

MARKETS AND PROFITABILITY

Market Insights: 1,4-Butanediol (BDO) - 2022

December 2022



This Report was prepared by NexantECA, the Energy and Chemicals Advisory company ("NexantECA"). Except where specifically stated in this Report, the information contained herein is prepared on the basis of information that is publicly available, and contains no confidential third party technical information to the best knowledge and belief of NexantECA. The information has not been independently verified or otherwise examined to determine its accuracy, completeness or financial feasibility. Neither NexantECA, Subscriber nor any person acting on behalf of either shall have any liabilities for any loss or damage arising from or connected to the use of any information contained in this Report. NexantECA does not represent or warrant that any assumed conditions will come to pass.

The Report is for Subscriber's internal use only and shall be kept strictly confidential. The Report should not be otherwise reproduced, distributed or used without first obtaining prior written consent by NexantECA. Each Subscriber agrees to use reasonable effort to protect the confidential nature of the Report.

Copyright © by NexantECA (BV) Ltd. 2022. All rights reserved.



Contents

1	Executive Summary	1
2	Introduction	6
2.1	Overview	6
2.2	Properties and Hazards	7
2.3	Handling and Storage	8
2.4	Bio-based BDO	9
2.5	Key End Use Applications	10
2.5.1	Tetrahydrofuran (THF)	10
2.5.1.1	Elastane (Polyurethane-polyurea Copolymer) via PTMEG from THF	11
2.5.1.2	THF as a Resin Solvent	11
2.5.1.3	THF as a Reaction Solvent or Starting Material	13
2.5.2	Polybutylene Terephthalate (PBT)	15
2.5.2.1	Properties of PBT	16
	Resin Properties	16
2.5.2.2	Developments in PBT Products	18
2.5.3	Polybutylene adipate terephthalate (PBAT)	19
2.5.4	Gamma-Butyrolactone (GBL)	20
2.5.4.1	n-Methyl Pyrrolidone (NMP)	20
2.5.4.2	2-Pyrrolidone	21
2.5.4.3	N-Vinyl Pyrrolidone (NVP)	21
2.5.5	Polyurethane Thermoplastic Elastomers and Fibres	22
2.5.5.1	Thermoplastic Polyurethanes	22
2.5.5.2	Castable Polyurethanes	23
2.5.5.3	Reaction Injection Moulding	23
2.5.6	Copolyester-Ether Thermoplastic Elastomers	24
3	Market Outlook	26
3.1	Global	26
3.1.1	Market Overview	26
3.1.2	Market Drivers	28
3.1.3	Market Constraints	29
3.1.4	Competitive Landscape	30
3.1.5	Supply and Demand	31
3.1.6	Pricing Analysis and Trends	33
3.2	Asia Pacific excluding China	34
3.2.1	Market Overview	34
3.2.2	Competitive Landscape	35
3.2.3	Supply and Demand	36
3.3	China	38
3.3.1	Market Overview	38
3.3.2	Competitive Landscape	39



3.3.3	Supply, Demand and Trade	40
3.4	North America	42
3.4.1	Market Overview	42
3.4.2	Competitive Landscape.....	43
3.4.3	Supply and Demand.....	43
3.5	South America.....	45
3.5.1	Market Overview	45
3.5.2	Competitive Landscape.....	45
3.5.3	Supply, Demand and Trade	45
3.6	Western Europe	46
3.6.1	Market Overview	46
3.6.2	Competitive Landscape.....	47
3.6.3	Supply and Demand.....	47
3.7	Central Europe	49
3.7.1	Market Overview	49
3.7.2	Competitive Landscape.....	49
3.7.3	Supply, Demand and Trade	49
3.8	Eastern Europe	50
3.8.1	Market Overview	50
3.8.2	Competitive Landscape.....	50
3.8.3	Supply, Demand and Trade	50
3.9	Middle East.....	51
3.9.1	Market Overview	51
3.9.2	Competitive Landscape.....	51
3.9.3	Supply, Demand and Trade	51
3.10	Africa	53
3.10.1	Market Overview	53
3.10.2	Competitive Landscape.....	53
3.10.3	Supply, Demand and Trade	53
4	Cost Competitiveness.....	54
4.1	Cost Structure and Assumptions.....	54
4.1.1	Variable Costs	55
4.1.1.1	Feedstock Costs	55
4.1.1.2	Utility Costs	55
4.1.2	Direct Fixed Costs	55
4.1.3	Allocated Fixed Costs	57
4.1.4	Other considerations	57
4.2	Delivered Cost Assumptions	58
4.2.1	Shipping Costs	58
4.2.2	Tariffs	58
4.3	Cost Competitiveness	59
5	Market Summary	60



Figures

Figure 1	1,4 BDO Value Chain	6
Figure 2	Overview of THF	10
Figure 3	Global BDO Demand by End Use, 2022	27
Figure 4	Global BDO Demand by Region, 2022	27
Figure 5	Global BDO Capacity by Region, 2022	30
Figure 6	Global BDO Capacity by Producer, 2022	30
Figure 7	Global BDO Supply, Demand and Operating Rate	31
Figure 8	Global BDO Net Trade by Region	32
Figure 9	Global BDO Pricing by Region	34
Figure 10	Asia Pacific (excluding China) BDO Demand by End-Use, 2022	35
Figure 11	Asia Pacific (excluding China) BDO Supply, Demand, and Net Trade	36
Figure 12	China BDO Demand by End-Use, 2022	38
Figure 13	China BDO Supply, Demand, and Net Trade	41
Figure 14	North America BDO Demand by End-Use, 2022	42
Figure 15	North America BDO Supply, Demand, and Net Trade	44
Figure 16	South America BDO Supply, Demand, and Net Trade	45
Figure 17	Western Europe BDO Demand by Application, 2022	46
Figure 18	Western Europe BDO Supply, Demand and Trade	48
Figure 19	Central Europe BDO Supply, Demand, and Net Trade	49
Figure 20	Eastern Europe BDO Supply, Demand, and Net Trade	50
Figure 21	Middle East BDO Demand by Application, 2021	51
Figure 22	Middle East BDO Supply, Demand, and Net Trade	52
Figure 23	Africa BDO Supply, Demand, and Net Trade	53
Figure 24	Components of Delivered Cost to Market	54
Figure 25	Delivered Cost Competitiveness for BDO	59
Figure 26	Porter Five Forces	60

Tables

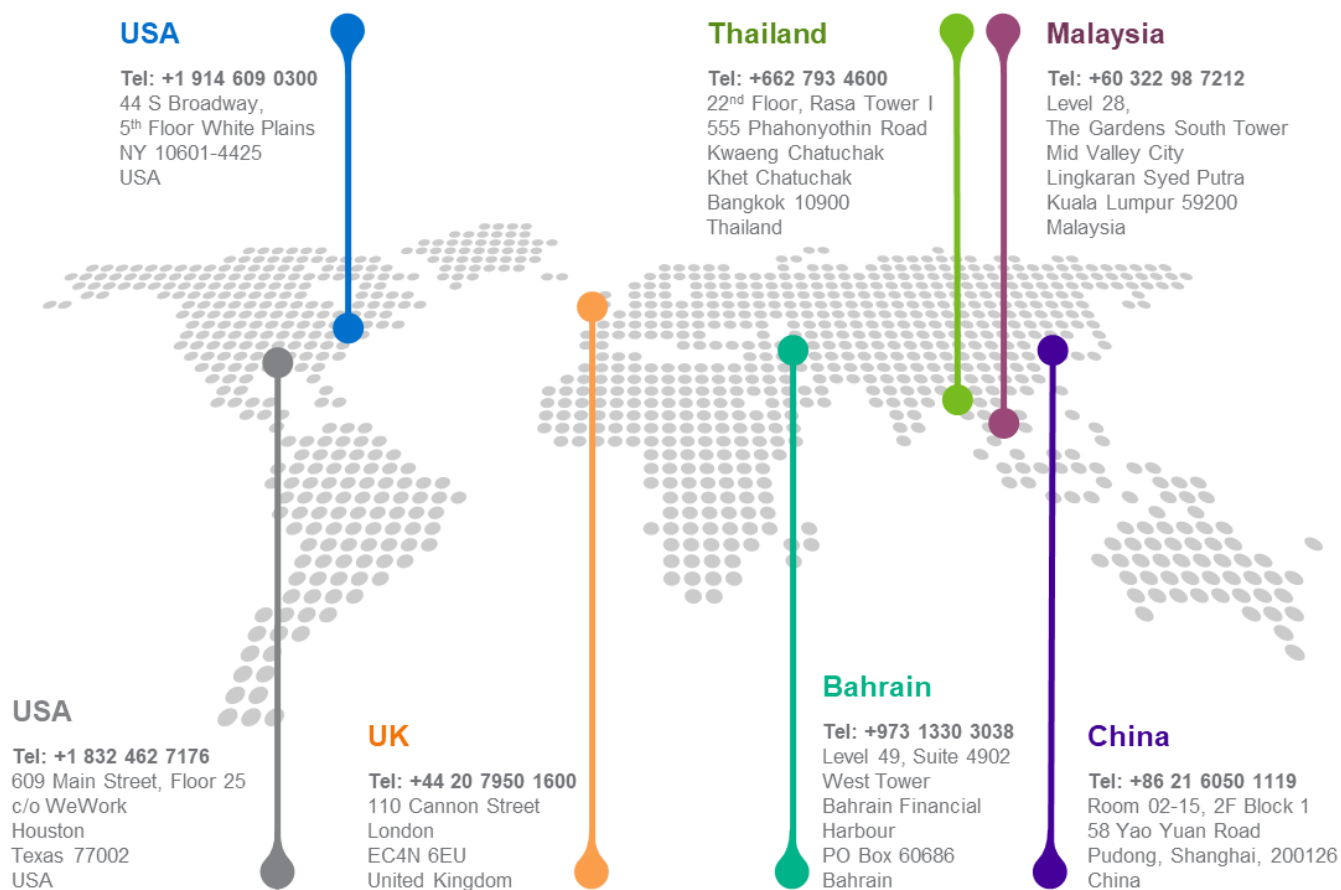
Table 1	Key Physical and Thermodynamic Properties of BDO	7
Table 2	Typical Commercial Specification for BDO	7
Table 3	THF Applications as a Resin Solvent	12
Table 4	THF Applications as a Reaction Solvent or Starting Material	14
Table 5	PBT Resin Properties	16
Table 6	PBT End Use by Major Market	17
Table 7	GBL and Derivatives Applications	20
Table 8	Global BDO Demand by End use	27
Table 9	Global BDO Demand by Region	28
Table 10	Global BDO Supply, Demand and Net Trade	31
Table 11	Asia Pacific (excluding China) BDO Capacity	36
Table 12	Asia Pacific (excluding China) BDO Supply, Demand, and Net Trade	37
Table 13	China BDO Capacity	40
Table 14	China BDO Supply, Demand, and Net Trade	41



Table 15	North America BDO Capacity.....	43
Table 16	North America BDO Supply, Demand, and Net Trade	44
Table 17	South America BDO Supply, Demand, and Net Trade	45
Table 18	Western Europe BDO Capacity.....	47
Table 19	Western Europe BDO Supply, Demand and Trade	48
Table 20	Central Europe BDO Supply, Demand, and Net Trade.....	49
Table 21	Eastern Europe BDO Supply, Demand, and Net Trade	50
Table 22	Middle East BDO Capacity	51
Table 23	Middle East BDO Supply, Demand, and Net Trade	52
Table 24	Africa BDO Supply, Demand, and Net Trade	53
Table 25	Wage Assumptions, Q2 2022.....	56
Table 26	Packaging and Freight Costs, Delivered to United States	58
Table 27	Tariffs Due on Imports to US	58



NexantECA partners with clients to help them navigate the big global energy, chemicals and materials issues of tomorrow. We provide independent advice through our consulting, subscriptions and reports, and training businesses using expertise developed in markets, economics and technology through our fifty years of operation. We are entirely dedicated to supporting sustainable development of the industry and provide expert advice with efficiency, speed, and agility.



Disclaimer

This Report was prepared by NexantECA, the Energy and Chemicals Advisory company. Except where specifically stated otherwise in this Report, the information contained here is prepared on the basis of information that is publicly available, and contains no confidential third-party technical information to the best knowledge of NexantECA. Aforesaid information has not been independently verified or otherwise examined to determine its accuracy, completeness or financial feasibility. Neither NexantECA, Client nor any person acting on behalf of either assumes any liabilities with respect to the use of or for damages resulting from the use of any information contained in this Report. NexantECA does not represent or warrant that any assumed conditions will come to pass.