqueline Aloisi de Lardere, Director
UNEP Industry and Environment Centre**

**John Whitelaw, Director
UNEP International Environmental Technology Centre**

Table of contents

Preface	5		
<i>By Jacqueline Aloisi de Larderel, Director, UNEP Industry and Environment Centre, and John Whitelaw, Director, UNEP International Environmental Technology Centre</i>			
1		3	
A bridge to sustainable development	11	Transferring technologies	37
A wide range	13	Success factors	37
Growing use	13	Knowledge gap	39
Impressive results	14	Plugging the gap	40
Main needs	14	Intermediaries crucial	41
Barriers	15	Other issues	41
Unfinished agenda	15	Reaching small and medium-sized enterprises	41
Box		Skills management	44
<i>ISO 14001 – a major driving force?</i>	17	Key role for private sector	46
		Public sector approach	49
		Montreal Protocol	50
		Mixed private-public approaches	53
		Capacity-building	55
		Promoting exports	55
		Is trade a barrier?	56
		South-South transfers	57
		“Start at home”	57
		Sources	59
2		Boxes	
Bringing tangible, measurable benefits	21	<i>Bottom-line benefits are persuasive</i>	39
A fivefold approach	21	<i>Barriers to technology transfer</i>	40
Technology solutions exist	23	<i>Information systems surveyed</i>	44
Three main categories	23	<i>Asia and Pacific focus on small and medium-sized enterprises</i>	46
Four generations of ESTs	24	<i>Transferring ESTs to small and medium-sized enterprises in Morocco</i>	47
Cleaning up industry	25	<i>The OzonAction Programme</i>	52
Chemicals	25	<i>Not one-time transactions</i>	55
Pulp and paper	27	<i>ESTs can overcome trade concerns</i>	56
Steel	30		
Construction	30	4	
Counting the costs of ESTs	31	Financing ESTs	61
Benefiting the bottom line	35	What is the cost?	61
Sources	35	Private sector financing	62
Boxes		Public-private partnerships	63
<i>Characteristics of sustainable technologies</i>	24	Funding technology transfer	69
<i>Saving energy and raw materials in the chemical industry</i>	26	Supporting smaller enterprises	69
<i>Reducing pollution in pulp and paper production</i>	27	Other funding sources	70
<i>Waste reduction: an urgent priority for metal plating</i>	29		
<i>On-site ‘green’ building techniques in Japan</i>	31		

The World Bank	70		
International funding	74		
Self-financing in Europe	75		
The good news – and the bad	75		
Sources	75		
Boxes			
<i>Privatization as a catalyst</i>	63		
<i>An innovative approach to financing</i>			
<i>ESTs</i>	65		
<i>Funding renewable energy technologies</i>	67		
<i>Implementing a national strategy</i>	70		
<i>Pollution prevention in India</i>	71		
<i>ESTs help Pakistan pulp and paper mill</i>	73		
<i>Collaborating on the border</i>	74		
5			
The role of government	77		
Direct regulations	77		
Command-and-control criticized	80		
New thinking – new policies	82		
Economic instruments	83		
Ecotaxes	85		
European Union broadens policies	87		
Taxing energy	90		
California and zero-emission vehicles	90		
The voluntary approach	90		
Incentive programmes	92		
International agreements	93		
In the developing world	93		
Critical role	99		
Sources	99		
Boxes			
<i>Japan: legislation is the driving force</i>	79		
<i>Regulatory flexibility</i>	82		
<i>Effluent taxes in the Netherlands</i>	83		
<i>Nitrogen oxide charge in Sweden</i>	85		
<i>Covenants work in the Netherlands</i>	91		
<i>Government-industry partnerships advance</i>			
<i>energy-efficient ESTs</i>	92		
<i>The Montreal Protocol – a dramatic impact</i>			
<i>on ESTs</i>	95		
<i>‘Technology tree’</i>	96		
<i>Conflicting cases: Mexico and Tanzania</i>	97		
		6	
		ESTs for pollution control	101
		Air pollution	101
		Water and wastewater treatment	103
		Solid waste treatment	106
		Landfill	106
		Waste to energy	107
		Recovery and recycling	109
		Land remediation	116
		Environmental monitoring	116
		Sources	119
		Boxes	
		<i>Emissions control at an incineration plant</i>	102
		<i>New lithography technology</i>	102
		<i>Zero wastewater emission in the wiredrawing</i>	
		<i>process</i>	103
		<i>Treating wastewater in the rubber industry</i>	105
		<i>Solid and hazardous waste in Egypt</i>	106
		<i>Waste-to-energy schemes work in Scandinavia</i>	107
		<i>Recycling – an option for leather tanneries</i>	112
		<i>An integrated approach in Madrid</i>	113
		<i>Coping with scrapped cars</i>	115
		<i>Air and water monitoring at a chemical plant</i>	116
		<i>Reducing pollution and waste through improved</i>	
		<i>process control</i>	117
		7	
		Cleaner production and	
		eco-efficiency	121
		ESTs for cleaner production	124
		Improving technologies	126
		Barriers to cleaner production	127
		Funding constraints and needs	129
		Cleaner Production Programme	130
		Other United Nations activities	132
		Progress and problems	133
		Eco-efficiency	135
		Towards zero emissions	135
		Work in progress	136
		Off the drawing board	140
		The eco-factory	140
		Industrial ecology	141
		Valid and viable	141
		Sources	141

Boxes			
<i>Clear environmental and financial benefits</i>	124	Biomass in developing countries	171
<i>Tunisian initiative leads to cleaner technologies</i>	126	Some problems	171
<i>Economic return in the Philippines</i>	127	Biogas	173
<i>Gas phase heat treatment of metals</i>	127	Not without difficulties	174
<i>Saving costs and improving product quality</i>	129	Increasingly popular	176
<i>Reducing heat loss in lead oxide units</i>	130	Fuel cell power	177
<i>Conserving water, energy and chemicals</i>	130	Geothermal power	177
<i>The price can be acceptable</i>	132	Nuclear energy	179
<i>Saving water and waste in food processing</i>	133	Evolutionary advances	181
<i>Cleaner production initiatives in Thailand</i>	135	Thermonuclear fusion	181
<i>Cleaner production at the grassroots</i>	136	“Real opportunity”	183
<i>A fast response in Africa</i>	137	Sources	183
		Boxes	
		<i>Solar-powered telecommunications in</i>	
		<i>Australia</i>	157
		<i>Solar power in Freiburg</i>	159
		<i>Affording solar electricity</i>	160
		<i>Choosing the right projects</i>	166
		<i>Denmark – a world leader</i>	167
		<i>The Swedish experience with biomass</i>	170
		<i>Heating homes from straw</i>	171
		<i>From distillery wastes to biogas</i>	173
		<i>A “definite sustainable option”</i>	174
8			
ESTs for energy	143		
Coal	145		
Advanced technologies	145		
Efficiency in industry	147		
Fundamental changes	149		
Residential and commercial use	150		
Co-generation	150		
A key role for technologies	153		
Sources	153		
Boxes			
<i>Cleaner coal technology in China</i>	146		
<i>Energy saving in the glass industry</i>	147		
<i>Efficient office lighting in the United States</i>	149		
<i>Co-generation in the United Kingdom</i>	149		
<i>District heating schemes in Europe</i>	150		
		10	
		ESTs for water conservation	185
		Agriculture	186
		Technologies and systems	186
		Chemical pollution	189
		Sanitation	191
		A key issue	191
		Sources	191
		Boxes	
		<i>Water conservation in China</i>	186
		<i>Permaculture in Australia</i>	187
		11	
		ESTs for road transportation	193
		Fuel efficiency technologies	193
		Technologies to reduce emissions	197
		Alternative carbon-based fuels	198
		Gas-powered vehicles	199

Do they work?	201	Boxes	
Cheaper to use?	201	<i>Suppliers' claims felt unreliable</i>	229
Zero-emission vehicles	202	<i>Using EnTA to choose the right technology in India</i>	231
Electric vehicles	202	<i>Assessing environmentally sound technologies in India</i>	233
Fuel cells	204		
A promising future	204		
Sources	207		
		14	
Boxes		Asia: economic growth and environmental deterioration	237
<i>The biggest challenge</i>	196	Massive investments needed	237
<i>Better traffic management vital too</i>	197	What is happening?	240
<i>Transport challenges in developing countries</i>	205	The driving forces	241
		Reluctance on cleaner production	242
		Finding the finance	242
		Other regions in brief	243
		Sources	245
		Boxes	
		<i>Progress on cleaner production in China</i>	239
		<i>Japan provides lessons for the whole region</i>	241
		15	
12		ESTs and future challenges	247
Biotechnology	209	An integrated approach	255
Cleaning up pollution	209	Sources	255
An exciting future	214		
Trends in agriculture	215	Boxes	
Further applications	217	<i>New technologies needed: air, energy and waste</i>	250
Approach causes concern	220	<i>New technologies needed: water and resources</i>	253
Biotechnology transfer	221		
Clear benefits	225		
Sources	225		
		Appendix: Sources of information	257
Boxes			
<i>Using micro-organisms against industrial pollution</i>	210	The UNEP Industry and Environment Centre (UNEP IE)	269
<i>New modular composting system</i>	211		
<i>Viet Nam focuses on composting</i>	213	The UNEP International Environmental Technology Centre (IETC)	270
<i>Research projects produce results in the United States</i>	214		
<i>Promoting biotechnology transfer</i>	218		
<i>Developing environmentally sound biotechnologies in India</i>	221		
<i>Biotechnology goes mobile</i>	224		
		Selected publications from UNEP IE and IETC	271
13			
Environmental technology assessment	227		
Ten steps for EnTA	229		
Following a successful EnTA	231		
A systems approach	233		
Growing interest and cooperation	235		
"Fix it or scrap it now"	235		
Sources	235		