

**THE MARKET FOR POLYURETHANE
CHEMICALS AND PRODUCTS IN
ASIA-PACIFIC**

Volume 4 - Raw Materials

**© IAL CONSULTANTS
JUNE 2004**

CP House, 97-107 Uxbridge Road, Ealing, London W5 5TL
Tel: +44 (0) 20 8832 7780 Fax: +44 (0) 20 8566 4931
Email: ial@brg.co.uk
Web site: www.ialconsultants.com

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted in any form, or by any means, electronic, mechanical, photocopying, recording or otherwise without the prior permission of the copyright owner.

NOTE

The information given in this report has been compiled from published sources and interpreted from fieldwork based on informed opinions. Whilst every care has been taken in the preparation of the report, there may have been some errors in the information obtained. Although it is impossible to verify every single detail by cross checking, we believe the general picture provided is reasonably accurate and comprehensive.

Many IAL reports contain an overview of selected company financial information and capabilities based on published sources where available. Although the companies represented are believed to be the major suppliers the profiles are meant to be indicative rather than definitive.

It is fundamental to the philosophy of IAL Consultants to constantly seek to extend and improve our service to clients. In pursuit of these aims, we shall be pleased to consider all requests for regular or periodic updating of all or any part of the information contained in this report, or for extensions in coverage in terms of product areas, market sectors and/or geographic regions.

We are, of course, always happy to discuss with any subscriber the possibility of undertaking further work, whether arising out of this report or in different business areas.

MORE INFORMATION ON IAL CONSULTANTS

At the end of this report you will find a copy of our corporate brochure and a list of our latest published reports. Should you require more information on either our published reports or our private client services, please contact us at the address given.

Full details on all IAL Consultants published studies (including full tables of contents and tables of tables) and ad-hoc research services can be found on our website :

www.ialconsultants.com

CONTENTS

1. INTRODUCTION.....	1
1.1 SCOPE OF THE STUDY	1
1.2 METHODOLOGY.....	2
1.3 UNITS OF VOLUME.....	2
1.4 FORMULATIONS	2
1.4.1 Flexible Foam	3
1.4.2 Rigid Foam.....	4
1.4.3 Coatings	5
1.4.4 Adhesives & Sealants	6
1.4.5 Elastomers.....	7
1.5 ABBREVIATIONS.....	8
2. SUMMARY	9
2.1 CONSUMPTION OF PU RAW MATERIALS IN ASIA-PACIFIC BY COUNTRY	9
2.2 CONSUMPTION OF PU RAW MATERIALS IN ASIA-PACIFIC BY PRODUCT SECTOR.....	12
3. RAW MATERIALS.....	15
3.1 EAST ASIA	16
3.1.1 MDI.....	16
MDI Producers	17
3.1.2 TDI.....	18
TDI Producers	19
3.1.3 Aliphatic Isocyanates	21
Producers of Aliphatic Isocyanates.....	23
3.1.4 Polyols.....	23
Polyether Polyol Producers.....	26
Graft Copolymer Polyols.....	28
Producers of Polyester Polyols	28
Producers of PTMEG Polyols	31
Polyol Precursors – Propylene Oxide	33
3.1.5 Trends & Issues Affecting Raw Material Production.....	34
Isocyanates	34
Polyols.....	34
3.2 SOUTH EAST ASIA & AUSTRALIA.....	36
3.2.1 MDI.....	36
MDI Producers	37
3.2.2 TDI.....	37
TDI Producers	38
3.2.3 Aliphatic Isocyanates	38
3.2.4 Polyols.....	40
Polyether Polyol Producers.....	42
Graft Copolymer Polyols.....	43
Producers of Polyester Polyols	43
Polyol Precursors – Propylene Oxide	44
3.2.5 Trends & Issues Affecting Raw Material Production.....	45
Isocyanates	45
Polyols.....	45
3.3 INDIA & PAKISTAN.....	46
3.3.1 MDI.....	46
MDI Producers	47
3.3.2 TDI.....	47
TDI Producers	47
3.3.3 Aliphatic Isocyanates	48
3.3.4 Polyols.....	49
Polyether Polyol Producers.....	51

	Graft Copolymer Polyols.....	52
	Producers of Polyester Polyols	52
	Polyol Precursors – Propylene Oxide	53
3.3.5	<i>Trends & Issues Affecting Raw Material Production</i>	53
	Isocyanates	53
	Polyols.....	54
4.	MAJOR END-USE MARKETS FOR POLYURETHANE.....	55
4.1	EAST ASIA - BUILDING & CONSTRUCTION	55
4.1.1	<i>Industry Overview</i>	55
4.1.2	<i>Trends & Issues Affecting the Building & Construction Industry</i>	56
4.2	EAST ASIA - AUTOMOTIVE.....	61
4.2.1	<i>Industry Overview</i>	61
4.2.2	<i>Trends & Issues Affecting the Automotive Industry</i>	64
4.3	EAST ASIA - REFRIGERATION	68
4.3.1	<i>Industry Overview</i>	68
4.3.2	<i>Trends & Issues Affecting the Refrigeration Industry</i>	70
4.4	EAST ASIA – FOOTWEAR	73
4.4.1	<i>Industry Overview</i>	73
4.4.2	<i>Trends & Issues Affecting the Footwear Industry</i>	74
4.5	EAST ASIA - FURNITURE AND BEDDING	75
4.5.1	<i>Industry Overview</i>	75
4.5.2	<i>Trends & Issues Affecting the Furniture and Bedding Market</i>	77
4.6	SOUTH EAST ASIA & AUSTRALIA – BUILDING & CONSTRUCTION.....	81
4.6.1	<i>Industry Overview</i>	81
4.6.2	<i>Trends & Issues Affecting the Building & Construction Industry</i>	85
4.7	SOUTH EAST ASIA & AUSTRALIA – AUTOMOTIVE	87
4.7.1	<i>Industry Overview</i>	87
4.7.2	<i>Trends & Issues Affecting the Automotive Industry</i>	90
4.8	SOUTH EAST ASIA & AUSTRALIA – REFRIGERATION	94
4.8.1	<i>Industry Overview</i>	94
4.8.2	<i>Trends & Issues Affecting the Refrigeration Industry</i>	96
4.9	SOUTH EAST ASIA & AUSTRALIA – FOOTWEAR.....	99
4.9.1	<i>Industry Overview</i>	99
4.9.2	<i>Trends & Issues Affecting the Footwear Industry</i>	101
4.10	SOUTH EAST ASIA & AUSTRALIA - FURNITURE AND BEDDING.....	102
4.10.1	<i>Industry Overview</i>	102
4.10.2	<i>Trends & Issues Affecting the Furniture & Bedding Market</i>	103
4.11	INDIA & PAKISTAN – BUILDING & CONSTRUCTION.....	105
4.11.1	<i>Industry Overview</i>	105
4.11.2	<i>Trends & Issues Affecting the Building & Construction Industry</i>	107
4.12	INDIA & PAKISTAN – AUTOMOTIVE	108
4.12.1	<i>Industry Overview</i>	108
4.12.2	<i>Trends & Issues Affecting the Automotive Industry</i>	113
4.13	INDIA & PAKISTAN – REFRIGERATION	117
4.13.1	<i>Industry Overview</i>	117
4.13.2	<i>Trends & Issues Affecting the Refrigeration Industry</i>	118
4.14	INDIA & PAKISTAN – FOOTWEAR.....	120
4.14.1	<i>Industry Overview</i>	120
4.14.2	<i>Trends & Issues Affecting the Footwear Industry</i>	121
4.15	INDIA & PAKISTAN – FURNITURE & BEDDING	122
4.15.1	<i>Trends & Issues Affecting the Furniture and Bedding Market</i>	122
5.	DIRECTORY OF RAW MATERIAL SUPPLIERS	123
5.1	MANUFACTURERS OF ISOCYANATES.....	123
5.1.1	<i>China</i>	123
5.1.2	<i>India</i>	123
5.1.3	<i>Japan</i>	123
5.1.4	<i>South Korea</i>	124
5.1.5	<i>Taiwan</i>	125

5.2	MANUFACTURERS OF POLYOLS.....	126
5.2.1	<i>Australia</i>	126
5.2.2	<i>China</i>	126
5.2.3	<i>India</i>	128
5.2.4	<i>Indonesia</i>	128
5.2.5	<i>Japan</i>	129
5.2.6	<i>Singapore</i>	130
5.2.7	<i>South Korea</i>	130
5.2.8	<i>Taiwan</i>	132
5.2.9	<i>Thailand</i>	133
6.	SOURCES OF INFORMATION.....	135
6.1	CHEMICALS AND PLASTICS ASSOCIATIONS.....	135
6.1.1	<i>Australia</i>	135
6.1.2	<i>China</i>	135
6.1.3	<i>India</i>	136
6.1.4	<i>Indonesia</i>	136
6.1.5	<i>Japan</i>	137
6.1.6	<i>Malaysia</i>	137
6.1.7	<i>Pakistan</i>	137
6.1.8	<i>Philippines</i>	137
6.1.9	<i>Singapore</i>	138

TABLE OF TABLES

1. INTRODUCTION.....	1
1.1 SCOPE OF THE STUDY	1
1.2 METHODOLOGY.....	2
1.3 UNITS OF VOLUME.....	2
1.4 FORMULATIONS	2
Flexible Foam: Raw Material Formulations Used (%)	3
Rigid Foam: Raw Material Formulations Used (%)	4
PU Coatings: Raw Material Formulations Used (%).....	5
PU Adhesives & Sealants: Raw Material Formulations Used (%)	6
PU Elastomers: Raw Material Formulations Used (%)	7
1.5 ABBREVIATIONS.....	8
Polyurethane Abbreviations and General Terms	8
2. SUMMARY	9
2.1 CONSUMPTION OF PU RAW MATERIALS IN ASIA-PACIFIC BY COUNTRY	9
Total PU Raw Material Consumption in Asia-Pacific by country 2003 (Tonnes).....	9
Total PU Raw Material Consumption in Asia-Pacific by country 2008 (Tonnes).....	10
Total PU Raw Material Consumption in Asia-Pacific by Country 2003-2008 (% Growth p.a.)	11
2.2 CONSUMPTION OF PU RAW MATERIALS IN ASIA-PACIFIC BY PRODUCT SECTOR.....	12
Total PU Raw Material Consumption in Asia-Pacific by Product Sector 2003 (Tonnes).....	12
Total PU Raw Material Consumption in Asia-Pacific by Product Sector 2008 (Tonnes).....	13
Total PU Raw Material Consumption in Asia-Pacific by Product Sector 2003-2008 (% Growth p.a.).....	14
3. RAW MATERIALS.....	15
Polyurethane Raw Material Capacity in Asia-Pacific, 1998-2003 (Tonnes)	15
3.1 EAST ASIA	16
Demand for MDI in East Asia, 2003 (Tonnes).....	16
Demand for MDI in East Asia, 2008 (Tonnes).....	16
Demand for MDI in East Asia, 2003 - 2008 (% Growth p.a.)	16
MDI Production Capacity in East Asia, 2003 (Tonnes).....	17
Forecast MDI Capacity Expansions in East Asia by 2008 (Tonnes)	18
Demand for TDI in East Asia, 2003-2008 (Tonnes).....	18
TDI Production Capacity, East Asia, 2003 (Tonnes).....	19
Possible TDI Capacity Expansions by 2008 in East Asia (Tonnes).....	20
Demand for Aliphatic Isocyanates in East Asia, 2003 (Tonnes).....	21
Demand for Aliphatic Isocyanates in East Asia, 2008 (Tonnes).....	22
Demand for Aliphatic Isocyanates in East Asia, 2003 - 2008 (% Growth p.a.).....	22
Aliphatic Isocyanate Production Capacity in East Asia 2003 (Tonnes).....	23
Estimated East Asia Supply and Demand for Polyols, 2003-2008 (Tonnes)	24
Demand for Polyols in East Asia, 2003 (Tonnes).....	25
Demand for Polyols in East Asia, 2008 (Tonnes).....	25
Demand for Polyols in East Asia, 2003 - 2008 (% Growth p.a.)	25
Polyether Polyol Production Capacity East Asia, 2003 (Tonnes).....	26
Polyester Polyols Production Capacity in East Asia, 2003 (Tonnes).....	29
PTMEG Production Capacity in East Asia, 2003 (Tonnes).....	32
3.2 SOUTH EAST ASIA & AUSTRALIA.....	36
Demand for MDI in SEA & Australia, 2003 (Tonnes).....	36
Forecast Demand for MDI in SEA & Australia, 2008 (Tonnes).....	36
Growth in the Demand for MDI in SEA & Australia, 2003-2008 (% Growth p.a.)	37
Demand for TDI in SEA & Australia, 2003-2008 (Tonnes).....	37
Demand for Aliphatic Isocyanates in SEA & Australia, 2003 (Tonnes).....	38
Forecast Demand for Aliphatic Isocyanates in SEA & Australia, 2008 (Tonnes)	39
Growth in Demand for Aliphatic Isocyanates in SEA & Australia, 2003 - 2008 (% Growth p.a.).....	39
Demand for Polyols in SEA & Australia, 2003 (Tonnes).....	41
Forecast Demand for Polyols in SEA & Australia, 2008 (Tonnes)	41
Growth in Demand for Polyols in SEA & Australia, 2003-2008 (% Growth p.a.).....	42
Polyether Polyol Production Capacity SEA & Australia, 2003 (Tonnes).....	42

	Polyester Polyols Production Capacity in SEA & Australia, 2003 (Tonnes).....	44
3.3	INDIA & PAKISTAN.....	46
	Demand for MDI in India & Pakistan, 2003 (Tonnes).....	46
	Forecast Demand for MDI in India & Pakistan, 2008 (Tonnes).....	46
	Demand for MDI in India & Pakistan, 2003 - 2008 (% Growth p.a.).....	46
	Demand for TDI in India & Pakistan, 2003-2008 (Tonnes).....	47
	TDI Production Capacity, India, 2003 (Tonnes).....	48
	Demand for Aliphatic Isocyanates in India & Pakistan, 2003-2008 (Tonnes).....	48
	Estimated Supply and Demand for Polyols in India & Pakistan, 2003-2008 (Tonnes).....	49
	Demand for Polyols in India & Pakistan, 2003 (Tonnes).....	50
	Forecast Demand for Polyols in India & Pakistan, 2008 (Tonnes).....	50
	Growth in Demand for Polyols in India & Pakistan, 2003-2008 (% Growth p.a.).....	50
	Polyether Polyol Production Capacity in India, 2003 (Tonnes).....	51
	Polyester Polyols Production Capacity in India, 2003 (Tonnes).....	52
4.	MAJOR END-USE MARKETS FOR POLYURETHANE.....	55
4.1	EAST ASIA - BUILDING & CONSTRUCTION.....	55
4.2	EAST ASIA - AUTOMOTIVE.....	61
	Total Vehicle Production in East Asia by Country, 2002 (Units).....	61
	Forecast Total Vehicle Production in East Asia by Country, 2008 (Units).....	62
	Production of Motorcycles in East Asia, 2003-2008 (Units).....	62
	Leading Vehicle Manufacturers in East Asia.....	63
	Leading Motorcycle Manufacturers in East Asia.....	63
4.3	EAST ASIA - REFRIGERATION.....	68
	Estimated Production of Domestic Refrigerators and Freezers in East Asia, 2002 -2007 (Units).....	68
	Estimated Production of Commercial Refrigerators and Freezers in East Asia, 2002 -2007 (Units).....	68
	World Production of Refrigerated Containers, 1997-2002 (TEU).....	69
	Production of Refrigerated Vehicles in East Asia, 2002-2007 (Units).....	70
4.4	EAST ASIA – FOOTWEAR.....	73
	Footwear Production in East Asia, 2003-2008 (Million Pairs).....	73
4.5	EAST ASIA - FURNITURE AND BEDDING.....	75
4.6	SOUTH EAST ASIA & AUSTRALIA – BUILDING & CONSTRUCTION.....	81
	Trends and Outlook of The Asian Macroeconomy by Country 1998-2002.....	82
	Construction Investment in Asia-Pacific by Country, 2001.....	83
4.7	SOUTH EAST ASIA & AUSTRALIA – AUTOMOTIVE.....	87
	Total Vehicle Production in SEA & Australia by Country, 2002 (Units).....	87
	Forecast Total Vehicle Production in SEA & Australia by Country, 2007 (Units).....	88
	Production of Motorcycles in SEA & Australia, 2002-2007 (Units).....	88
	Leading Vehicle Manufacturers in SEA & Australia.....	89
	Leading Motorcycle Manufacturers in SEA.....	89
4.8	SOUTH EAST ASIA & AUSTRALIA – REFRIGERATION.....	94
	Estimated Production of Domestic Refrigerators and Freezers in SEA and Australia, 2003-2008 (Units).....	94
	Manufacturers of Domestic Refrigerators and Freezers in SEA & Australia.....	95
	Manufacturers of Commercial Refrigerators and Freezers in SEA & Australia.....	96
4.9	SOUTH EAST ASIA & AUSTRALIA – FOOTWEAR.....	99
	Footwear Production in SEA & Australia, 2003-2008 (Million Pairs).....	99
	Leading Footwear Manufacturers in SEA & Australia.....	100
4.10	SOUTH EAST ASIA & AUSTRALIA - FURNITURE AND BEDDING.....	102
4.11	INDIA & PAKISTAN – BUILDING & CONSTRUCTION.....	105
4.12	INDIA & PAKISTAN – AUTOMOTIVE.....	108
	Total Vehicle Production in India & Pakistan, 2003 (Units).....	108
	Forecast Total Vehicle Production in India & Pakistan, 2008 (Units).....	108
	Market Shares in the Indian LCV Sector (First Half of 2000-1).....	109
	Production of Two-Wheelers in India & Pakistan, 2003 (Millions).....	110
	Major Automotive Manufacturers and their Manufacturing Locations in India.....	111
	Leading Motorcycle Manufacturers in India & Pakistan.....	112
	Market Shares of Indian Tractor Manufacturers (1999-2000).....	112
4.13	INDIA & PAKISTAN – REFRIGERATION.....	117
	Estimated Production of Domestic Refrigerators and Freezers in India & Pakistan, 2003-2008 (Units).....	117
	Major Producers of Domestic Refrigerators & Freezers in India & Pakistan.....	117
	Leading Manufacturers of Commercial Refrigerators, Freezers and Chillers in India & Pakistan.....	118
4.14	INDIA & PAKISTAN – FOOTWEAR.....	120
	Footwear Production in India & Pakistan, 2003-2008 (Million Pairs).....	120
	Leading Footwear Manufacturers in India & Pakistan.....	121

4.15	INDIA & PAKISTAN – FURNITURE & BEDDING	122
5.	DIRECTORY OF RAW MATERIAL SUPPLIERS	123
5.1	MANUFACTURERS OF ISOCYANATES.....	123
5.2	MANUFACTURERS OF POLYOLS.....	126
6.	SOURCES OF INFORMATION.....	135
6.1	CHEMICALS AND PLASTICS ASSOCIATIONS.....	135