

MARKETS AND PROFITABILITY

Profitability Forecast: Polyester & Intermediates - 2019

Global

October 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	Cyclicalities 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	Mono-Ethylene Glycol (MEG).....	39
5.1	Introduction.....	39
5.1.1	Price Basis and Mechanism	39
5.1.2	Regional Pricing Basis	40



5.2	Asia Pacific	41
5.2.1	Profitability Projections	41
5.2.2	Price Projections	44
5.3	United States	45
5.3.1	Profitability Projections	45
5.3.2	Price Projections	48
5.4	Western Europe	49
5.4.1	Profitability Projections	49
5.4.2	Price Projections	52
5.5	Regional Price Spreads	53
6	para-Xylene	54
6.1	Introduction	54
6.1.1	Pricing Basis and Mechanism	55
6.1.2	Regional Price Definitions	55
6.2	Asia Pacific	56
6.2.1	Profitability Projections	56
6.2.2	Price Projections	60
6.3	United States	61
6.3.1	Profitability Projections	61
6.3.2	Price Projections	65
6.4	Western Europe	66
6.4.1	Profitability Projections	66
6.4.2	Price Projections	70
6.5	Regional Price Spreads	71
7	ortho-Xylene	73
7.1	Introduction	73
7.1.1	Pricing Basis and Mechanism	73
7.1.2	Regional Price Definitions	73
7.2	Asia Pacific	74
7.2.1	Profitability Projections	74
7.2.2	Price Projections	74
7.3	United States	75
7.3.1	Profitability Projections	75
7.3.2	Price Projections	75
7.4	Western Europe	76
7.4.1	Profitability Projections	76
7.4.2	Price Projections	76
7.5	Regional Price Spreads	77
8	Purified Terephthalic Acid (PTA)	78
8.1	Introduction	78
8.1.1	Pricing Basis and Mechanism	78
8.1.2	Regional Price Definitions	79
8.2	Asia Pacific	80



8.2.1	Profitability Projections	80
8.2.2	Price Projections	82
8.3	United States	83
8.3.1	Profitability Projections	83
8.3.2	Price Projections	85
8.4	Western Europe	86
8.4.1	Profitability Projections	86
8.4.2	Price Projections	88
8.5	Regional Price Spreads	89
9	Polyethylene Terephthalate (PET)	91
9.1	Introduction	91
9.1.1	Pricing Basis and Mechanism	92
9.1.2	Regional Price Definitions	92
9.2	Asia Pacific	93
9.2.1	Profitability Projections	93
9.2.2	Price Projections	96
9.3	United States	97
9.3.1	Profitability Projections	97
9.3.2	Price Projections	100
9.4	Western Europe	101
9.4.1	Profitability Projections	101
9.4.2	Price Projections	104
9.5	Regional Price Spreads	105

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 MEG Return on Investment and Operating Rate	41
Figure 26	Asia MEG Margins.....	43
Figure 27	NE Asia Mono Ethylene Glycol Cost Margin and Price Projections.....	44
Figure 28	NE Asia MEG Price Scenarios	44
Figure 29	United States MEG Return on Investment and Operating Rate.....	45
Figure 30	United States MEG Cash Margins	45
Figure 31	United States MEG Cost Margin and Price Projections	48
Figure 32	United States MEG Price Scenarios	48
Figure 33	Western Europe MEG Return on Investment and Operating Rate	49
Figure 34	Western Europe MEG Cash Cost Margins.....	51
Figure 35	Western Europe MEG Cost Margin and Price Projections.....	52
Figure 36	Western Europe MEG Price Scenarios	52
Figure 37	Global MEG Prices	53
Figure 38	<i>para</i> -Xylene Plant Configuration	54
Figure 39	Asia <i>para</i> -Xylene Return on Investment and Operating Rate	56
Figure 40	Asia <i>para</i> -Xylene Cash Margins	58
Figure 41	Asia Integrated <i>para</i> -Xylene Cash Margins.....	58
Figure 42	China <i>para</i> -Xylene Cost Margin and Price Projections	60
Figure 43	NE Asia <i>para</i> -Xylene Price Scenarios	60
Figure 44	United States <i>para</i> -Xylene Return on Investment and Operating Rate	62
Figure 45	United States <i>para</i> -Xylene Extraction Cash Margins	62
Figure 46	United States Integrated <i>para</i> -Xylene Cash Margins	63
Figure 47	United States <i>para</i> -Xylene Cost Margin and Price Projections	65
Figure 48	United States <i>para</i> -Xylene Price Scenarios	65
Figure 49	Western Europe <i>para</i> -Xylene Return on Investment and Operating Rate	66
Figure 50	Western Europe <i>para</i> -Xylene Extraction Cash Margins.....	68
Figure 51	Western Europe Integrated <i>para</i> -Xylene Cash Margins	68
Figure 52	Western Europe <i>para</i> -Xylene Cost Margin and Price Projections	70
Figure 53	Western Europe <i>para</i> -Xylene Price Scenarios	70
Figure 54	Global <i>para</i> -Xylene Price Projections.....	71
Figure 55	Asia <i>ortho</i> -Xylene / <i>para</i> -Xylene Price Ratio	74
Figure 56	NE Asia <i>ortho</i> -Xylene Price Scenarios	74
Figure 57	United States Xylene Isomers Prices	75
Figure 58	United States <i>ortho</i> -Xylene Price Scenarios	75
Figure 59	Western Europe <i>ortho</i> -Xylene Price Ratio to Mixed Xylenes	76
Figure 60	Western Europe <i>ortho</i> -Xylene Price Scenarios	76
Figure 61	Global <i>ortho</i> -Xylene Prices.....	77
Figure 62	Asia PTA Margins.....	81
Figure 63	China PTA Cost Margin and Price Projections.....	82



Figure 64	NE Asia PTA Price Scenarios	82
Figure 65	United States PTA Cash Margin Projections.....	84
Figure 66	United States PTA Cost Margin and Price Projections	85
Figure 67	United States PTA Price Scenarios.....	85
Figure 68	Western Europe PTA Margins.....	87
Figure 69	Western Europe PTA Cost Margin and Price Projections	88
Figure 70	Western Europe PTA Price Scenarios	88
Figure 71	Global PTA Price Projections	89
Figure 72	Asia PET Return on Investment and Operating Rate	93
Figure 73	Asia PET Margins.....	95
Figure 74	China PET Cost Margin and Price Projections.....	96
Figure 75	NE Asia PET Price Scenarios	96
Figure 76	United States PET Return on Investment and Operating Rates	97
Figure 77	United States PET Cash Cost Margins	99
Figure 78	United States PET Cost Margin and Price Projections	100
Figure 79	United States PET Price Scenarios.....	100
Figure 80	Western Europe PET Return on Investment and Operating Rate	101
Figure 81	Western Europe PET Margins.....	103
Figure 82	Western Europe PET Cost Margin and Price Projections	104
Figure 83	Western Europe PET Price Scenarios	104
Figure 84	Global PET Price Projections	105

Tables

Table 1	World Economic Growth	10
Table 2	Asia MEG Cost Profitability and Price Projections	43
Table 3	United States MEG Cost Profitability and Price Projections	47
Table 4	Western Europe MEG Cost Profitability and Price Projections	51
Table 5	Asia <i>para</i> -Xylene Cost Profitability and Price Projections	59
Table 6	United States <i>para</i> -Xylene Cost Profitability and Price Projections (Xylenes Isomerisation and Extraction)	63
Table 7	United States Integrated <i>para</i> -Xylene Cost Profitability and Price Projections	64
Table 8	Western Europe <i>para</i> -Xylene Cost Profitability and Price Projections (Xylenes Isomerisation and Extraction)	69
Table 9	Integrated <i>para</i> -Xylene Cost Profitability and Price Projections	69
Table 10	Asia PTA Cost Profitability and Price Projections	81
Table 11	United States PTA Cost Profitability and Price Projections	84
Table 12	Western Europe PTA Cost Profitability and Price Projections	87
Table 13	Asia PET Cost Profitability and Price Projections	95
Table 14	United States PET Cost Profitability and Price Projections	99
Table 15	Western Europe PET Cost Profitability and Price Projections	103