

MARKETS AND PROFITABILITY

Profitability and Price Forecast: Linear Alpha Olefins - 2021

Global

November 2021



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. 2021. All rights reserved.



Contents

1	Executive Summary	1
1.1	Introduction.....	1
2	Economic Assumptions and Forecast 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 Refining 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	Butene-1	39
5.1	Introduction.....	39
5.1.1	Pricing Basis and Mechanism.....	40
5.1.2	Regional Price Definitions	40



5.2	Asia Pacific	41
5.2.1	Profitability and Price Projections	41
5.3	United States	44
5.3.1	Profitability and Price Projections	44
5.4	Western Europe	47
5.4.1	Profitability and Price Projections	47
5.5	Regional Price Spreads	49
6	Hexene-1	50
6.1	Introduction	50
6.1.1	Pricing Basis and Mechanism	50
6.1.2	Regional Price Definitions	50
6.2	Asia Pacific	51
6.2.1	Profitability and Price Projections	51
6.3	United States	53
6.3.1	Profitability and Price Projections	53
6.4	Western Europe	55
6.4.1	Profitability and Price Projections	55
6.5	Regional Price Spreads	57
7	Octene-1	58
7.1	Introduction	58
7.1.1	Pricing Basis and Mechanism	58
7.1.2	Regional Price Definitions	58
7.2	Asia Pacific	59
7.2.1	Profitability and Price Projections	59
7.3	United States	61
7.3.1	Profitability and Price Projections	61
7.4	Western Europe	63
7.4.1	Profitability and Price Projections	63
7.5	Regional Price Spreads	65

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 U.S. 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 Pacific Butene-1 Cash Cost Margin	41
Figure 26	Asia Pacific Butene-1 Cost, Margin and Price Projections.....	43
Figure 27	Asia Pacific Butene-1 Price Forecast Scenarios	43
Figure 28	United States Butene-1 Cash Cost Margins.....	44
Figure 29	United States Butene-1 Cost Margin and Price Projections.....	46
Figure 30	United States Butene-1 Price Forecast Scenarios	46
Figure 31	Western Europe Butene-1 Margins	47
Figure 32	Western Europe Butene-1 Cost, Margin and Price Projections	48
Figure 33	Western Europe Butene-1 Price Forecast Scenarios	48
Figure 34	Global Butene-1 Prices.....	49
Figure 35	South-East Asia Hexene-1 Margins	51
Figure 36	Asia Pacific Hexene-1 Cost Margin and Price Projections.....	52
Figure 37	Asia Pacific Hexene-1 Price Forecast Scenarios	52
Figure 38	United States Hexene-1 Margins	53
Figure 39	United States Hexene-1 Cost Margin and Price Projections.....	54
Figure 40	United States Hexene-1 Price Forecast Scenarios	54
Figure 41	Western Europe Hexene-1 Margins	55
Figure 42	Western Europe Hexene-1 Cost Margin and Price Projections	56
Figure 43	Western Europe Hexene-1 Price Forecast Scenarios	56
Figure 44	Global Hexene-1 Prices.....	57
Figure 45	South-East Asia Octene-1 Margins	59
Figure 46	Asia Pacific Octene-1 Cost Margin and Price Projections	60
Figure 47	Asia Pacific Octene-1 Price Forecast Scenarios	60
Figure 48	United States Octene-1 Margins	61
Figure 49	United States Octene-1 Cost Margin and Price Projections	62
Figure 50	United States Octene-1 Price Forecast Scenarios	62
Figure 51	Western Europe Octene-1 Margins	63
Figure 52	Western Europe Octene-1 Cost Margin and Price Projections	64
Figure 53	Western Europe Octene-1 Price Forecast Scenarios	64
Figure 54	Global Octene-1 Prices	65



Tables

Table 1	World Economic Growth	10
Table 2	Asia Pacific Butene-1 Profitability and Price Projections	41
Table 3	United States Butene-1 Profitability and Price Projections	44
Table 4	Western Europe Butene-1 Profitability and Price Projections	47
Table 5	Asia Pacific Hexene-1 Profitability and Price Projections	51
Table 6	United States Hexene-1 Profitability and Price Projections	53
Table 7	Western Europe Hexene-1 Profitability and Price Projections	55
Table 8	Asia Pacific Octene-1 Profitability and Price Projections	59
Table 9	United States Octene-1 Profitability and Price Projections	61
Table 10	Western Europe Octene-1 Profitability and Price Projections	63