

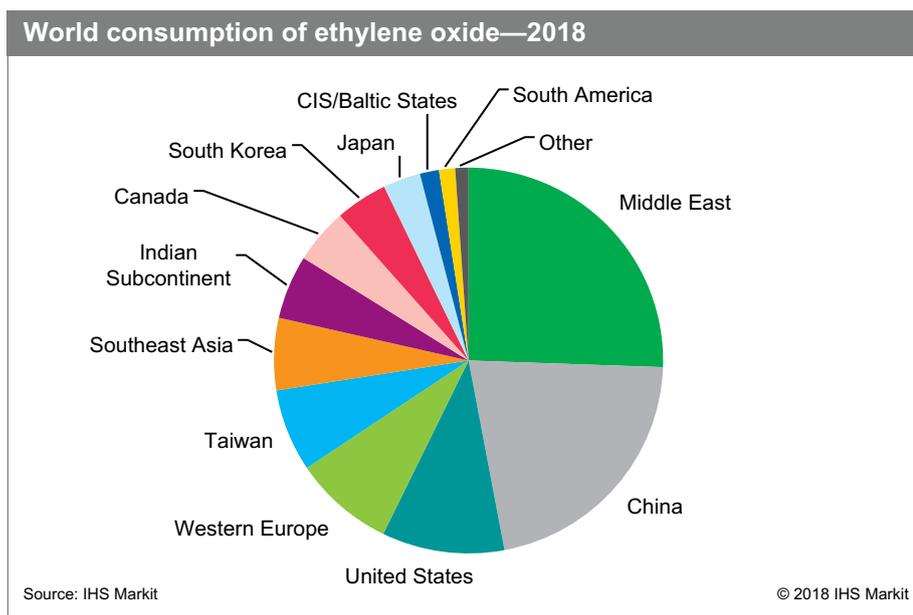
# Ethylene Oxide

15 October 2018

## Abstract

Ethylene oxide (EO) is a basic chemical produced primarily by the catalytic oxidation of ethylene. It is a chemical intermediate that cannot be directly used and is further reacted to produce a wide spectrum of products. Ethylene glycols (mono-, di-, triethylene glycol) constitute by far the single-largest outlet for ethylene oxide, accounting for about 65% of the EO market in 2018. Other dominant end uses include higher-value derivatives such as ethoxylates, ethanolamines, glycol ethers, polyethylene glycol, and polyether polyols.

The following pie chart shows world consumption of ethylene oxide:



As of 2018, EO was produced primarily in Northeast Asia, the Middle East, and North America, accounting for a combined 77% of global production. In these three regions, a significant portion of the producers are forward-integrated into the production of MEG and the EO consumption pattern is therefore broadly similar to the MEG production footprint globally.

The Middle East was quite active between 2005 and 2010, with new EO capacity additions. The region was capitalizing on the availability of extremely cheap ethane to competitively produce ethylene and downstream ethylene derivatives, including ethylene oxide. But the pace of new additions in the Middle East has slowed with a clear shift in new capacity going to North America. Between the late 1990s and the late 2000s, North America lost significant momentum on the back of new large-scale EO capacity commissioning in the Middle East and Northeast Asia. In the United States, EO/EG producers had lost their competitive edge because of higher raw material costs and aging production units. Over the last

## Contacts

**Koon-Ling Ring** · [Koon-Ling.ring@ihsmarkit.com](mailto:Koon-Ling.ring@ihsmarkit.com)  
**Maria deGuzman** · [Maria.deguzman@ihsmarkit.com](mailto:Maria.deguzman@ihsmarkit.com)

decade, the net EO capacity change was therefore negative in North America. The advent of shale gas production in the region has changed the state of the US and North American petrochemical industry. Natural gas liquids coproduced along with natural gas (ethane and propane, essentially) are now competitively priced feedstock readily available to the petrochemical industry. As a result, the new petrochemical project pipeline has significantly picked up in North America and new EO capacity will be started up through 2023.

Overall demand for ethylene oxide is tied to the general economy and has been increasingly linked to emerging countries, where the improvement in living standards is driving an increasing usage of a broad spectrum of polymers and chemicals that are further used for the production of packaging, films, textile fibers, soaps, detergents, etc. Over the coming five years, overall demand for ethylene oxide is expected to increase further, fueled primarily by an incremental demand for polyester products, antifreeze, polyurethanes, soaps, detergents, etc. in emerging regions.

Like all other petrochemicals, the ethylene oxide industry is cyclical, with the equilibrium between supply and demand driving the state of the industry. In times of large concomitant new capacity commissioning, operating rates generally go down and margins contract because of increased competition among producers. As margins remain under pressure, no new capacity is built (trough conditions). When demand gradually catches up with production, operating rates firm up and margins expand. This is when the next wave of capacity is generally planned (and the next cycle begins). Peak conditions were prominent within the ethylene oxide industry between 2011 and 2015, but the ethylene oxide industry is currently facing five years of forecast oversupply, which will inevitably put pressure on operating rates. These conditions will be related to new capacity increasing faster than demand. The slowdown in EO demand growth will also further exacerbate the supply glut seen in the industry.

# Contents

<b>Executive summary</b>	<b>6</b>
<b>Summary</b>	<b>8</b>
<b>Introduction</b>	<b>12</b>
<b>Manufacturing processes</b>	<b>13</b>
Direct oxidation	13
Biomass-to-EO/EG	15
– Bio-based ethanol-to-ethylene	15
– Other bio-based routes	16
Coal-to-MEG	16
Chlorohydrin process	17
<b>Health and environmental issues</b>	<b>19</b>
<b>Supply and demand by region</b>	<b>20</b>
World	20
– World capacity	20
– Producing companies	21
– Salient statistics	23
– Consumption	24
– Monoethylene glycol	27
– Diethylene and triethylene glycols	28
– Polyethylene glycols	29
– Ethoxylates	30
– Ethanolamines	31
– Glycol ethers	32
– Polyether polyols	33
– Other	33
– Price	34
– Trade	34
North America	36
– Overview	36
– Salient statistics	37
– Consumption	37
– Trade	39
– United States	40
– Producing companies	40
– Salient statistics	43
– Consumption	43
– Monoethylene glycol	44
– Diethylene, triethylene, and polyethylene glycol	45
– Ethoxylates	45
– Ethanolamines	46

– Glycol ethers	46
– Polyether polyols	46
– Other	46
– Trade	46
– Canada	47
– Producing companies	47
– Salient statistics	49
– Consumption	50
– Trade	51
– Mexico	52
– Producing companies	52
– Salient statistics	53
– Consumption	54
– Trade	56
South America	56
– Producing companies	56
– Salient statistics	57
– Consumption	58
– Trade	60
Western Europe	61
– Producing companies	61
– Salient statistics	64
– Consumption	65
– Monoethylene glycol	67
– Diethylene, triethylene, and polyethylene glycols	67
– Ethoxylates	68
– Ethanolamines	68
– Trade	69
Central Europe	69
– Producing companies	69
– Salient statistics	70
– Consumption	71
– Trade	73
CIS and Baltic States	74
– Producing companies	74
– Salient statistics	75
– Consumption	76
– Trade	78
Middle East	79
– Producing companies	79
– Salient statistics	82
– Consumption	83
– Trade	85

Africa	86
– Producing companies	86
– Salient statistics	86
– Consumption	87
– Trade	87
Indian Subcontinent	87
– Producing companies	87
– Salient statistics	89
– Consumption	89
– Trade	91
Northeast Asia	91
– Overview	91
– Salient statistics	92
– Consumption	93
– Trade	95
– China	95
– Producing companies	95
– Salient statistics	98
– Consumption	99
– Monoethylene glycol	101
– Polyethylene glycols	102
– Ethoxylates	102
– Ethanolamines	103
– Polyether polyols	103
– Trade	103
– Japan	104
– Producing companies	104
– Salient statistics	105
– Consumption	106
– Trade	107
– South Korea	108
– Producing companies	108
– Salient statistics	109
– Consumption	110
– Trade	112
– Taiwan	113
– Producing companies	113
– Salient statistics	114
– Consumption	115
– Trade	116
Southeast Asia	116
– Producing companies	116
– Salient statistics	118

– Consumption	119
– Trade	121
<b>Additional resources</b>	<b>123</b>
<b>Revisions</b>	<b>124</b>

## IHS Markit Customer Care

CustomerCare@ihsmarkit.com

Americas: +1 800 IHS CARE (+1 800 447 2273)

Europe, Middle East, and Africa: +44 (0) 1344 328 300

Asia and the Pacific Rim: +604 291 3600

---

### Disclaimer

The information contained in this report is confidential. Any unauthorized use, disclosure, reproduction, or dissemination, in full or in part, in any media or by any means, without the prior written permission of IHS Markit Ltd. or any of its affiliates ("IHS Markit") is strictly prohibited. IHS Markit owns all IHS Markit logos and trade names contained in this report that are subject to license. Opinions, statements, estimates, and projections in this report (including other media) are solely those of the individual author(s) at the time of writing and do not necessarily reflect the opinions of IHS Markit. Neither IHS Markit nor the author(s) has any obligation to update this report in the event that any content, opinion, statement, estimate, or projection (collectively, "information") changes or subsequently becomes inaccurate. IHS Markit makes no warranty, expressed or implied, as to the accuracy, completeness, or timeliness of any information in this report, and shall not in any way be liable to any recipient for any inaccuracies or omissions. Without limiting the foregoing, IHS Markit shall have no liability whatsoever to any recipient, whether in contract, in tort (including negligence), under warranty, under statute or otherwise, in respect of any loss or damage suffered by any recipient as a result of or in connection with any information provided, or any course of action determined, by it or any third party, whether or not based on any information provided. The inclusion of a link to an external website by IHS Markit should not be understood to be an endorsement of that website or the site's owners (or their products/services). IHS Markit is not responsible for either the content or output of external websites. Copyright © 2018, IHS Markit™. All rights reserved and all intellectual property rights are retained by IHS Markit.

