

MARKETS AND PROFITABILITY

Profitability and Price Forecast: Acrylonitrile - 2023

October 2023



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 (BVI) Ltd. 2023. 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	7
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	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	25
3.1	Asia Pacific.....	25
3.2	United States.....	27
3.3	Western Europe	29
4	Petrochemical Feedstocks and Refining Products Pricing	31
4.1	Naphtha	33
4.2	Gasoline	34
4.3	Fuel Oil	35
4.4	Natural Gas	36
4.5	Ethane	38
4.6	Propane.....	39
4.7	Coal	40
4.8	Carbon Costs	41
5	Acrylonitrile (ACN)	42
5.1	Introduction.....	42
5.1.1	Pricing Basis and Mechanism	42



5.1.2	Regional Price Definitions	42
5.2	Asia Pacific	44
5.2.1	Profitability Projections	44
5.2.2	Price Projections	47
5.3	United States	48
5.3.1	Profitability Projections	48
5.3.2	Price Projections	51
5.4	Western Europe	53
5.4.1	Profitability Projections	53
5.4.2	Price Projections	55
5.5	Regional Price Spreads	56



Figures

Figure 1	Crude Oil Price Scenarios	6
Figure 2	World Economic Performance and Outlook	9
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	25
Figure 14	United States Petrochemical Industry Profitability	27
Figure 15	Western Europe Petrochemicals Industry Profitability	29
Figure 16	United States Petrochemical Feedstock and Refined Product Prices	32
Figure 17	United States Petrochemical Feedstock Prices Relative to WTI Crude Oil	32
Figure 18	Global Naphtha Prices	33
Figure 19	Global Premium Gasoline Prices	34
Figure 20	Global High Sulphur Fuel Oil Prices	35
Figure 21	Global Natural Gas Prices	36
Figure 22	United States Ethane Prices	38
Figure 23	Global Propane Prices	39
Figure 24	China Coal Prices	40
Figure 25	EU Emissions Trading Scheme Cost of Carbon	41
Figure 26	China Acrylonitrile Return On Investment	44
Figure 27	China Acrylonitrile Margins	46
Figure 28	China Acrylonitrile Cost Margin and Price Projections	47
Figure 29	North-East Asia Acrylonitrile Price Scenarios	47
Figure 30	United States Acrylonitrile Return on Investment and Operating Rates	48
Figure 31	United States Acrylonitrile Margins	49
Figure 32	United States Acrylonitrile Cost Margin and Price Projections	51
Figure 33	United States Acrylonitrile Domestic and Export Price Projections	51
Figure 34	United States Acrylonitrile Price Scenarios	52
Figure 35	Western Europe Acrylonitrile Return on Investment and Operating Rates	53
Figure 36	Western Europe Acrylonitrile Cash Cost Margins	54
Figure 37	Western Europe Acrylonitrile Cost Margin and Price Projections	55
Figure 38	Western Europe Acrylonitrile Price Scenarios	55
Figure 39	Global Acrylonitrile Prices	56

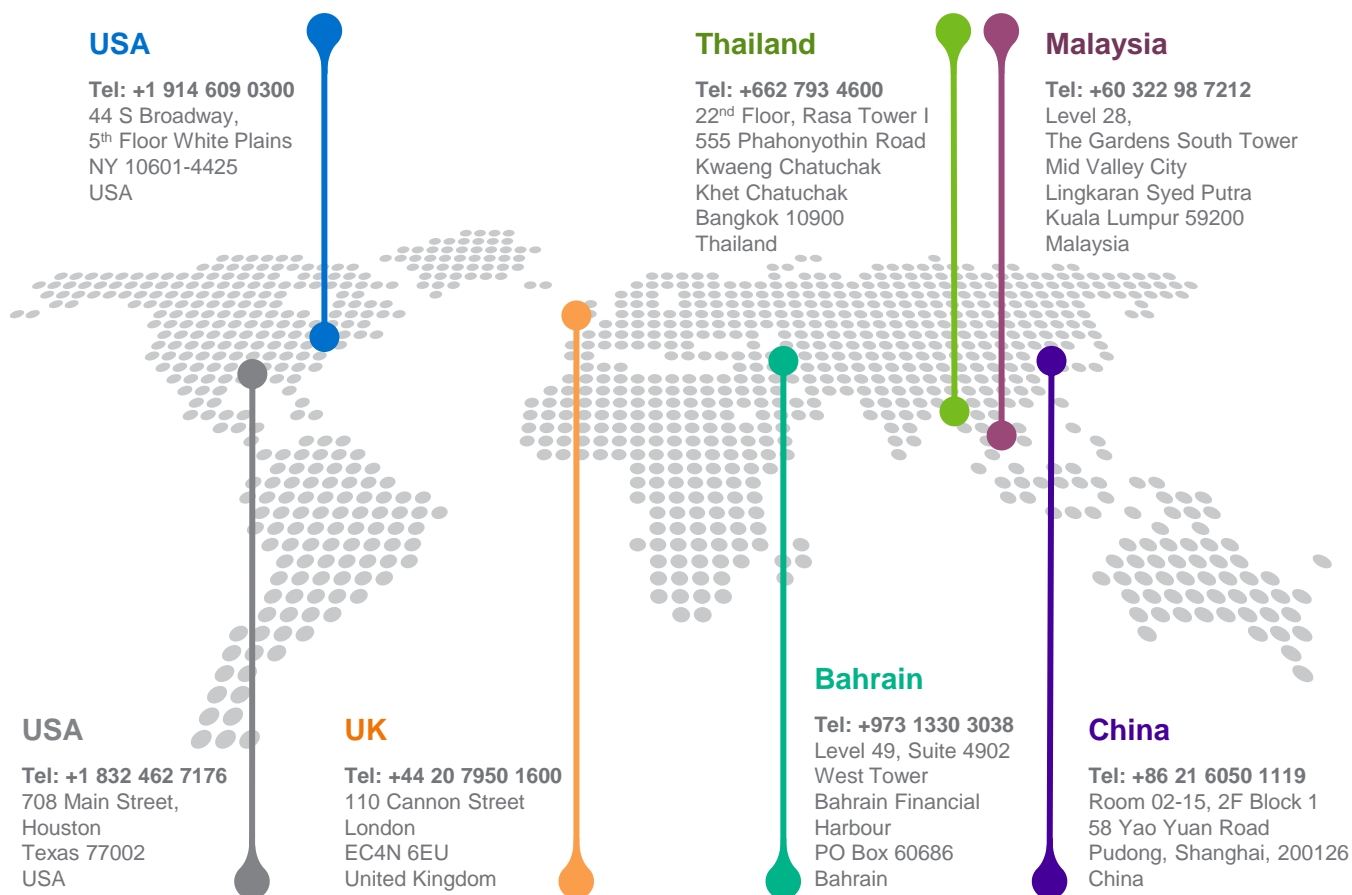
Tables



Table 1	World Economic Growth.....	9
Table 2	China Acrylonitrile Cost Profitability and Price Projections	46
Table 3	United States Acrylonitrile Cost Profitability and Price Projections	49
Table 4	Western Europe Acrylonitrile Cost Profitability and Price Projections	54



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.