

Turning Waste into Value

*The GCC Journey towards
the foreground*

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Agenda

- **Capturing the Value of the Flared Gas**
- Ethylene Capacity Growth Trajectory & Global Position
- Changing Feedstock Mix
- Future Growth Dimension
 - Capacity Expansion
 - Products Diversification Drive
- Concluding Remarks

Capturing the Value of Flared Gas

A key enabler in the development of the GCC chemical industry was in large part due to capturing the value of associated gas, significant of which use to be flared!



Country	1973		1980		1993	
	Flared Gas (Bn m ³)	Share of Total Gas Produced	Flared Gas (Bn m ³)	Share of Total Gas Produced	Flared Gas (Bn m ³)	Share of Total Gas Produced
Kuwait	9.33	57%	1.42	16%	0.5	14%
Qatar	4.63	75%	1.19	19%	-	-
Saudi Arabia	37.99	86%	38.37	72%	11.7	18%
UAE	12.44	91%	9.58	54%	0.84	2%
Sub-total	64.39	80%	50.56	59%	13.04	12%

- *By turning **waste** into **value**, the GCC Chemical Industry was developed, thereby changing the region from an **economical**, **social** and **environmental** perspective*

Capturing the Value of Flared Gas

The 'Associated Gas' is an ethane-rich gas, which is the source of the petrochemical industry's most versatile and favorable feedstock: Ethylene

Country	Gas Reserves at the end of 2017 (Trillion cubic feet)	Type	Ethane Content (Vol. %)
 Qatar	879.9	Non-associated	5.3
 Saudi Arabia	283.8	61% Associated 39% Non-associated	16.7 4.5
 UAE	209.7	Primarily associated	10
 Kuwait	59.9	Associated	17.2
 Oman	23.5	88% non-associated	5.6

The availability of the ethane-rich gas in KSA, UAE and Kuwait rendered the 3 countries leaders in the ethylene value chain production



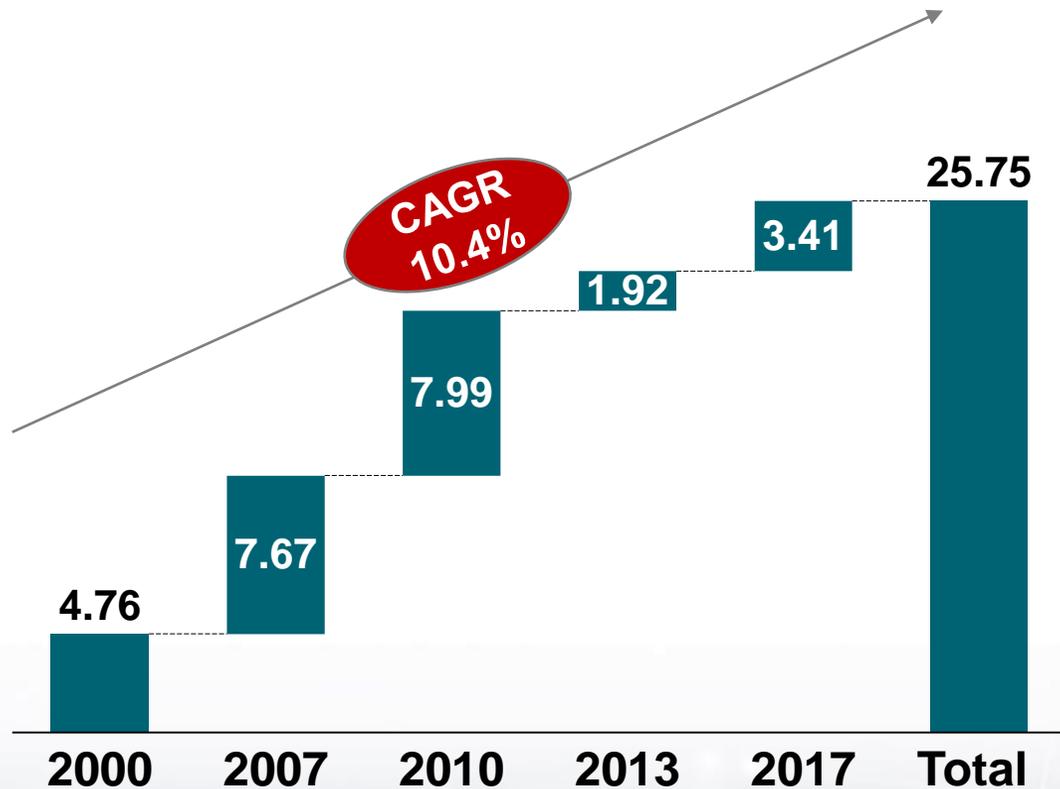
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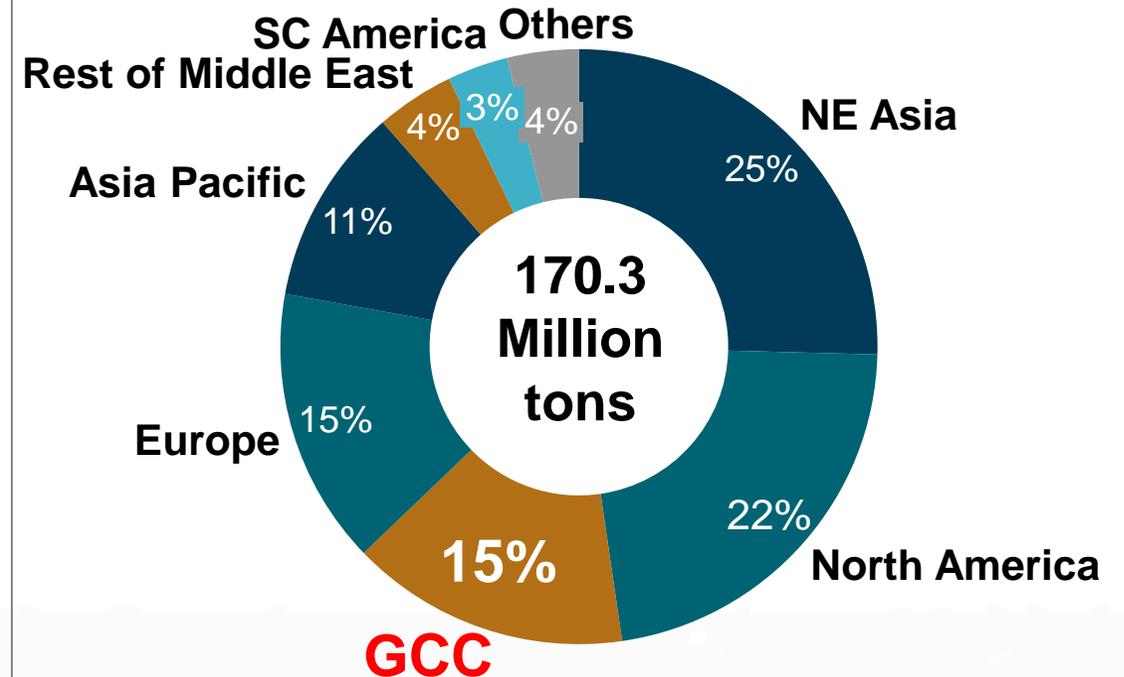
Ethylene Growth Trajectory & Global Position

The Ethylene production capacity in the GCC has grown exponentially, rendering the region a leading global production hub with a global share of 15%

**GCC Ethylene Capacity Growth, 2000-2017
(million tons)**



Global Ethylene Capacity – By Region (2017)



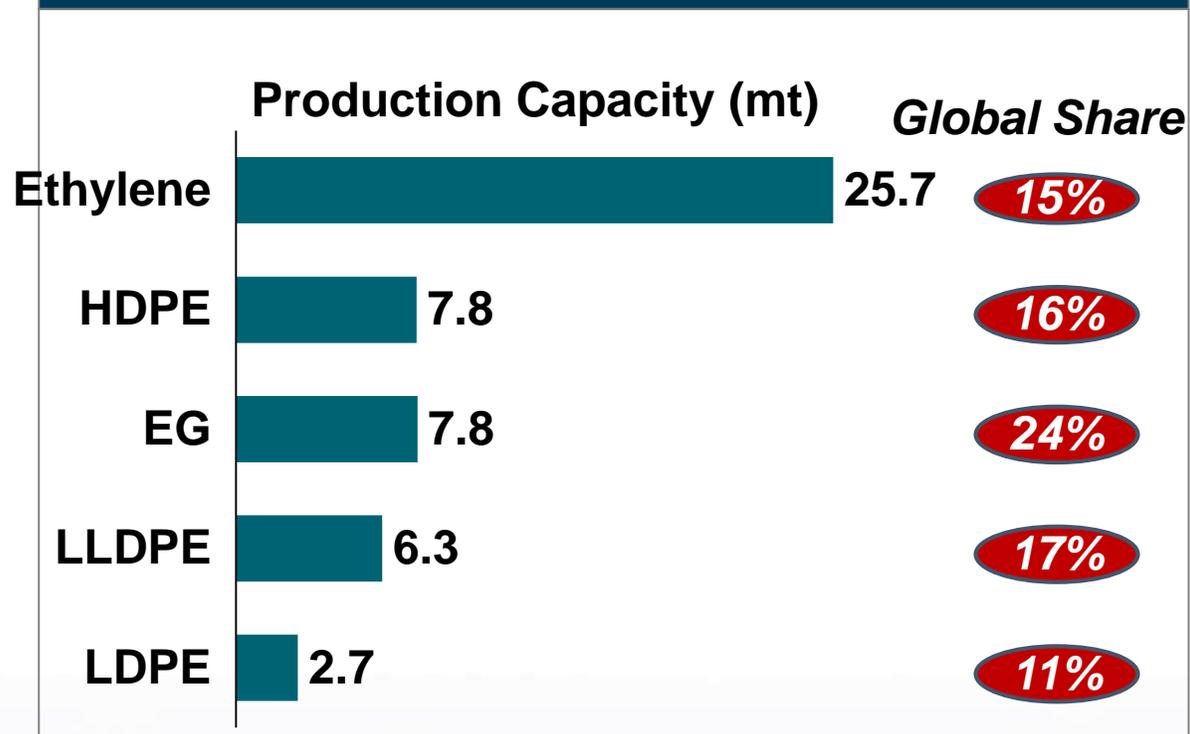
Source: GPCA Analysis; ICIS; 2019

Note: Based on source information from GPCA member companies

Ethylene Growth Trajectory & Global Position

Likewise, the GCC ethylene derivatives' global position is large, ranging from 11-24% of global production capacity

Global Ethylene & Key Derivatives Share (2017)



Key Ethylene Derivatives in the GCC - 2017

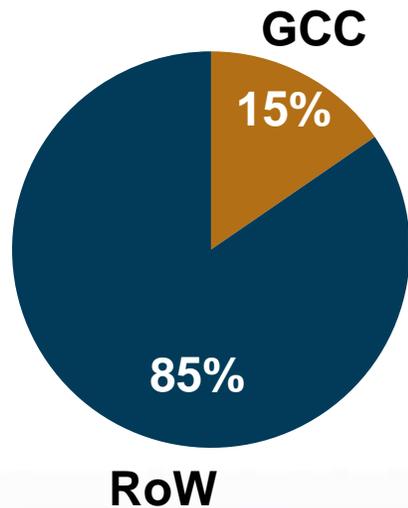
- PE (HD, LL, LD) accounts for **60%** of ethylene consumption
- HDPE is the largest volume C2 Derivatives with capacity of **7.8** million tons, accounting for **16%** of the global capacity
- LLDPE is 2nd largest PE with **6.3** million tons, accounting for **17%** of global capacity
- Ethylene glycol (EG) global share is the highest among the C2 derivatives, with **24%** of global production capacity

Ethylene Growth Trajectory & Global Position

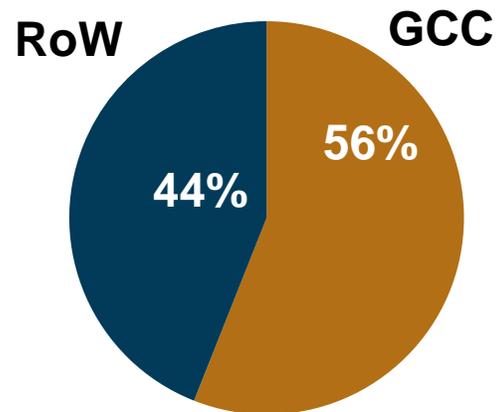
Due to export orientation, the Arabian Gulf has maintained a prominent share in global trade of key commodity Ethylene Derivatives

PE Global Share in Capacity and Trade (2017)

Production Capacity

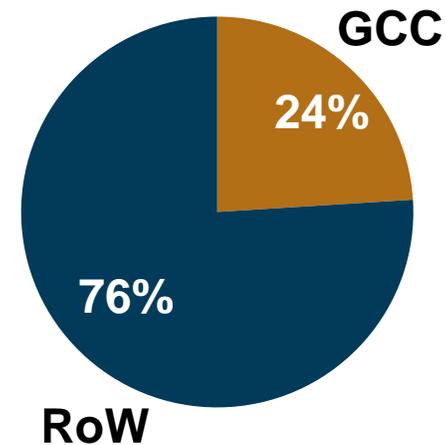


Export

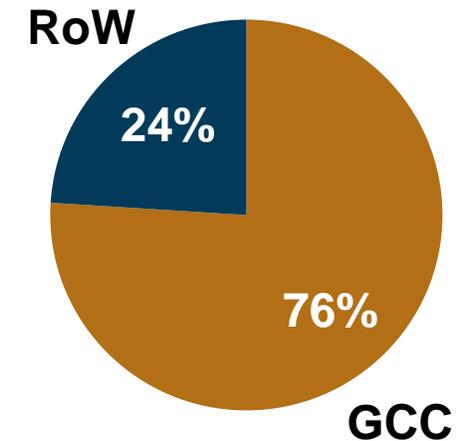


EG Global Share in Capacity and Trade (2017)

Production Capacity

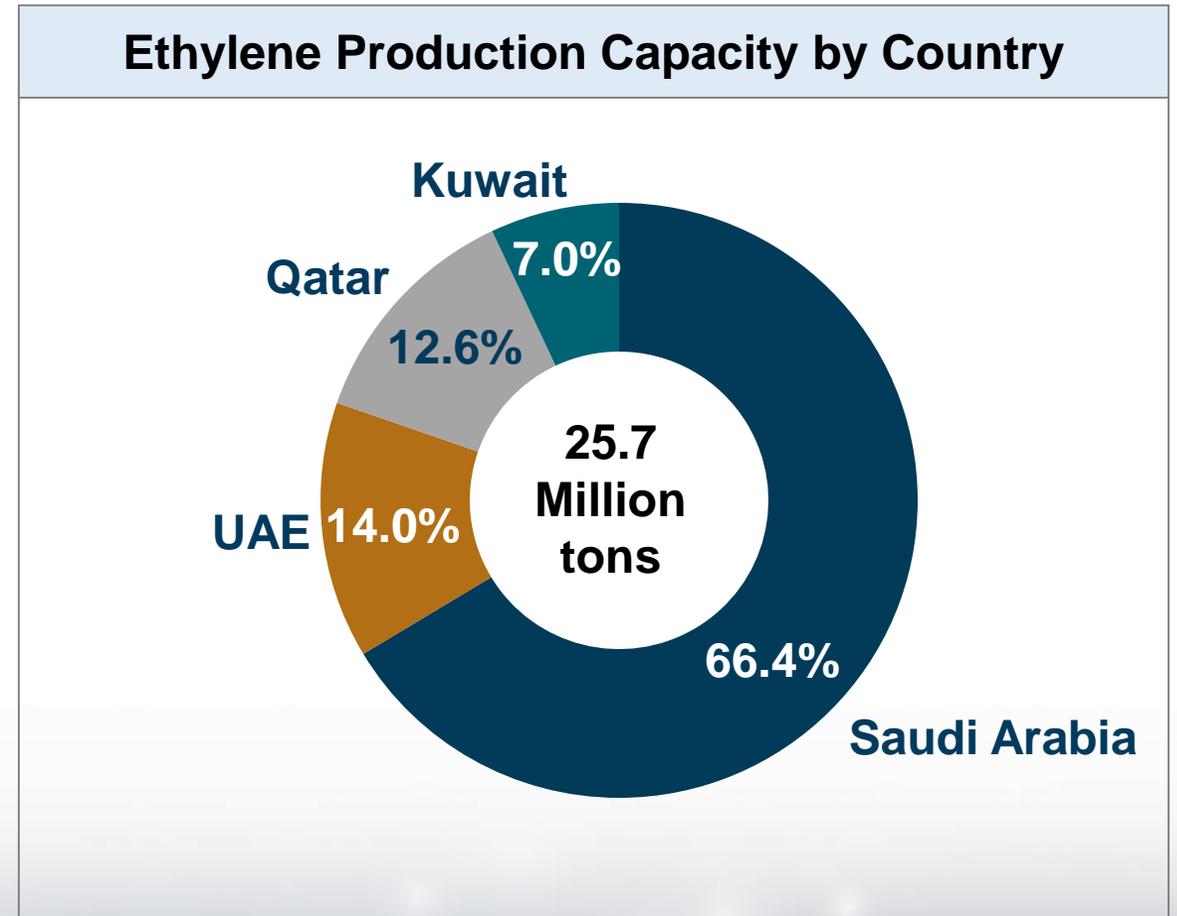
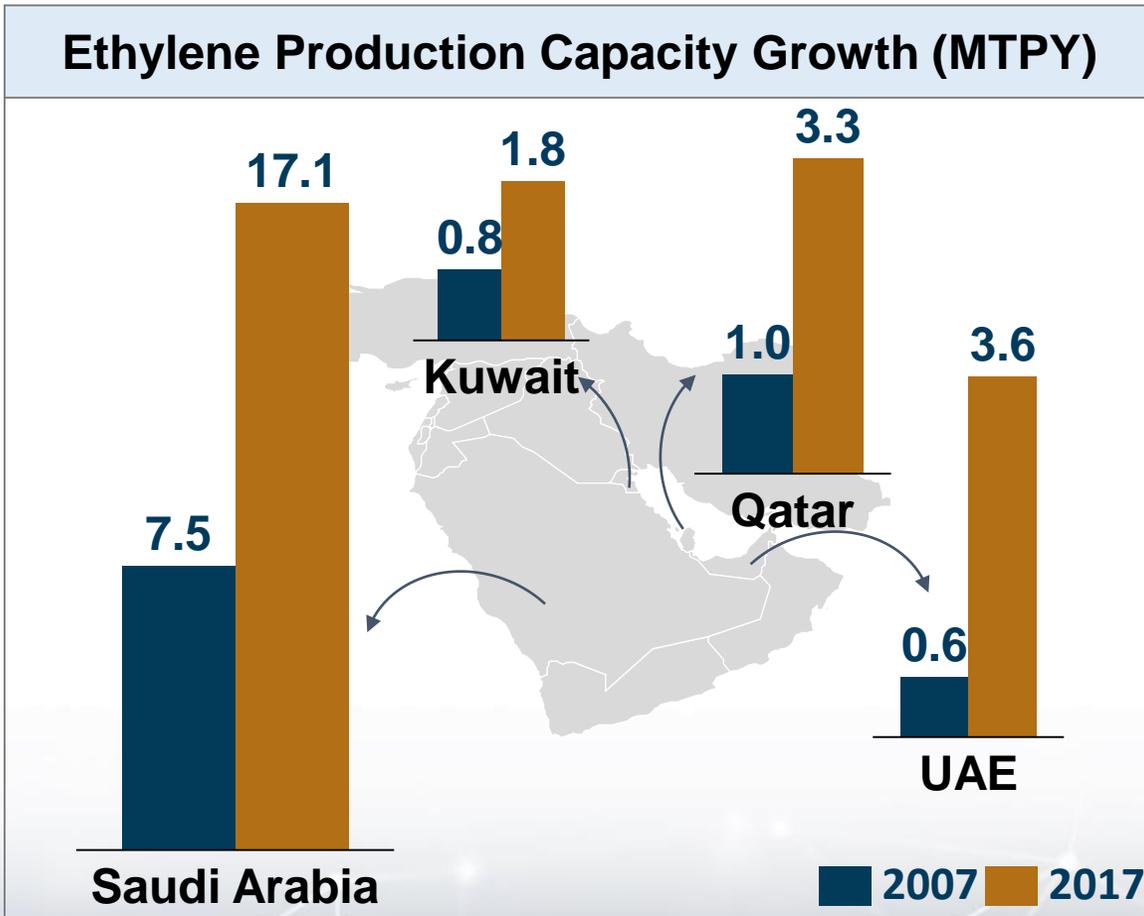


Export*



Ethylene Growth Trajectory & Global Position

*Between 2007-2017, ethylene capacity increased over **two** folds in KSA, Kuwait & Qatar and over **six** folds in UAE, with KSA maintaining the lion share of regional ethylene capacity*



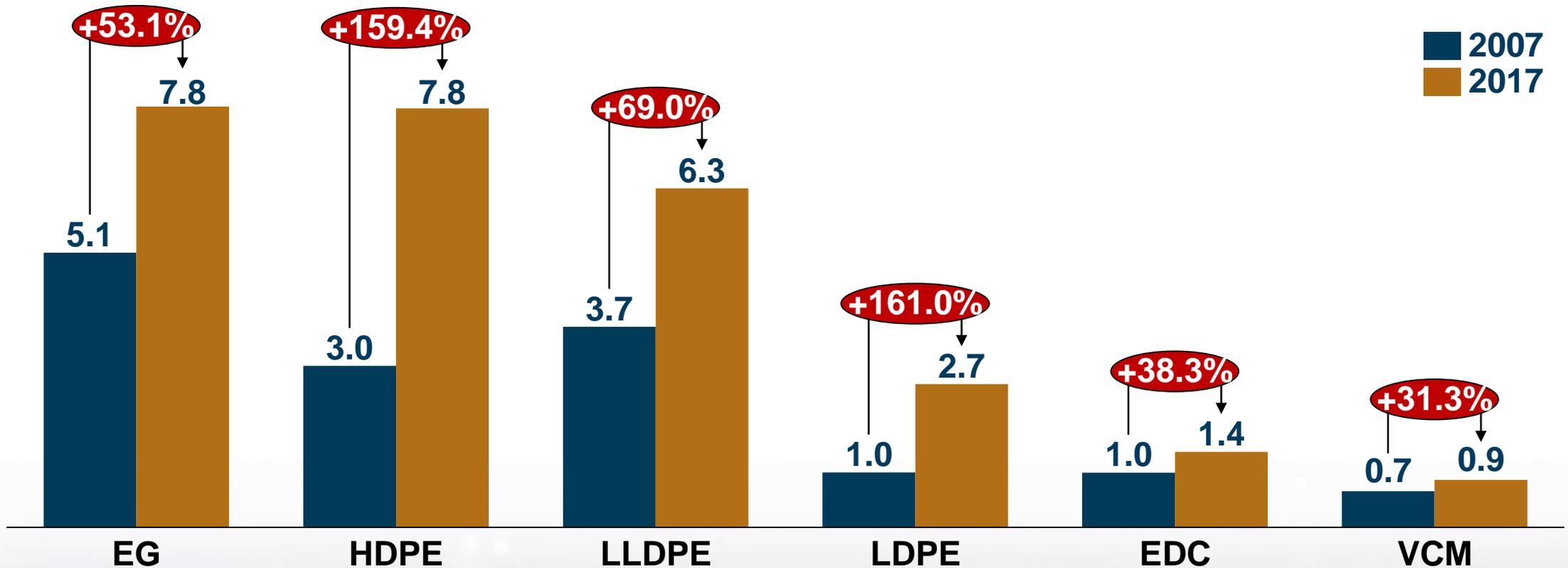
Source: GPCA Analysis, 2019

Note: Based on source information from GPCA member companies

Ethylene Growth Trajectory & Global Position

Unlike other basic petrochemicals, ethylene is captively used by the regional industry with the capacity build-up over the past decade translating into corresponding ethylene derivative capacity additions

Ethylene Derivatives' Capacity Growth in million tons, (2007-2017)



Source: GPCA Analysis, 2019

Note: Growth represents an increase in capacity between 2007-2017; Based on source information from GPCA member companies



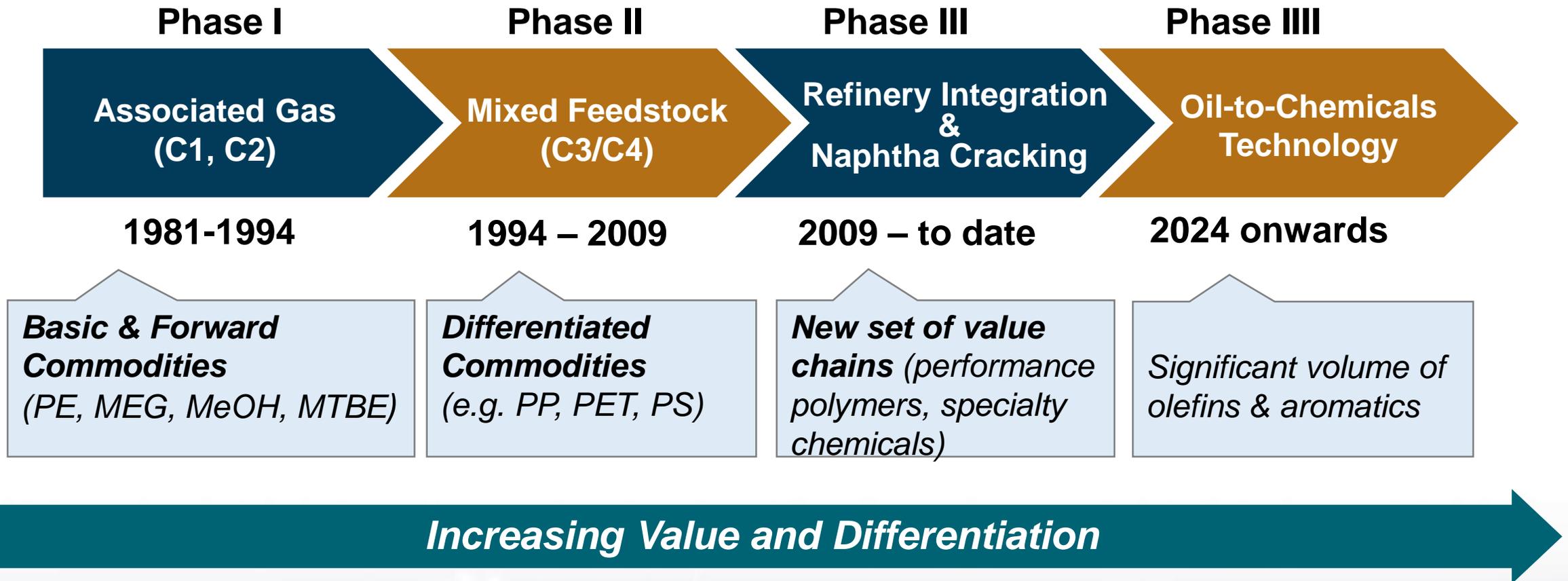
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Changing Feedstock Mix

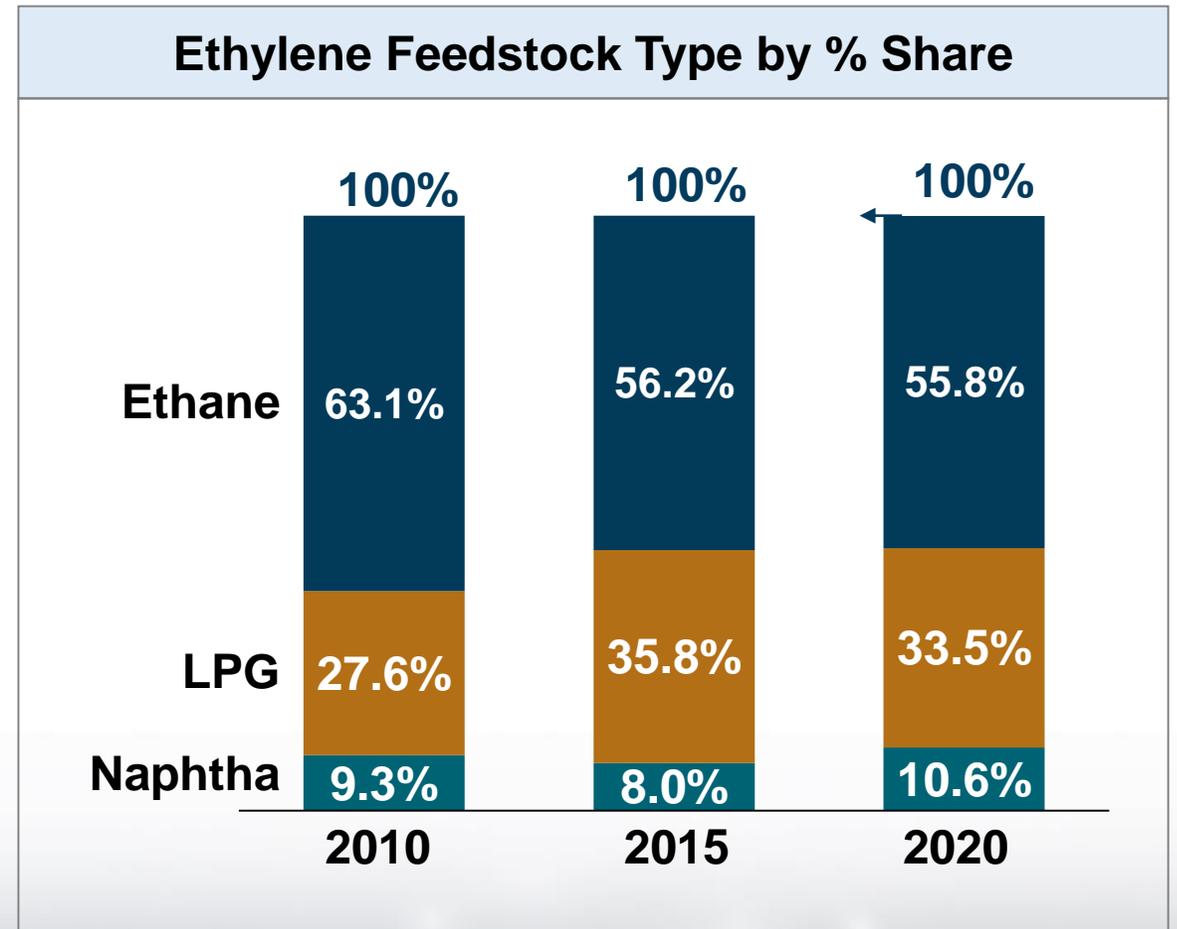
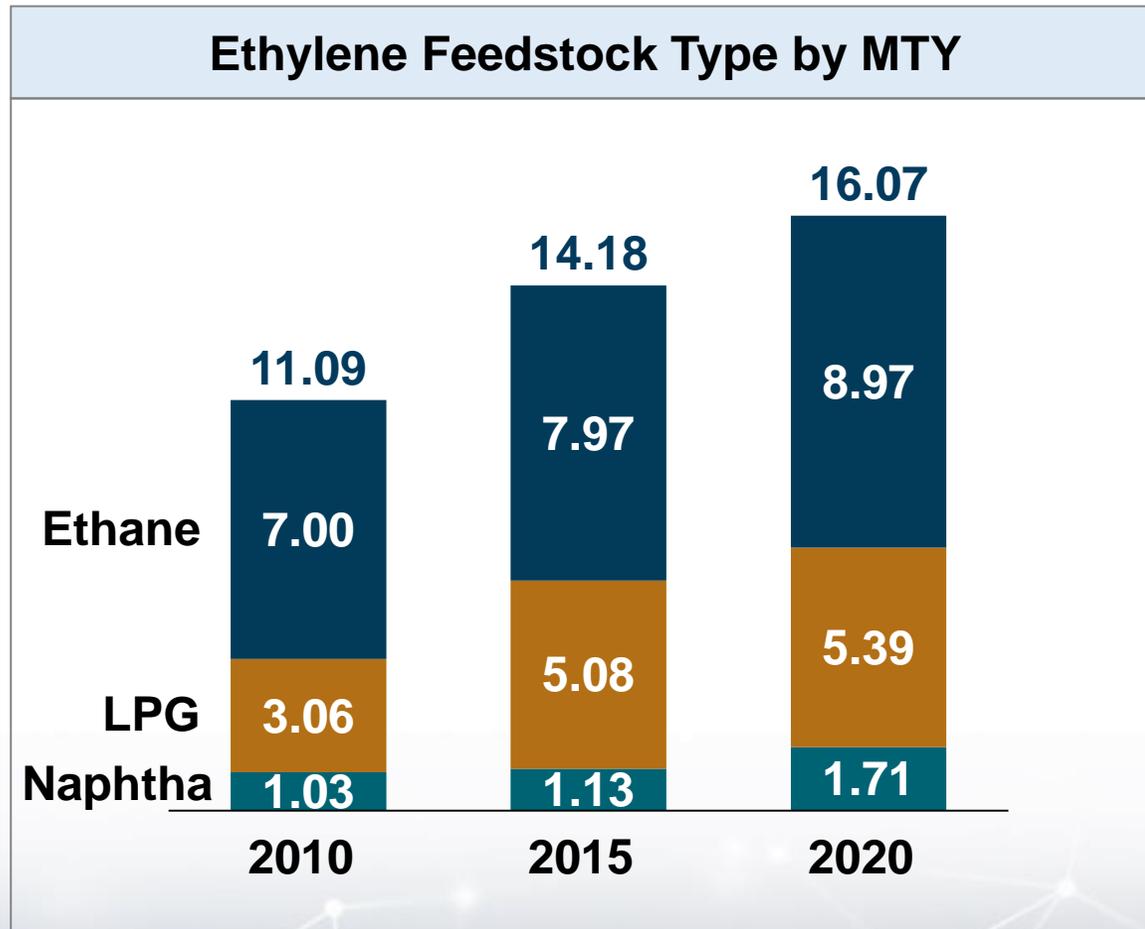
Throughout its evolution, the industry's pace of development and products portfolio had largely been influenced by volume and type of feedstock available





Changing Feedstock Mix

Despite growing share of LPG and Naphtha in the ethylene feedstock product mix, ethane will remain the short-term the main feedstock source for ethylene



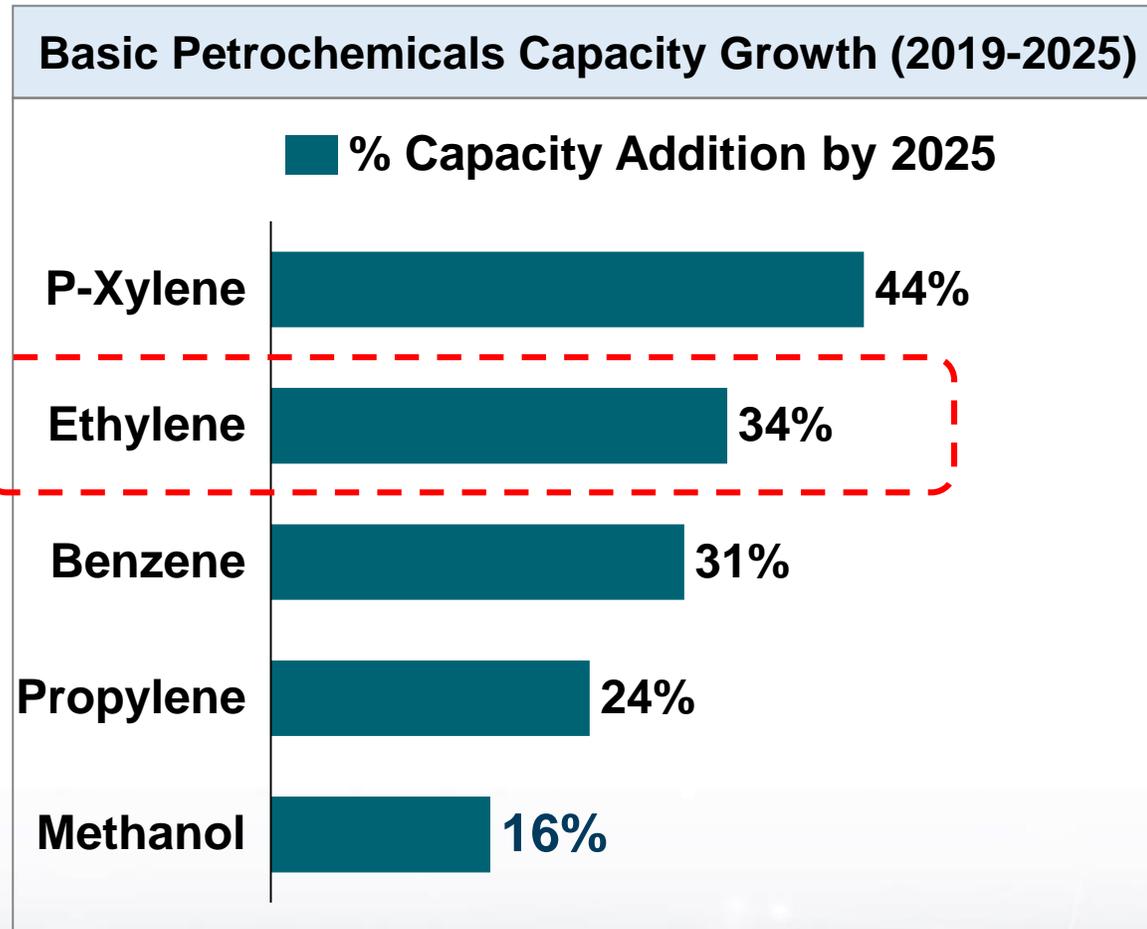


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Capacity Expansion Drive

Despite constraint in gas supply throughout the region, massive capacity addition at the basic petrochemicals level is in the pipeline; notably in C2 and Aromatics value chains



Basic Chemicals Growth Trend

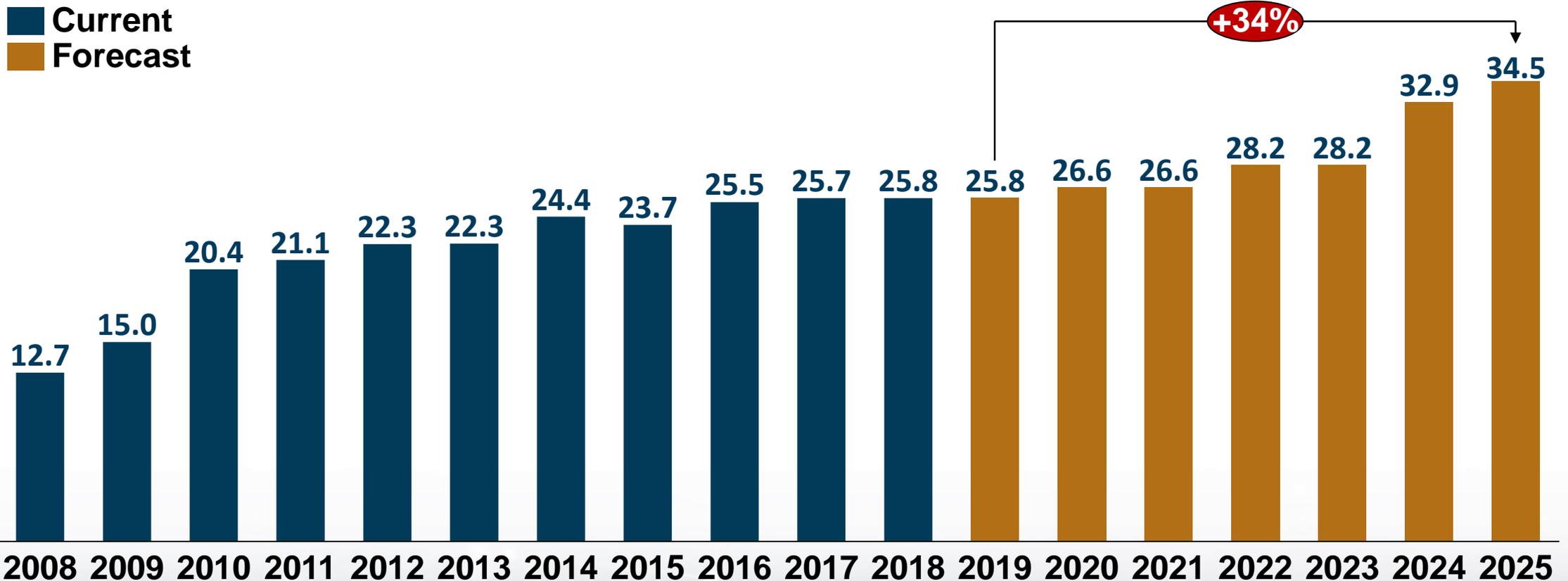
Between 2019 and 2025, the capacity addition at the basic building blocks will be:

- Ethylene capacity will increase from **25.7** to **34.5** million tons, ca. **34%** of the existing capacity
- P-Xylene will almost double to **8.5** million tons, an increase of **44%**
- Propylene and Benzene capacity will increase by **31%** and **24%** respectively compared with 2019
- Methanol capacity growth will be the lowest increasing by **16%** to reach **12.8** million tons

Ethylene Capacity Expansion

Between 2019 and 2025, 8.8 million tons of ethylene capacity will be added in the GCC, representing a 34% increase over the current capacity

GCC Ethylene Capacity Expansion (million tons) – Historical & Forecasted



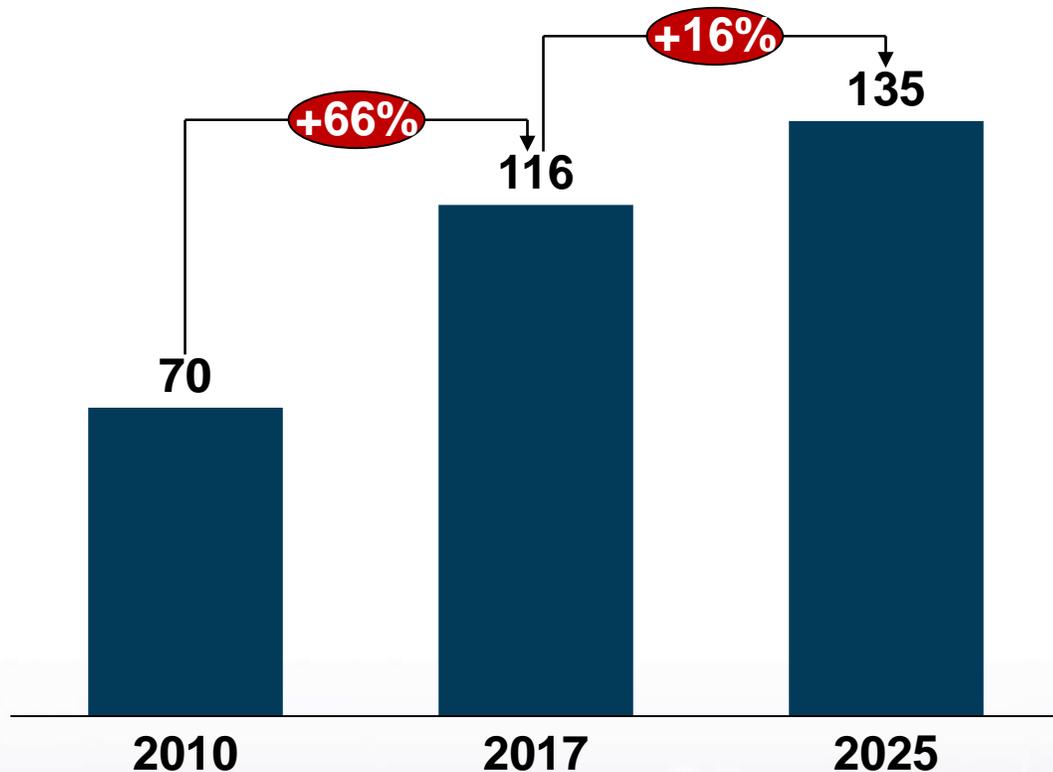
Source: GPCA Analysis, 2019

Note: Based on source information from GPCA member companies and future announced projects

Products Diversification Drive

GCC producers continue to add new and differentiated products in an effort to capture value over volume

Chemical products Number in the GCC Industry



Trends in Industry's Products Diversification

- Products diversification gained momentum in the past decade driven by:
 - Strategic direction of the producers to maximize value addition by expanding to higher value specialty and performance chemicals
 - Feedstock allocation linked to diversification to maximize the industry's socio-economic benefits
- Between 2010 and 2017, the industry added **46** products, representing **66%** increase in products slate
- By 2025, the industry's portfolio is projected to increase by **16%** adding **19** new production lines

Source: GPCA Analysis, 2019

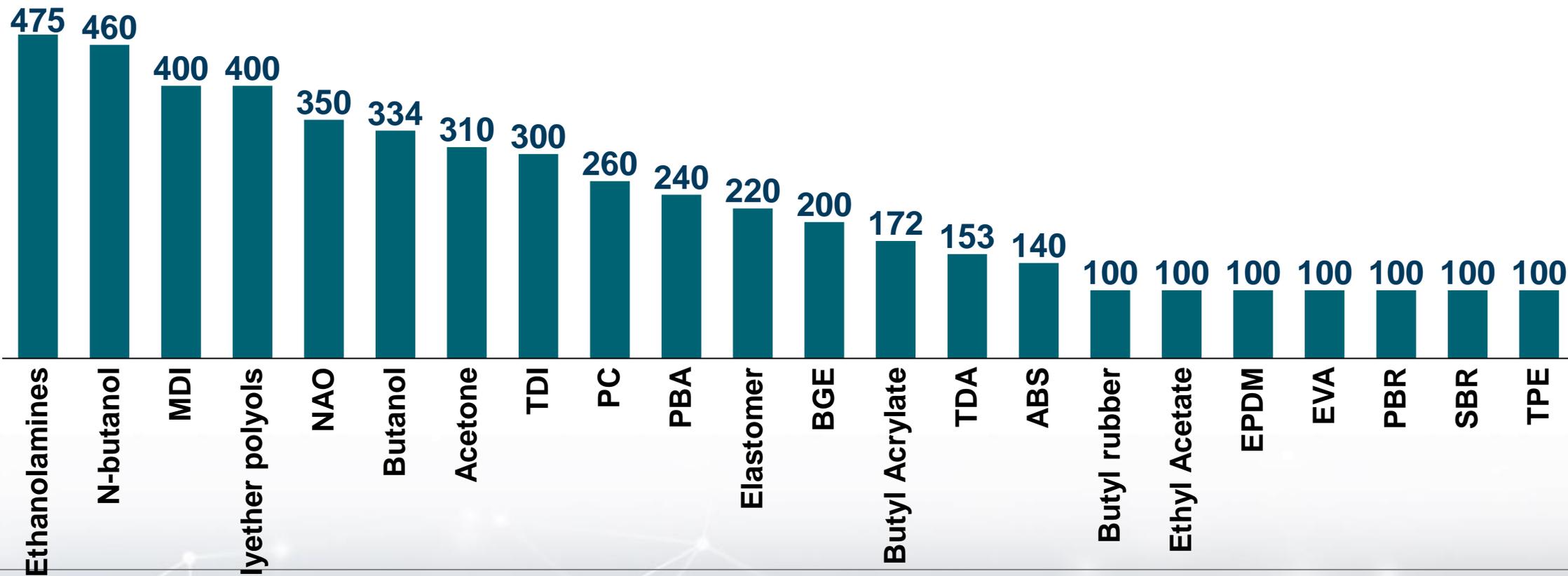
Note: Based on source information from GPCA member companies and future announced projects



Product Diversification Drive

The new products which have come on stream between 2010 and 2017 will stimulate a new set of downstream industries in the region

Selected New Products KT (2010-2017)



Source: GPCA Analysis, 2019

Note: Based on source information from GPCA member companies, products included are those with capacity more than 100 KT



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Closing Remarks



Ethylene Production Growth

- GCC is a global hub for the production ethylene, its ongoing expansion drive will further enhance its global position



Capacity Expansion

- Ethylene capacity expansion will be driven by heavy feedstock cracking, refinery integration and oil-to-chemicals technology



Feedstock Advantage

- The GCC will retain its ethylene cost leadership driven by feedstock cost advantage combined with leveraging economies of scale



Drive for Diversification

- Diversification of feedstock will prompt more diversified products portfolio in the GCC chemical industry



Product Value Creation

- GCC producers will continue to add new differentiated grades and specialty derivatives to capture value over volume



GPCA Ethylene Report 2019

The 2019 GCC Ethylene Report is an essential resource for detailed information on the GCC Ethylene market and includes strategic considerations for future growth



Thank you

www.gpca.org.ae

