

MARKETS AND PROFITABILITY

Profitability Forecast: Butadiene Derivatives - 2018

Global

September 2018



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. 2018. 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	4
2.3.3	Low Crude Oil Price	6
2.3.4	Medium Crude Oil Price	6
2.3.5	High Crude Oil Price	7
2.4	Economic Growth.....	8
2.4.1	Forecasting Methodology/Assumptions	8
2.4.2	Global Economic Growth	8
2.5	Inflation.....	11
2.6	Exchange Rates	12
2.6.1	Forecasting Methodology and Assumptions	12
2.6.2	Outlook for the Euro	12
2.7	Profitability Forecasting Methodology	13
2.7.1	Introduction.....	13
2.7.2	Price Influences.....	14
2.7.3	Petrochemical Production Costs	16
2.7.4	Driving Forces for Profitability	18
2.7.5	Cyclicalities of the Petrochemical Industry	22
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	5
Figure 2	World Economic Performance and Outlook	9
Figure 3	United States GDP Price Deflator	11
Figure 4	Euro : US Dollar Exchange Rate	12
Figure 5	Petrochemical Simulator Forecast Methodology.....	13
Figure 6	Petrochemical Price Influences	15
Figure 7	Production Cost Elements	16
Figure 8	Price Influences in the Cost Curve	18
Figure 9	Petrochemical Industry Return on Capital and Operating Rate Correlation	19
Figure 10	Western Europe Average Return on Investment by Product	20
Figure 11	United States Average Return on Investment by Product.....	20
Figure 12	Petrochemical Industry Profitability and Operating Rate.....	22
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	9
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