

MARKETS AND PROFITABILITY

Profitability Forecast: Butadiene Derivatives - 2019

Global

September 2019



This Report was prepared by Nexant, Inc. ("Nexant"). Except where specifically stated otherwise 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 of Nexant. Aforesaid information has not been independently verified or otherwise examined to determine its accuracy, completeness or financial feasibility. Neither Nexant, Subscriber 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. Nexant does not represent or warrant that any assumed conditions will come to pass.

The Report is submitted on the understanding that the Subscriber will maintain the contents confidential except for the Subscriber's internal use. The Report should not be reproduced, distributed or used without first obtaining prior written consent by Nexant. Each Subscriber agrees to use reasonable effort to protect the confidential nature of the Report.

Copyright © by Nexant Inc. 2019. All rights reserved.



Contents

1	Executive Summary	1
1.1	Introduction.....	1
2	Economic Assumptions and Forecasting Methodology	2
2.1	Introduction.....	2
2.2	Scenarios	3
2.3	Crude Oil	4
2.3.1	Crude Oil Price Basis	4
2.3.2	Crude Oil Scenarios	5
2.3.3	Low Crude Oil Price	7
2.3.4	Medium Crude Oil Price	8
2.3.5	High Crude Oil Price	8
2.4	Economic Growth	9
2.4.1	Forecasting Methodology/Assumptions	9
2.4.2	Global Economic Growth	9
2.5	Inflation	12
2.6	Exchange Rates	13
2.6.1	Forecasting Methodology and Assumptions	13
2.6.2	Outlook for the Euro	13
2.7	Profitability Forecasting Methodology	14
2.7.1	Introduction.....	14
2.7.2	Price Influences.....	15
2.7.3	Petrochemical Production Costs	17
2.7.4	Driving Forces for Profitability	19
2.7.5	Cyclicality of the Petrochemical Industry	23
3	Petrochemical and Polymer Industry Profitability	24
3.1	Asia Pacific.....	24
3.2	United States.....	26
3.3	Western Europe	28
4	Petrochemical Feedstocks and Refined Products Pricing	30
4.1	Naphtha.....	32
4.2	Gasoline	33
4.3	Fuel Oil	34
4.4	Natural Gas	35
4.5	Ethane	36
4.6	Propane.....	37
4.7	Coal.....	38
5	Acrylonitrile Butadiene Styrene (ABS).....	39
5.1	Introduction.....	39
5.1.1	Pricing Basis and Mechanism	39
5.1.2	Regional Price Definitions	39



5.2	Asia Pacific.....	40
5.2.1	Profitability Projections.....	40
5.2.2	Price Projections.....	42
5.3	United States.....	43
5.3.1	Profitability Projections.....	43
5.3.2	Price Projections.....	45
5.4	Western Europe.....	46
5.4.1	Profitability Projections.....	46
5.4.2	Price Projections.....	48
5.5	Regional Price Spreads.....	49
6	Styrene Butadiene Rubber (SBR).....	51
6.1	Introduction.....	51
6.1.1	Pricing Basis and Mechanism.....	51
6.1.2	Regional Price Definitions.....	52
6.2	Asia Pacific.....	53
6.2.1	Profitability Projections.....	53
6.2.2	Price Projections.....	55
6.3	United States.....	56
6.3.1	Profitability Projections.....	56
6.3.2	Price Projections.....	58
6.4	Western Europe.....	59
6.4.1	Profitability Projections.....	59
6.4.2	Price Projections.....	61
6.5	Regional Price Spreads.....	62
7	Butadiene Rubber (BR).....	63
7.1	Introduction.....	63
7.1.1	Pricing Basis and Mechanism.....	64
7.1.2	Regional Price Definitions.....	64
7.2	Asia Pacific.....	65
7.2.1	Profitability Projections.....	65
7.2.2	Price Projections.....	67
7.3	United States.....	68
7.3.1	Profitability Projections.....	68
7.3.2	Price Projections.....	70
7.4	Western Europe.....	71
7.4.1	Profitability Projections.....	71
7.4.2	Price Projections.....	73
7.5	Regional Price Spreads.....	74



Figures

Figure 1	Crude Oil Price Scenarios	6
Figure 2	World Economic Performance and Outlook	10
Figure 3	United States GDP Price Deflator	12
Figure 4	Euro Versus US Dollar	13
Figure 5	Petrochemical Simulator Forecast Methodology.....	14
Figure 6	Petrochemical Price Influences	16
Figure 7	Production Cost Elements	17
Figure 8	Price Influences in the Cost Curve	19
Figure 9	Return on Capital and Operating Rate	20
Figure 10	Western Europe Average Return on Investment	21
Figure 11	United States Average Return on Investment.....	21
Figure 12	Petrochemical Industry Profitability and Operating Rate.....	23
Figure 13	Asian Petrochemical Industry Profitability	24
Figure 14	United States Petrochemical Industry Profitability	26
Figure 15	Western Europe Petrochemicals Industry Profitability	28
Figure 16	United States Petrochemical Feedstock and Refined Product Prices	31
Figure 17	United States Petrochemical Feedstock Prices Relative to WTI Crude Oil	31
Figure 18	Global Naphtha Prices.....	32
Figure 19	Global Premium Gasoline Prices	33
Figure 20	Global High Sulphur Fuel Oil Prices	34
Figure 21	Global Natural Gas Prices	35
Figure 22	United States Ethane Prices	36
Figure 23	Global Propane Prices.....	37
Figure 24	China Coal Prices	38
Figure 25	Asia ABS Cash Margins	40
Figure 26	Asian ABS Cost Margin and Price Projections.....	42
Figure 27	SE Asia ABS Price Scenarios	42
Figure 28	United States ABS Margin Projections.....	43
Figure 29	United States ABS Cost Margin and Price Projections	45
Figure 30	United States ABS Price Scenarios	45
Figure 31	Western Europe ABS Margins	46
Figure 32	Western Europe ABS Cost Margin and Price Projections.....	48
Figure 33	Western Europe ABS Price Scenarios	48
Figure 34	Global ABS Prices	49
Figure 35	Asia SBR Margins	53
Figure 36	Asia SBR Cost Margin and Price Projections.....	55
Figure 37	SE Asia SBR Price Scenarios	55
Figure 38	United States SBR Margin Projections.....	56
Figure 39	United States SBR Cost Margin and Price Projections	58
Figure 40	United States SBR Price Scenarios	58
Figure 41	Western Europe SBR Margins	59
Figure 42	Western Europe SBR Cost Margin and Price Projections	61



Figure 43	Western Europe SBR Price Scenarios.....	61
Figure 44	Global SBR Price Projections.....	62
Figure 45	Asia Butadiene Rubber Margins.....	65
Figure 46	SE Asia Butadiene Rubber Cost Margin and Price Projections.....	67
Figure 47	SE Asia Butadiene Rubber Price Scenarios.....	67
Figure 48	United States Butadiene Rubber Margin Projections.....	68
Figure 49	United States Butadiene Rubber Cost Margin and Price Projections.....	70
Figure 50	United States Butadiene Rubber Price Scenarios.....	70
Figure 51	Western Europe Butadiene Rubber Margins.....	71
Figure 52	Western Europe Butadiene Rubber Cost Margin and Price Projections.....	73
Figure 53	Western Europe Butadiene Rubber Price Scenarios.....	73
Figure 54	Global Butadiene Rubber Prices.....	74

Tables

Table 1	World Economic Growth.....	10
Table 2	ABS Profitability and Price Projections.....	40
Table 3	United States ABS Cost Profitability and Price Projections.....	43
Table 4	Western Europe ABS Profitability Projections.....	46
Table 5	Asia SBR Profitability and Price Projections.....	53
Table 6	United States SBR Cost Profitability and Price Projections.....	56
Table 7	Western Europe SBR Cost Profitability and Price Projections.....	59
Table 8	Asia Butadiene Rubber Cost Profitability and Price Projections.....	65
Table 9	United States Butadiene Rubber Profitability and Price Projections.....	68
Table 10	Western Europe Butadiene Rubber Cost Profitability and Price Projections.....	71