

## MARKETS AND PROFITABILITY

# Market Insights: Ethoxylates 2021

April 2021



This Report was prepared by NexantECA Energy & Chemicals Advisory ("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  |
| 2       | Introduction .....                          | 8  |
| 2.1     | Overview .....                              | 8  |
| 2.1.1   | Alcohol ethoxylates (AE).....               | 9  |
| 2.1.2   | Alkylphenol ethoxylates (APE).....          | 9  |
| 2.1.3   | Other ethoxylates.....                      | 9  |
| 2.1.3.1 | Fatty acid ethoxylates.....                 | 9  |
| 2.1.3.2 | Methyl ester ethoxylates (MEEs).....        | 9  |
| 2.1.3.3 | Other .....                                 | 9  |
| 2.2     | Business Structure.....                     | 10 |
| 2.3     | End-Use Sectors.....                        | 13 |
| 2.4     | Types of Ethoxylates .....                  | 14 |
| 2.4.1   | Alkylphenol Ethoxylates (APE) .....         | 15 |
| 2.4.2   | Alcohol Ethoxylates (AE) .....              | 15 |
| 2.4.3   | Fatty Acid Ethoxylates .....                | 17 |
| 2.4.4   | Others .....                                | 17 |
| 2.5     | Market Entry Considerations .....           | 21 |
| 2.6     | Feedstocks.....                             | 22 |
| 2.6.1   | Alcohols .....                              | 22 |
| 2.6.2   | Alkyl Phenol .....                          | 22 |
| 2.6.3   | Fatty Acids .....                           | 23 |
| 2.6.4   | Ethylene Oxide (EO).....                    | 24 |
| 2.7     | Products and Specifications .....           | 26 |
| 3       | Market Outlook.....                         | 27 |
| 3.1     | Global.....                                 | 27 |
| 3.1.1   | Market Overview .....                       | 27 |
| 3.1.2   | Market Drivers.....                         | 29 |
| 3.1.3   | Key Trends.....                             | 30 |
| 3.1.3.1 | Intermaterial Substitution.....             | 30 |
|         | Linear Alkylbenzene Sulfonate (LAS).....    | 31 |
|         | Alpha Olefin Sulfonates (AOS) .....         | 31 |
|         | Methyl Ester Sulfonate (MES) .....          | 32 |
|         | Biobased Surfactants.....                   | 32 |
| 3.1.3.2 | Sustainability and “Green” Surfactants..... | 32 |
| 3.1.3.3 | Reduced detergent use per wash .....        | 33 |
| 3.1.3.4 | Enzymes.....                                | 33 |
| 3.1.3.5 | Regulations.....                            | 33 |
| 3.1.3.6 | Impact of COVID-19 .....                    | 34 |
| 3.1.4   | Competitive Landscape .....                 | 34 |
| 3.1.5   | Supply and Demand .....                     | 36 |
| 3.2     | Asia Pacific excluding China.....           | 39 |



|         |                                    |    |
|---------|------------------------------------|----|
| 3.2.1   | Market Overview .....              | 39 |
| 3.2.2   | Competitive Landscape .....        | 40 |
| 3.2.2.1 | Upstream Supply Developments ..... | 40 |
|         | Detergent Alcohol .....            | 40 |
|         | Ethylene Oxide .....               | 40 |
| 3.2.2.2 | Ethoxylates Supply .....           | 40 |
| 3.2.3   | Supply, Demand and Trade .....     | 42 |
| 3.3     | China.....                         | 43 |
| 3.3.1   | Market Overview .....              | 43 |
| 3.3.2   | Competitive Landscape .....        | 43 |
| 3.3.2.1 | Upstream Supply Developments ..... | 43 |
|         | Detergent Alcohol .....            | 43 |
|         | Ethylene Oxide .....               | 43 |
| 3.3.2.2 | Ethoxylates Supply .....           | 43 |
| 3.3.3   | Supply, Demand and Trade.....      | 45 |
| 3.4     | North America .....                | 46 |
| 3.4.1   | Market Overview .....              | 46 |
| 3.4.2   | Competitive Landscape .....        | 46 |
| 3.4.2.1 | Upstream Supply Developments ..... | 46 |
|         | Detergent Alcohol .....            | 46 |
|         | Ethylene Oxide .....               | 46 |
| 3.4.2.2 | Ethoxylates Supply .....           | 47 |
| 3.4.3   | Supply, Demand, and Trade.....     | 49 |
| 3.5     | South America .....                | 50 |
| 3.5.1   | Market Overview .....              | 50 |
| 3.5.2   | Competitive Landscape .....        | 50 |
| 3.5.2.1 | Upstream Supply Developments ..... | 50 |
|         | Detergent Alcohol .....            | 50 |
|         | Ethylene Oxide .....               | 50 |
| 3.5.2.2 | Ethoxylates Supply .....           | 50 |
| 3.5.3   | Supply, Demand, and Trade.....     | 51 |
| 3.6     | Western Europe .....               | 52 |
| 3.6.1   | Market Overview .....              | 52 |
| 3.6.2   | Competitive Landscape .....        | 52 |
| 3.6.2.1 | Upstream Supply Developments ..... | 52 |
| 3.6.2.2 | Ethoxylates Supply .....           | 52 |
| 3.6.3   | Supply, Demand and Trade.....      | 55 |
| 3.7     | Central Europe.....                | 56 |
| 3.7.1   | Market Overview .....              | 56 |
| 3.7.2   | Competitive Landscape .....        | 56 |
| 3.7.2.1 | Upstream Supply Developments ..... | 56 |
| 3.7.2.2 | Ethoxylates Supply .....           | 56 |
| 3.7.3   | Supply, Demand and Trade.....      | 57 |
| 3.8     | Eastern Europe .....               | 58 |



|          |                                      |    |
|----------|--------------------------------------|----|
| 3.8.1    | Market Overview .....                | 58 |
| 3.8.2    | Competitive Landscape .....          | 58 |
| 3.8.2.1  | Upstream Supply Developments .....   | 58 |
| 3.8.2.2  | Ethoxylates Supply .....             | 58 |
| 3.8.3    | Supply, Demand and Trade .....       | 59 |
| 3.9      | Middle East .....                    | 60 |
| 3.9.1    | Market Overview .....                | 60 |
| 3.9.2    | Competitive Landscape .....          | 60 |
| 3.9.2.1  | Upstream Supply Developments .....   | 60 |
| 3.9.2.2  | Ethoxylates Supply .....             | 61 |
| 3.9.3    | Supply, Demand and Trade .....       | 62 |
| 3.10     | Africa .....                         | 63 |
| 3.10.1   | Market Overview .....                | 63 |
| 3.10.2   | Competitive Landscape .....          | 63 |
| 3.10.2.1 | Upstream Supply Developments .....   | 63 |
|          | Detergent Alcohol .....              | 63 |
|          | Ethylene Oxide .....                 | 63 |
| 3.10.2.2 | Ethoxylates Supply .....             | 63 |
| 3.10.3   | Supply, Demand and Trade .....       | 64 |
| 4        | Pricing .....                        | 65 |
| 4.1      | Historical Feedstock Pricing .....   | 65 |
| 4.1.1    | Detergent Alcohols .....             | 65 |
| 4.1.1.1  | Synthetic Alcohols .....             | 66 |
| 4.1.2    | Alkyl Phenol (APE) .....             | 66 |
| 4.1.3    | Fatty Acids .....                    | 66 |
| 4.1.4    | Ethylene Oxide .....                 | 66 |
| 4.2      | Ethoxylates Pricing .....            | 66 |
| 5        | Cost Competitiveness .....           | 68 |
| 5.1      | Cost Structure and Assumptions ..... | 68 |
| 5.1.1    | Variable Costs .....                 | 69 |
| 5.1.1.1  | Feedstock Costs .....                | 69 |
| 5.1.1.2  | Utility Costs .....                  | 70 |
| 5.1.1.3  | Co-product Credits .....             | 70 |
| 5.1.2    | Direct Fixed Costs .....             | 70 |
| 5.1.3    | Allocated Fixed Costs .....          | 71 |
| 5.1.4    | Other Considerations .....           | 72 |
| 5.2      | Cost Competitiveness .....           | 73 |
| 5.2.1    | Overview .....                       | 73 |
| 5.2.2    | Regional .....                       | 73 |
| 5.2.3    | Degree of Ethoxylation .....         | 74 |
| 6        | Porters Five Forces .....            | 75 |



## Figures

|           |                                                                                 |    |
|-----------|---------------------------------------------------------------------------------|----|
| Figure 1  | Representation of a Model Surfactant Molecule .....                             | 8  |
| Figure 2  | Example of an Ethoxylate: C <sub>12</sub> Fatty Alcohol Ethoxylate (5 EO) ..... | 8  |
| Figure 3  | Global Ethoxylate Demand by Derivative, 2020 .....                              | 8  |
| Figure 4  | Ethoxylation Value Chain and Key Players .....                                  | 10 |
| Figure 5  | Relative Weight and Value of Surfactants in Typical Detergents .....            | 11 |
| Figure 6  | Major Players in Ethoxylation Business and Level of Integration .....           | 12 |
| Figure 7  | Ethoxylates Global Demand by End-Use Sector .....                               | 13 |
| Figure 8  | Nonylphenol Ethoxylate .....                                                    | 15 |
| Figure 9  | Various Alcohol Ethoxylate Structures .....                                     | 16 |
| Figure 10 | Etymology of Detergent Alcohol Names .....                                      | 16 |
| Figure 11 | Fatty Acid Ethoxylates .....                                                    | 17 |
| Figure 12 | Methyl Ester Ethoxylates .....                                                  | 18 |
| Figure 13 | Alkyl Amine Ethoxylates .....                                                   | 18 |
| Figure 14 | Ethylene Diamine-based EO/PO Product .....                                      | 18 |
| Figure 15 | EO/PO Copolymer (Central PEG Block) .....                                       | 18 |
| Figure 16 | Sodium Diethoxylated Alkyl Phosphate .....                                      | 19 |
| Figure 17 | Example of a Glycerol Ester .....                                               | 19 |
| Figure 18 | Polyoxyethylene Sorbitan Stearate .....                                         | 19 |
| Figure 19 | Example of Fat Splitting Reaction .....                                         | 23 |
| Figure 20 | Natural Oil Component by Carbon Number .....                                    | 23 |
| Figure 21 | Global Demand of Ethylene Oxide by Derivatives .....                            | 24 |
| Figure 22 | Ethylene Oxide Derivatives Value Chain .....                                    | 24 |
| Figure 23 | Global Ethoxylates Demand by Derivative, 2020 .....                             | 27 |
| Figure 24 | Global Ethoxylate Demand by Region, 2020 .....                                  | 28 |
| Figure 25 | Consumption per capita of detergents in different regions .....                 | 29 |
| Figure 26 | Sensitivity of ethoxylate end-use segments to economic performance .....        | 29 |
| Figure 27 | Inter-material Competition .....                                                | 30 |
| Figure 28 | Formation of 1,4-dioxane Through Ethoxylation .....                             | 33 |
| Figure 29 | Global Ethoxylation Capacity by Region .....                                    | 34 |
| Figure 30 | Global Capacity Share by Producer .....                                         | 35 |
| Figure 31 | Global Ethoxylate Supply, Demand, and Trade .....                               | 37 |
| Figure 32 | Global Ethoxylate Net Trade .....                                               | 38 |
| Figure 33 | China Ethoxylation Capacity by Producer .....                                   | 41 |
| Figure 34 | Asia excl. China Ethoxylates Supply, Demand and Net Trade .....                 | 42 |
| Figure 35 | China Ethoxylation Capacity by Producer .....                                   | 44 |
| Figure 36 | China Ethoxylate Supply, Demand, and Trade .....                                | 45 |
| Figure 37 | North America Ethoxylation Capacity by Producer .....                           | 48 |
| Figure 38 | North America Ethoxylate Supply, Demand, and Trade .....                        | 49 |
| Figure 39 | South America Ethoxylate Supply, Demand, and Trade .....                        | 51 |
| Figure 40 | Western Europe Ethoxylation Capacity by Producer .....                          | 53 |
| Figure 41 | Western Europe Ethoxylate Supply, Demand, and Trade .....                       | 55 |
| Figure 42 | Central Europe Ethoxylate Supply, Demand, and Trade .....                       | 57 |



|           |                                                                                 |    |
|-----------|---------------------------------------------------------------------------------|----|
| Figure 43 | Eastern Europe Ethoxylate Supply, Demand, and Trade .....                       | 59 |
| Figure 44 | Middle East Ethoxylate Supply, Demand, and Trade .....                          | 62 |
| Figure 45 | Africa Ethoxylate Supply, Demand, and Trade .....                               | 64 |
| Figure 46 | Palm Kernel Oil Production .....                                                | 65 |
| Figure 47 | Components of Production Cost .....                                             | 68 |
| Figure 48 | Regional Cost Competitiveness .....                                             | 73 |
| Figure 49 | Cost Competitiveness of Ethoxylates with Different Degree of Ethoxylation ..... | 74 |
| Figure 50 | Porters Five Forces .....                                                       | 75 |

## Tables

|          |                                                                 |    |
|----------|-----------------------------------------------------------------|----|
| Table 1  | Type of Ethoxylate and typical end-use .....                    | 14 |
| Table 2  | Summary of Key Market Considerations .....                      | 21 |
| Table 3  | Global Ethoxylate Demand by Region .....                        | 28 |
| Table 4  | Properties of Surfactants .....                                 | 31 |
| Table 5  | Global Ethoxylate Demand by Region .....                        | 36 |
| Table 6  | Global Ethoxylate Supply, Demand, and Trade .....               | 37 |
| Table 7  | Asia excl. China Ethoxylation Capacity by Producer .....        | 41 |
| Table 8  | Asia excl. China Ethoxylates Supply, Demand and Net Trade ..... | 42 |
| Table 9  | China Ethoxylation Capacity by Producer .....                   | 44 |
| Table 10 | China Ethoxylate Supply, Demand, and Trade .....                | 45 |
| Table 11 | North America Ethoxylation Capacity by Producer .....           | 48 |
| Table 12 | North America Ethoxylate Supply, Demand, and Trade .....        | 49 |
| Table 13 | South America Ethoxylation Capacity by Producer .....           | 50 |
| Table 14 | South America Ethoxylate Supply, Demand, and Trade .....        | 51 |
| Table 15 | Ethoxylation Capacities in Western Europe in 2020 .....         | 54 |
| Table 16 | Western Europe Ethoxylate Supply, Demand, and Trade .....       | 55 |
| Table 17 | Central Europe Ethoxylate Supply, Demand, and Trade .....       | 57 |
| Table 18 | Eastern Europe Ethoxylation Capacity by Producer .....          | 58 |
| Table 19 | Eastern Europe Ethoxylate Supply, Demand, and Trade .....       | 59 |
| Table 20 | Middle East Ethoxylation Capacity by Producer .....             | 61 |
| Table 21 | Middle East Ethoxylate Supply, Demand, and Trade .....          | 62 |
| Table 22 | Africa Ethoxylate Supply, Demand, and Trade .....               | 64 |
| Table 23 | Feedstock Price Assumptions .....                               | 69 |
| Table 24 | Utility Rates .....                                             | 70 |
| Table 25 | Wage Assumptions .....                                          | 71 |
| Table 26 | Capital Cost Location Factors .....                             | 71 |