



# The Petrochemical Intermediates Conundrum

**APIC 2019, Taipei**

Amber Liu, Head of Asia Petchem Analytics  
ICIS Product & Analytics



# Market intelligence to support your commercial planning & decision making



# ICIS Price Forecast Reports



Choose ICIS price forecast reports for all of the following:

- ▶ Settling contract prices
- ▶ Reviewing your market position
- ▶ Making production or commercial decisions
- ▶ Buying or selling with confidence

# ICIS Supply & Demand Database

The ICIS Supply and Demand Database delivers an end-to-end perspective of the global petrochemical markets, covering 160 countries and over 100 products.

Data includes:

- ▶ Historical and forecast data (1978-2040)
- ▶ Petrochemical trade flows and patterns
- ▶ Import, export and consumption volumes
- ▶ Plant capacity, production and operating status
- ▶ Upcoming plants, including speculative and announced projects
- ▶ Data breakdown by country, region, product or product family
- ▶ Key information on over 12,000 refinery units, and 18,500 petrochemicals plants
- ▶ GDP, population, and consumer price index by country



# AGENDA

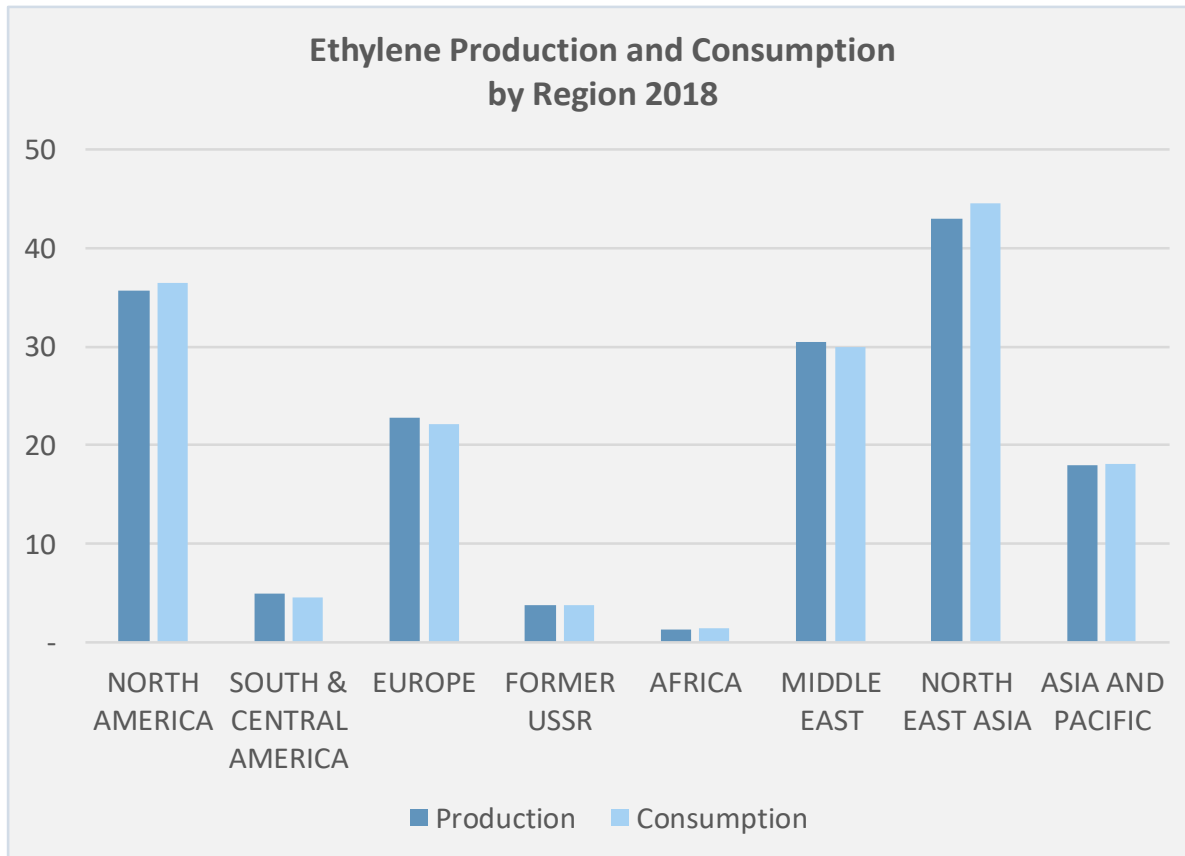
- ▶ Global olefin supply and demand review
- ▶ China ongoing project development across Ethylene & Propylene value chains
- ▶ India developments



## Global olefin supply & demand review

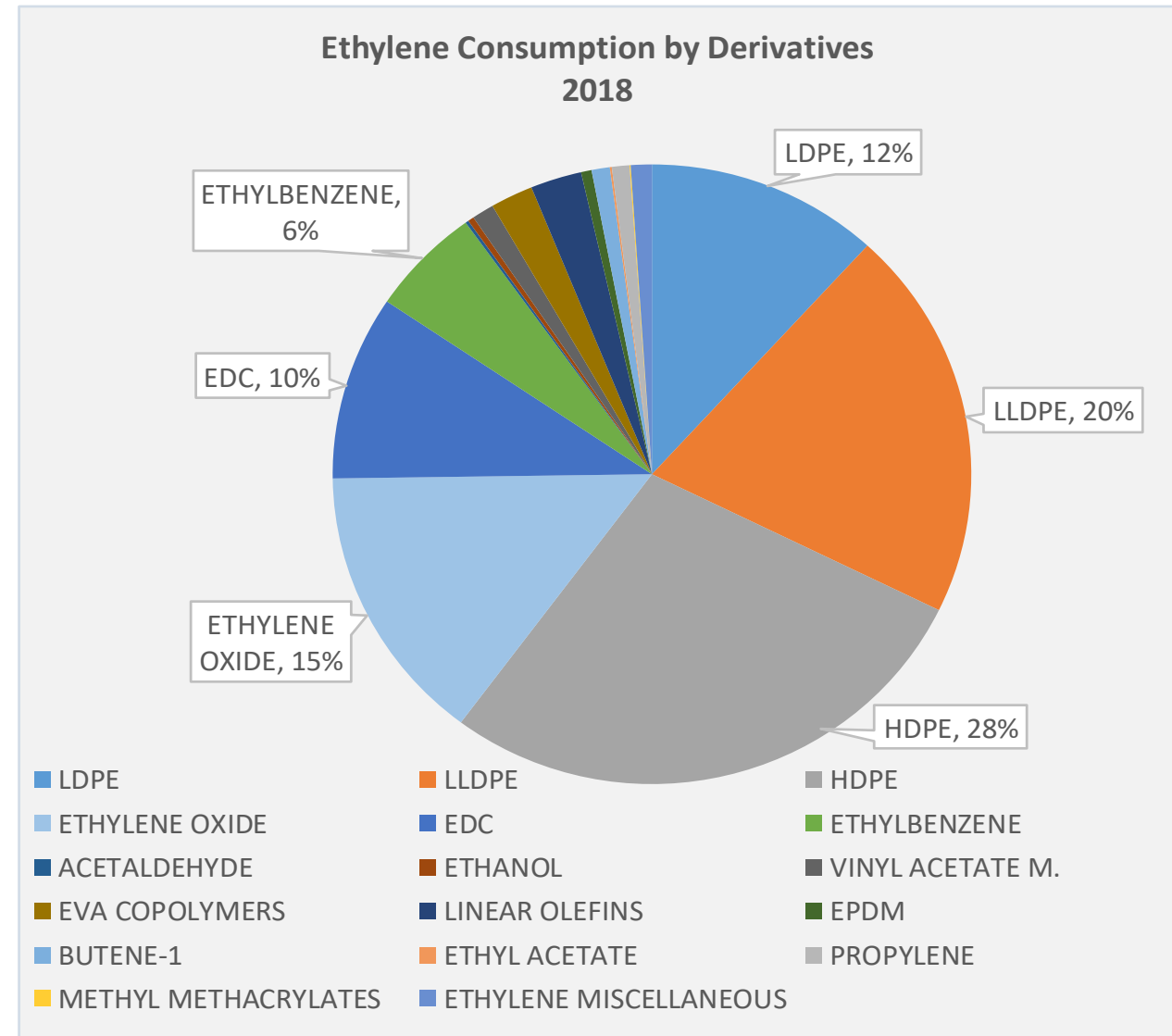


# Global Ethylene Supply & Demand

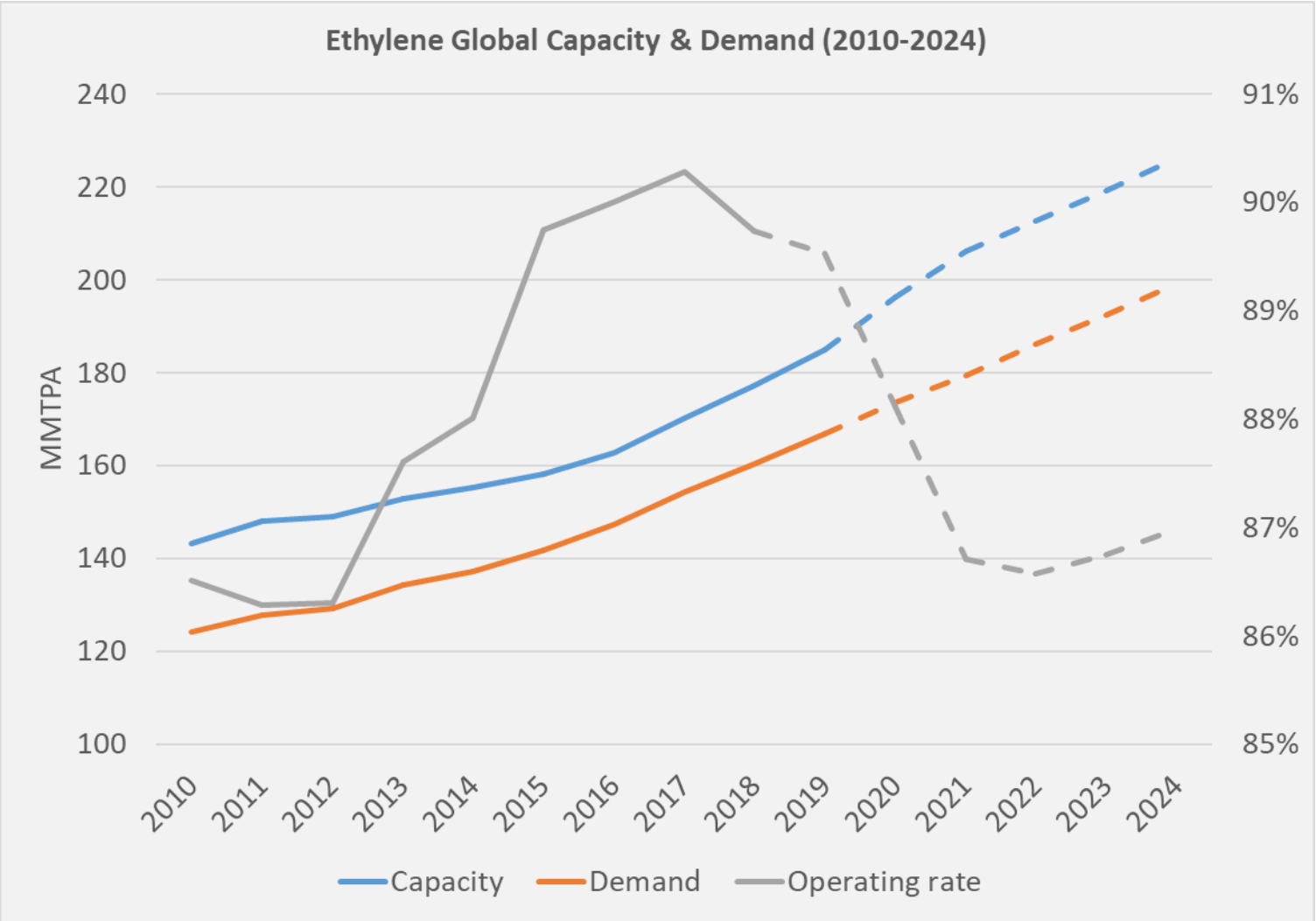


- Ethylene consumption in 2018 is estimated at 161 million tonnes
- Asia accounts for around 40% of global supply and consumption

Source: ICIS Supply & Demand Database



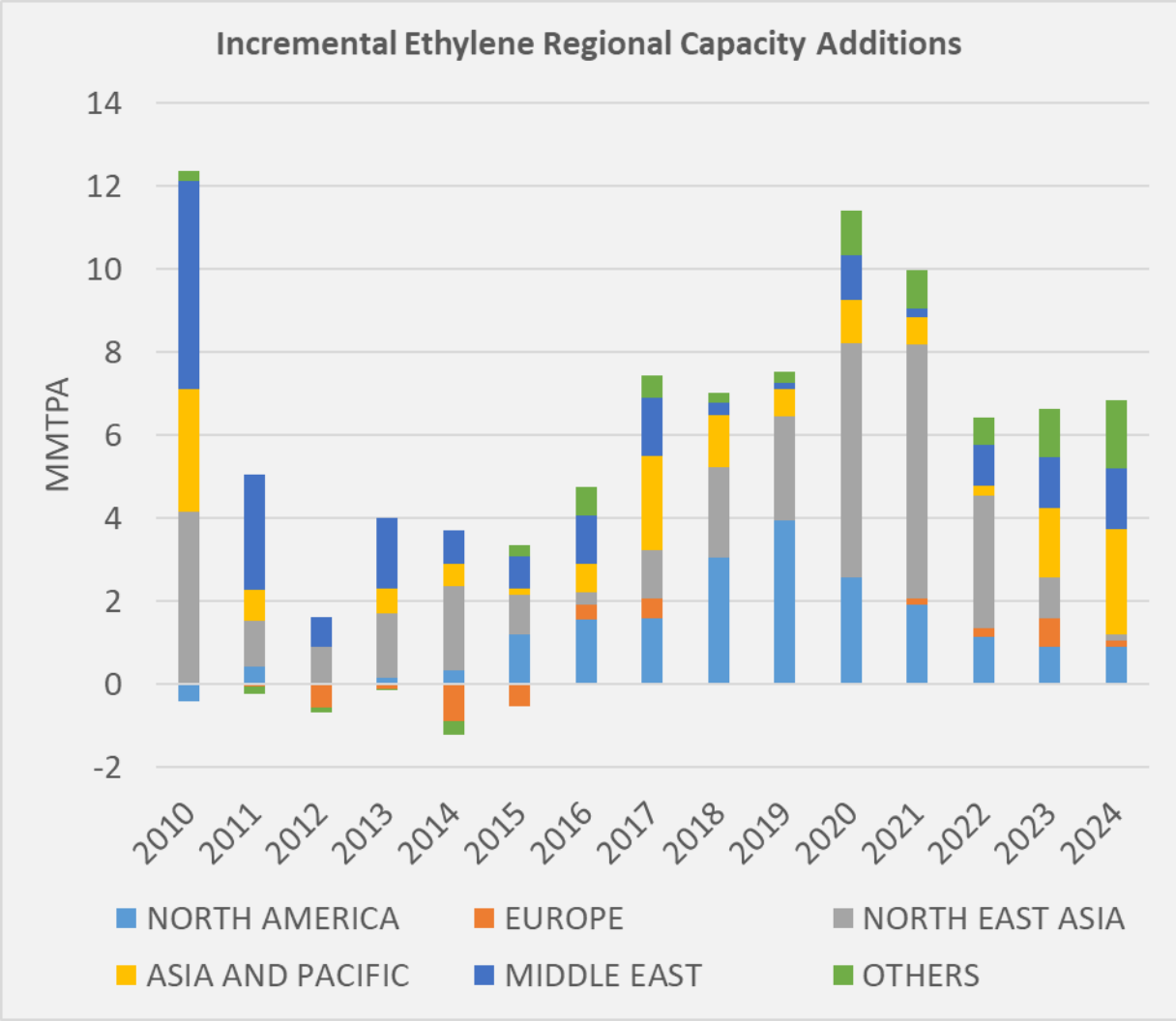
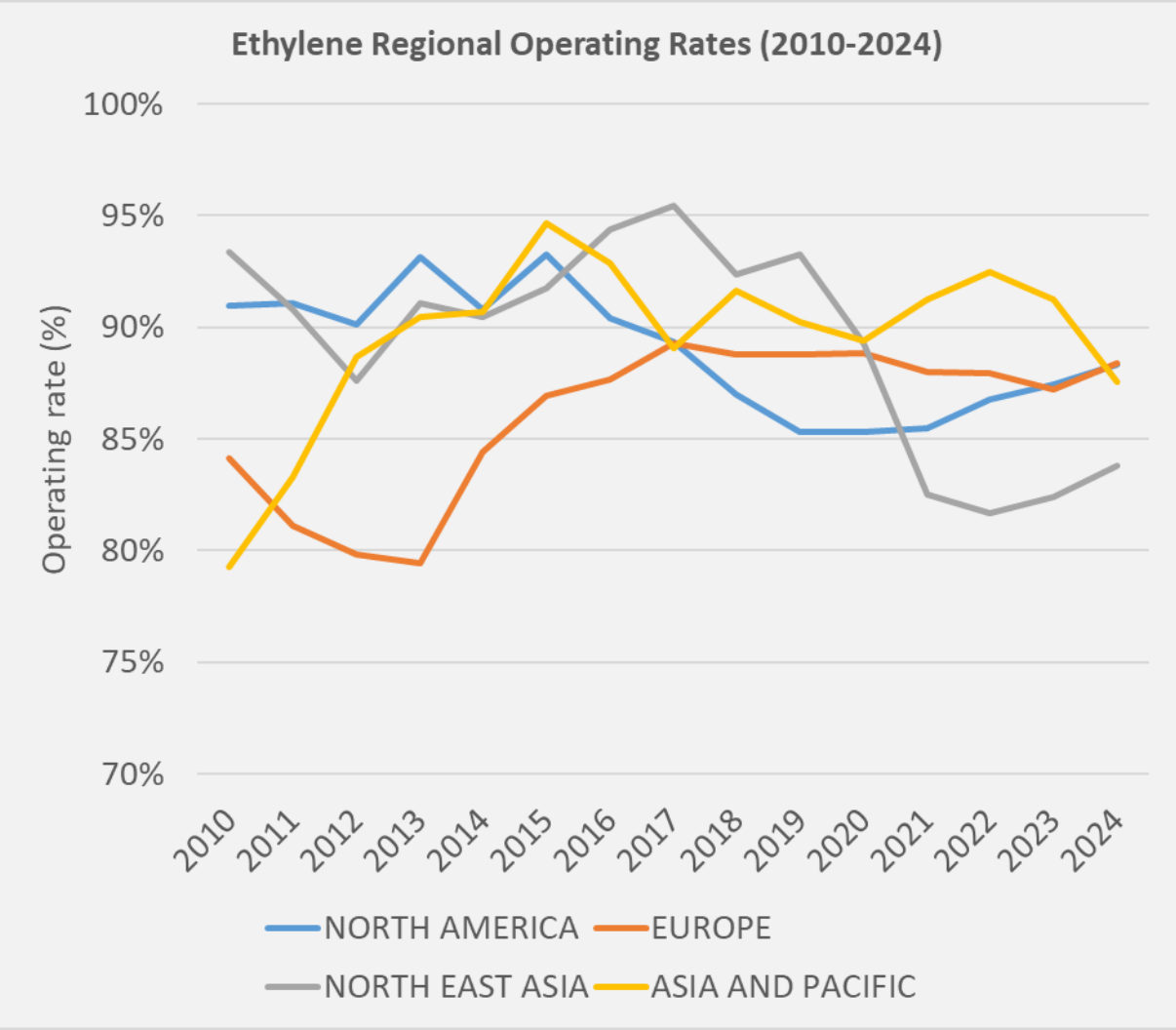
# Ethylene Supply & Demand: Ethylene demand is projected to be robust, industry is currently in a period of investment in olefin capacity



- ▶ Olefin industry, primarily ethylene, entering a period of capacity investment
- ▶ This follows from recent years of increasing global operating rates, which peaked around 2017
- ▶ Despite steady demand growth, there are increasing concerns of oversupplies of ethylene



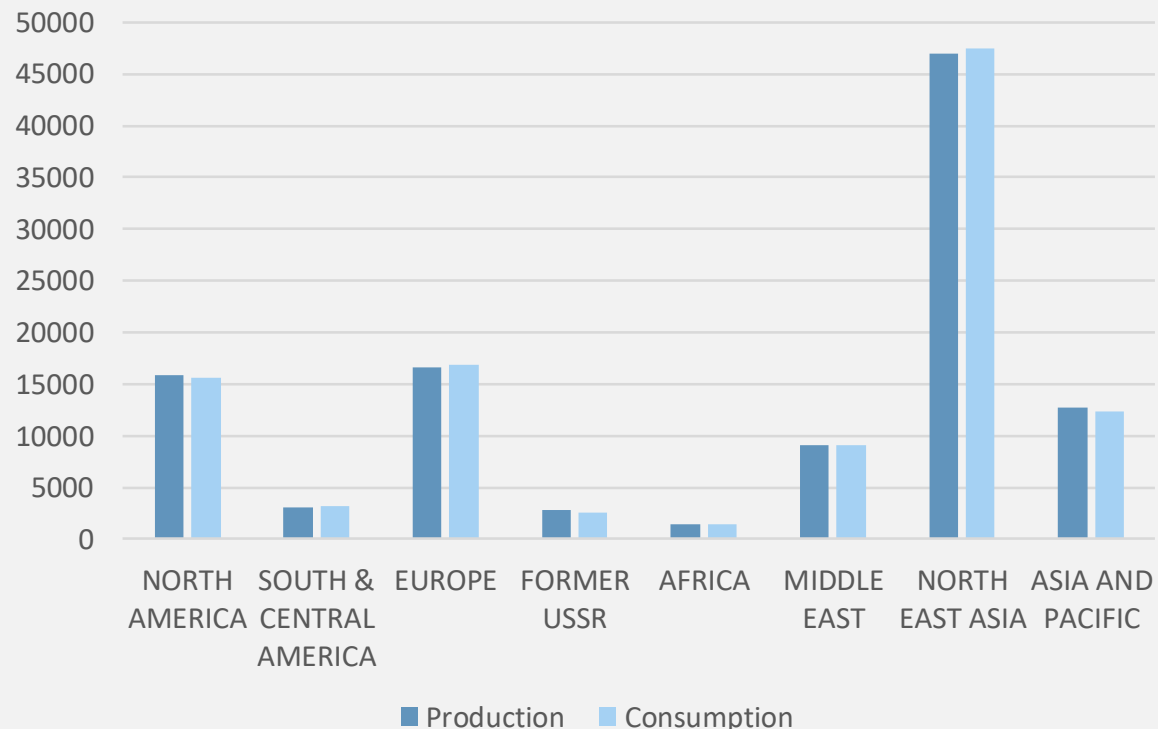
# Ethylene Supply & Demand: Splitting out developments by region shows “waves” of investments



“OTHERS” includes South & Central Americas, FUSSR & Africa

# Global Propylene Supply & Demand

Propylene Production and Consumption by Region 2018

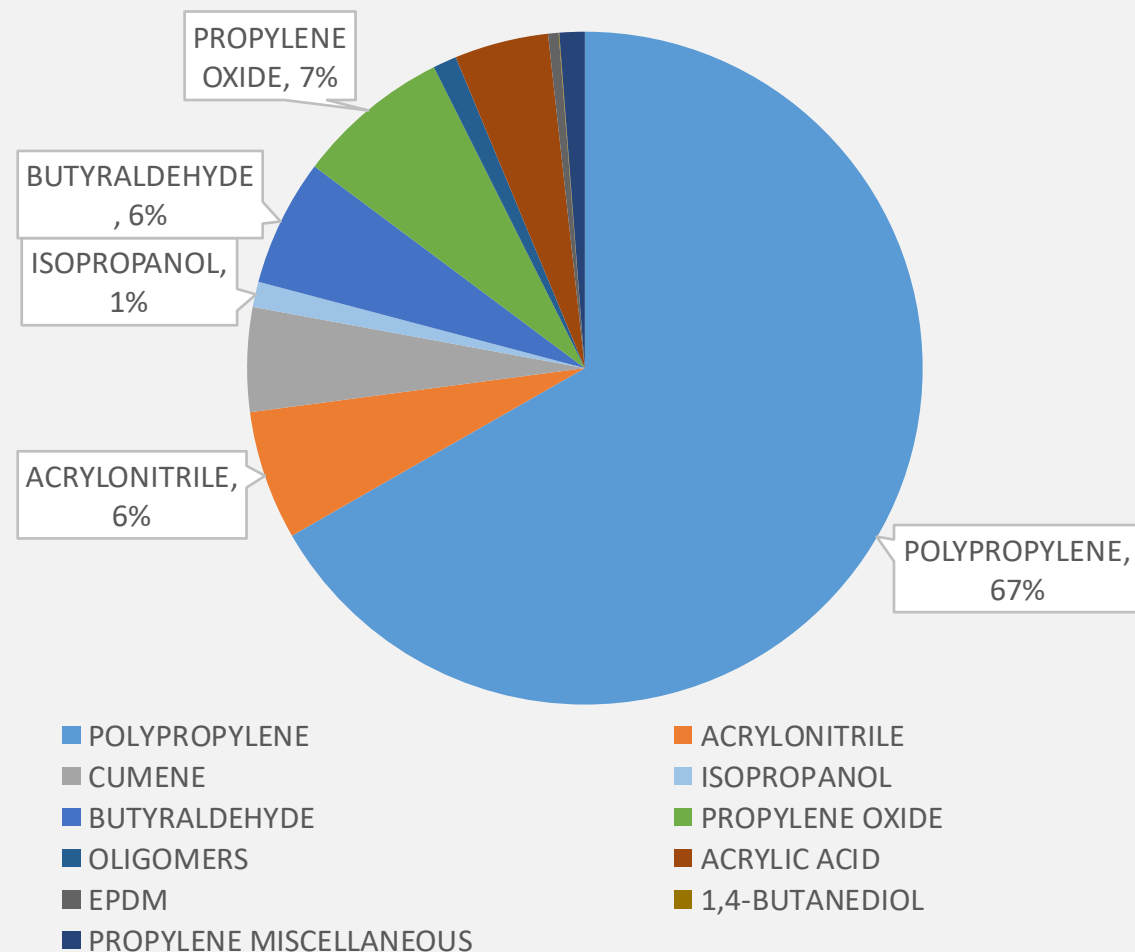


▶ Propylene consumption in 2018 is estimated at 109.0 million tonnes

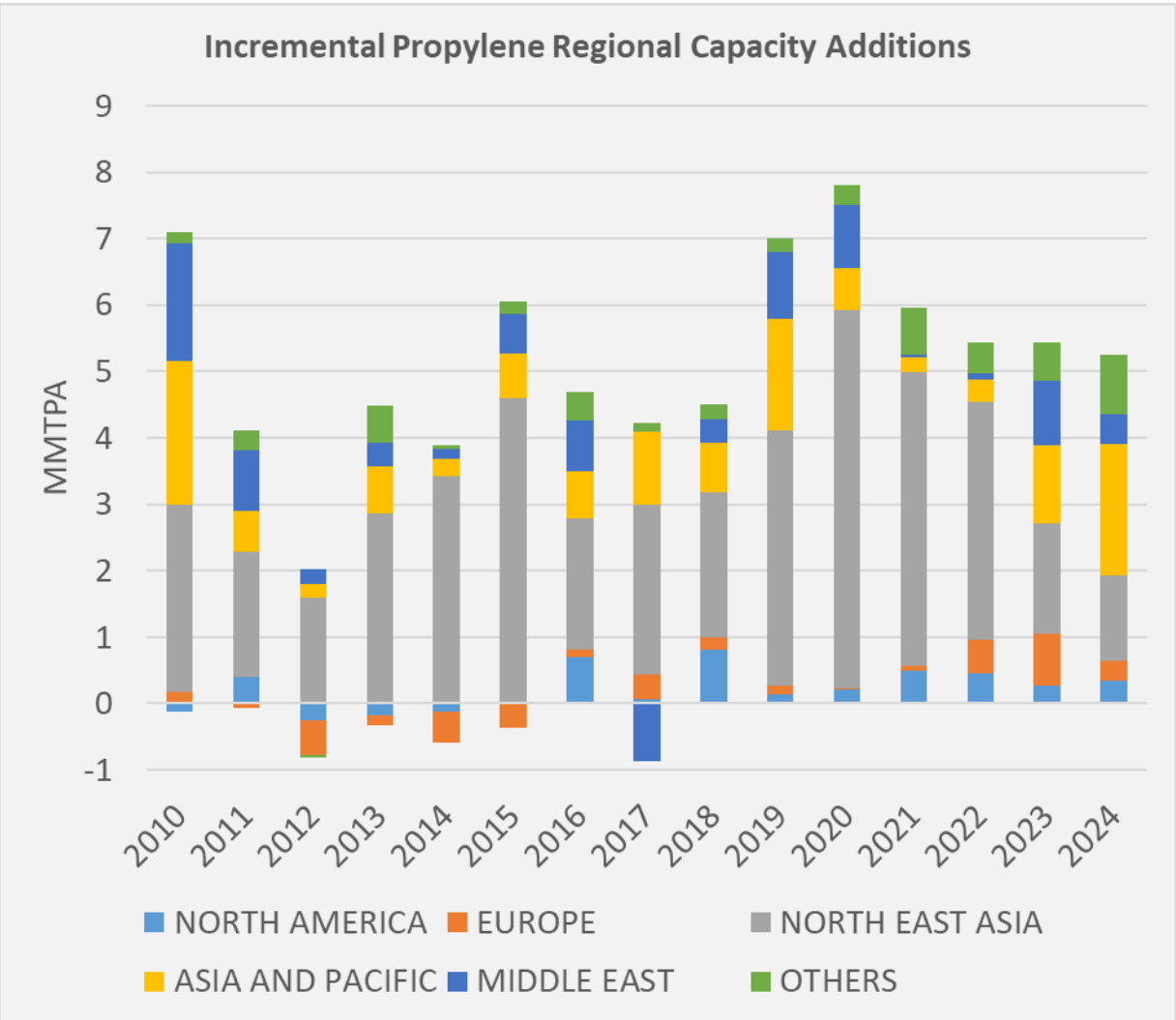
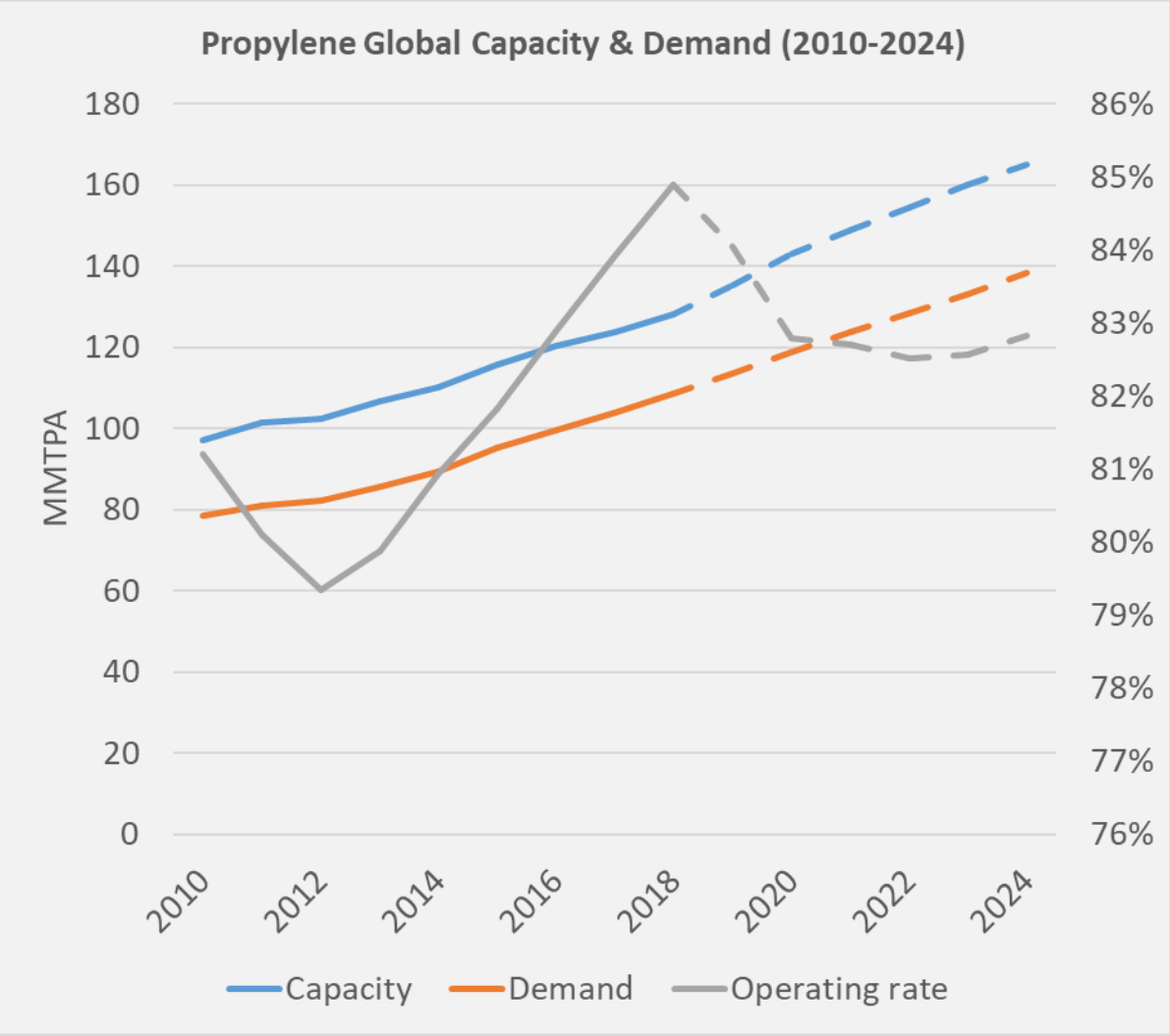
▶ Asia accounted for around 55% of global propylene consumption in 2018

Source: ICIS Supply & Demand Database

Propylene Consumption by Derivatives 2018



# Propylene Supply & Demand: Propylene operating rates also forecast to dip through same period; investments centred on Asia



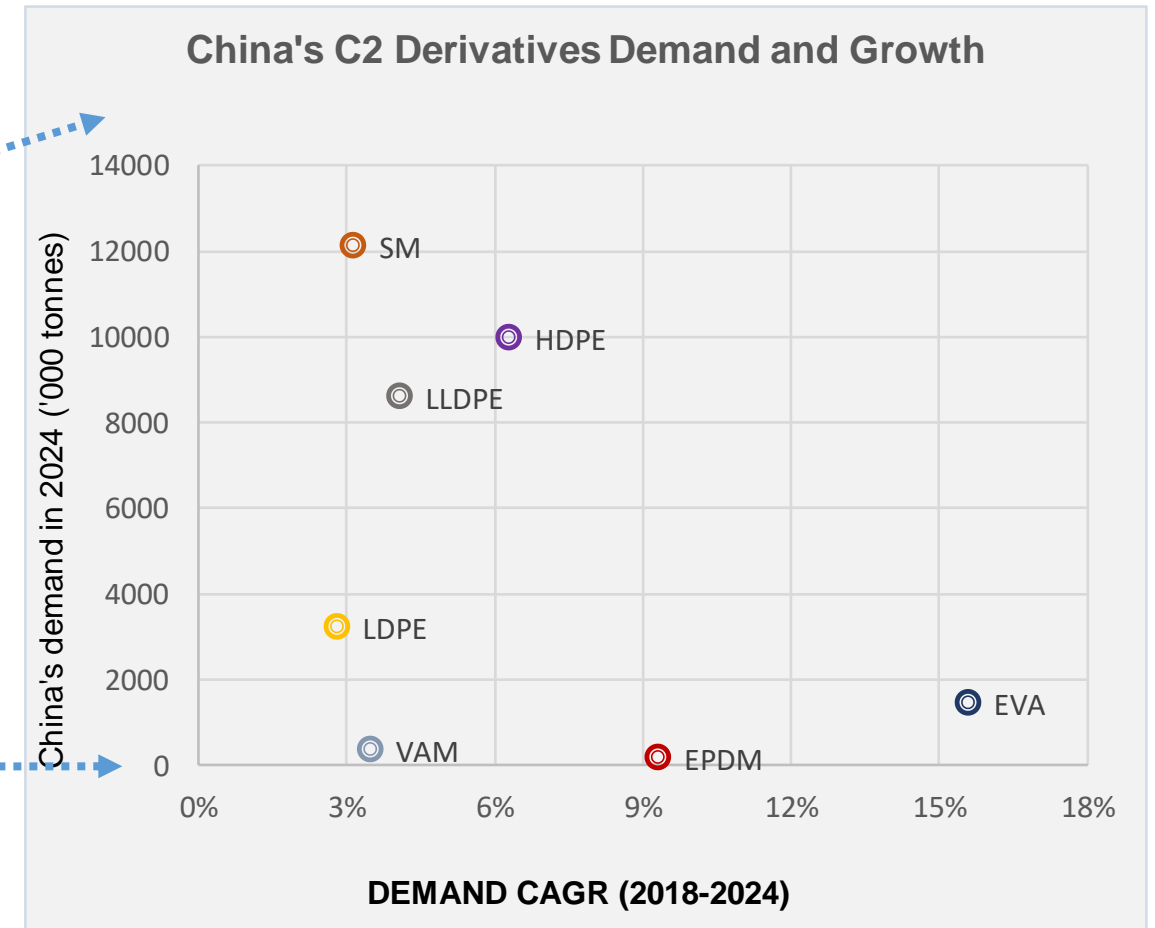
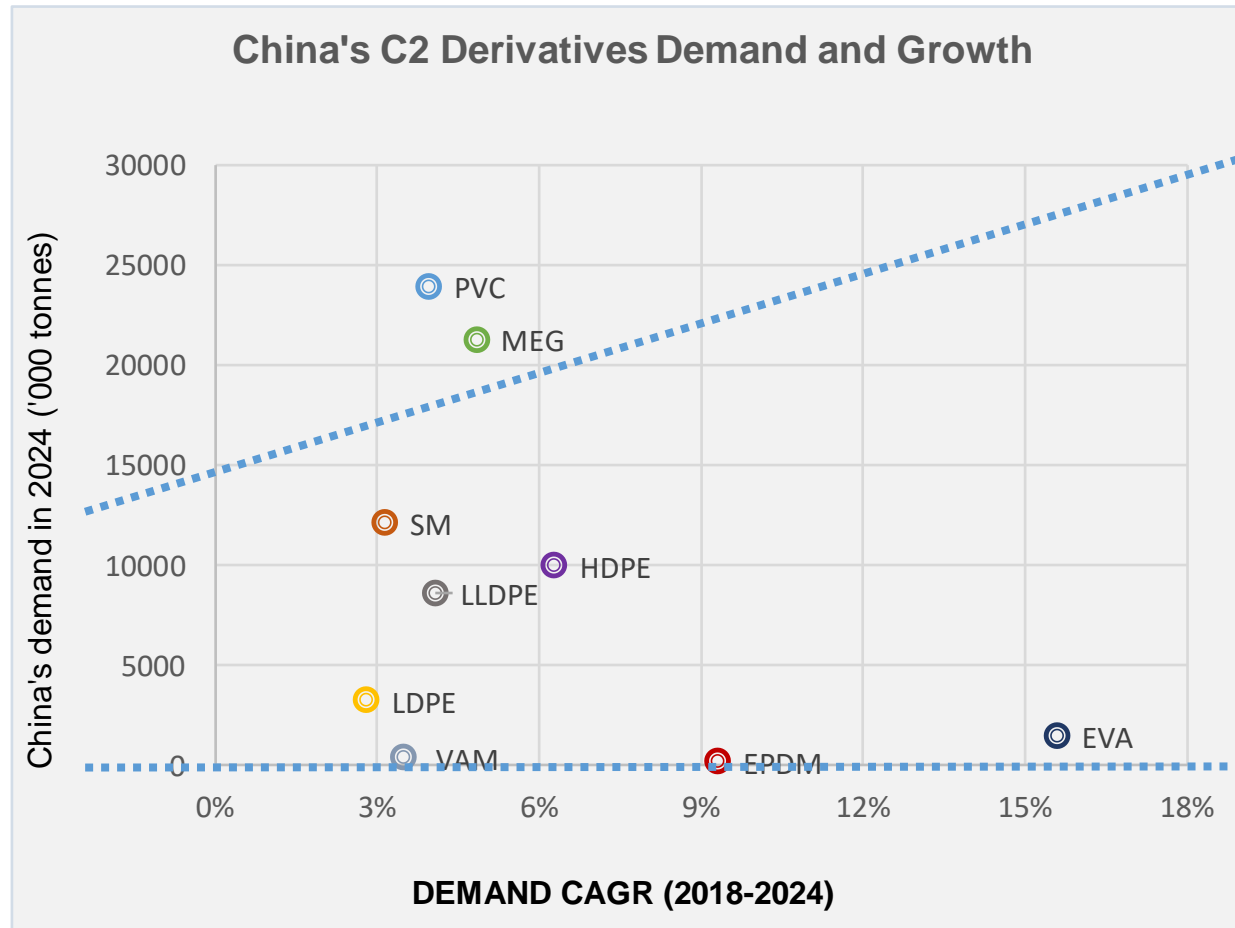
"OTHERS" includes South & Central Americas, FUSSR & Africa

# China ongoing project development across Ethylene & Propylene value chains



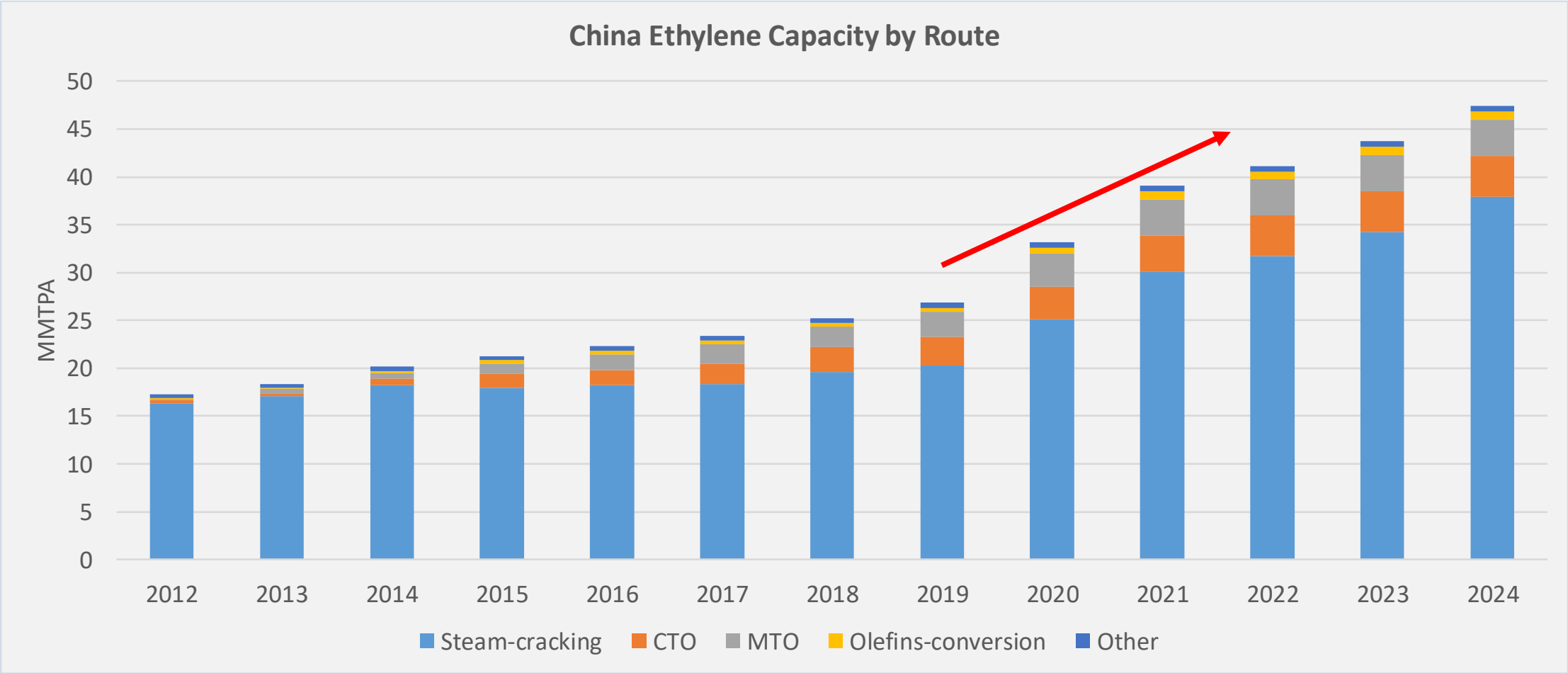
# China Ethylene Derivatives Demand Outlook:

- ▶ Most China C2 derivatives poised for demand growth rates over 3% except LDPE at 2.8%. EVA has the highest demand growth at 15.6% among all C2 derivatives followed by EPDM at 9.3%, HDPE at 6.3% and MEG at 4.8%.



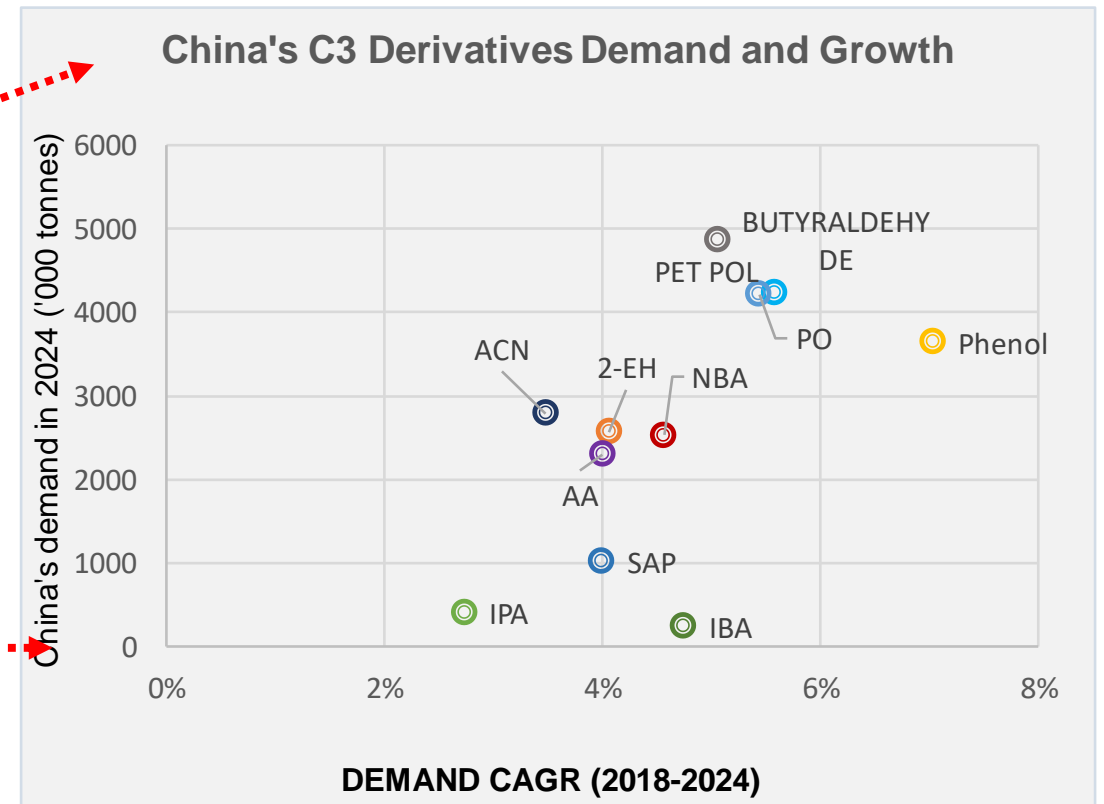
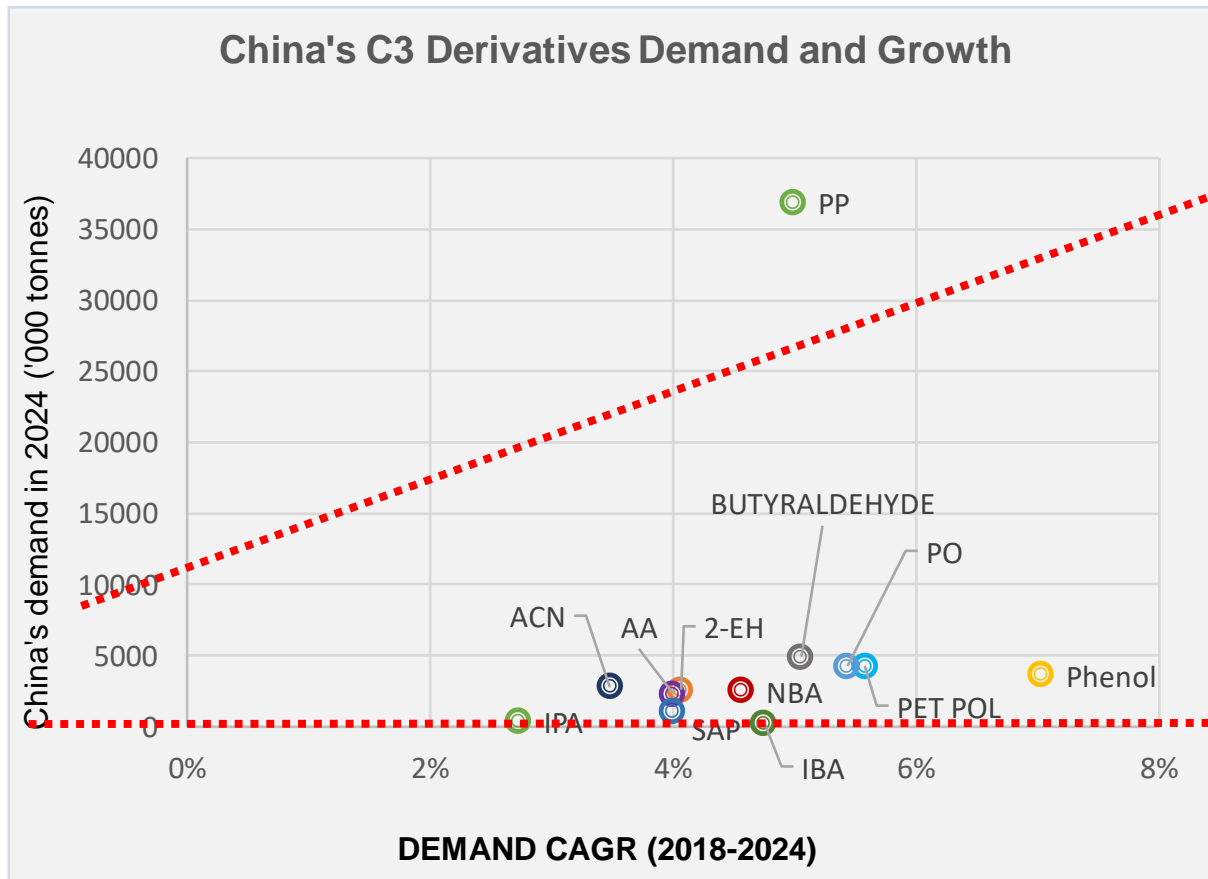


# Olefin Developments in China: Large focus on increasing ethylene capacities to enable increasing self sufficiency with CAGR at over 11% during 2018-2024

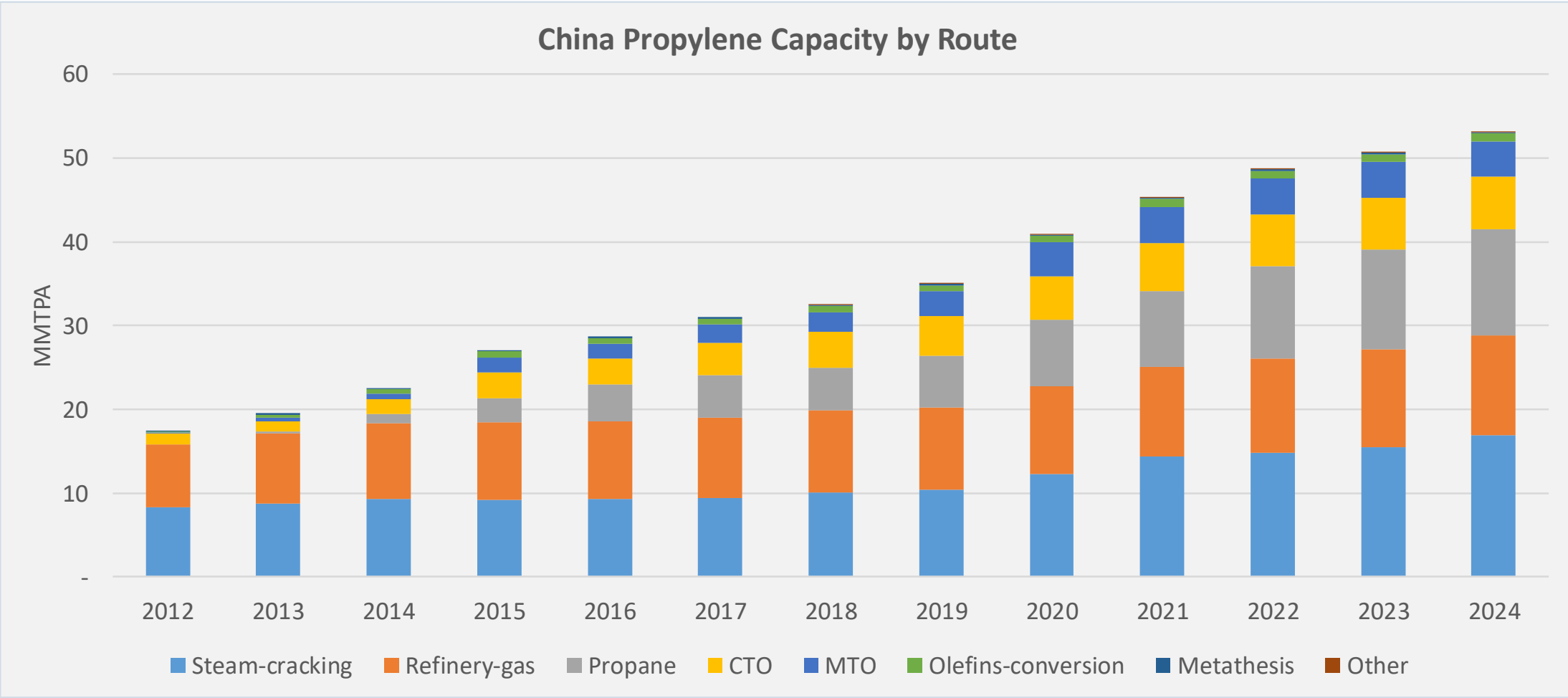


# China Propylene Derivatives Demand Outlook:

- Most China C3 derivatives keep a moderate demand growth rates at 4-6%. Phenol has the highest demand growth among all C3 derivatives at 7%. Demand growth for PP, Polyols and PO is at 5-5.6% and 2-EH, NBA, AA downstream & IBA at 4-4.6%.



# Propylene Production Routes: Steam-cracking a key route for new propylene capacities, on-purpose propylene additions also continue



# Olefin Developments in China: Increased self sufficiency to be achieved through steam-cracking, largely naphtha based

- ▶ Projects considered firm, totalling nearly 13 million tonnes from crackers of additional ethylene capacity between 2019 and 2023
- ▶ Total ethylene capacity ex-steam-cracking in China in 2018 was 25.3 million tonnes, with 2.0 million tonnes being between 2012 and 2017

Company	Location	Feedstock	Ethylene	Start-up year	HDPE	LLDPE	LDPE	EVA	MEG	SM	PVC
Sinopec Zhongke Ref & PC	ZHANJIANG, GUANGDONG	Naphtha	800	1H2020	350			100	400		
Zhejiang PC (Phase 1)	ZHOUSHAN, ZHEJIANG	Naphtha	1400	1H2020	525	225		100	650	1200	
Hengli PC	CHANGXING ISLAND, LIAONING	Naphtha, ethane, butane	1500	1H2020	400				900	720	
Wanhua Chemical	YANTAI, SHANDONG	LPG	1000	2H2020		450			200	650	400
Sinopec Sabic Tianjin PC	Tianjin	Naphtha, ethane	300	3Q2020							
Sinochem Quanzhou PC	QUANZHOU, FUJIAN	Naphtha	1000	4Q2020	360			100	500	450	
Liaoning Bora PC	PANJIN, LIAONING	Naphtha	1000	4Q2020	350	450				350	
Sinopec-SK Wuhan PC	Wuhan, Hubei	Naphtha	300	2020							
Fujian Gulei PC	ZHANGZHOU, FUJIAN	Naphtha	800	1H2021				300	500	600	
Shenghong Ref & Chem	LIANYUNGANG, JIANGSU	Naphtha	1100	2022				200	400	600	
Petrochina/PDVSA	JIEYANG, GUANGDONG	Naphtha	1200	2023	400	600				800	
Sinopec Hainan PC	YANGPU, HAINAN	Naphtha	1000	2023	350		200				
Huajin Aramco PC	PANJIN, LIAONING	Naphtha	1500	2024	350			200		510	

# Olefin Developments in China: Increased self sufficiency to be achieved through steam-cracking, largely naphtha based

Company	Location	Propylene (kt/a)	Feedstock	Derivatives	S/u date
Sinopec Zhongke Ref & PC	Zhanjiang, Guangdong	430	Naphtha	350kt PP	1Q20
Zhejiang PC (Phase 1)	Zhoushan, Zhejiang	700	Naphtha	450kt PP, 250kt Acetone, 400kt Phenol, 260kt ACN	4Q19
Hengli PC	Dalian, Liaoning	550	Naphtha, ethane, butane	450kt PP	1H20
Wanhua Chemical	Yantai, Shandong	400	LPG	300kt PP, 300kt PO	2H20
Sinopec Sabic Tianjin PC	Tianjin	150	Naphtha, ethane		3Q20
Sinochem Quanzhou PC	Quanzhou, Fujian	500	Naphtha	350kt PP, 260 ACN, 200PO	4Q20
Liaoning Bora PC	Panjin, Liaoning	600	Naphtha	400kt PP	2020
Sinopec-SK Wuhan PC	Wuhan, Hubei	150	Naphtha	300kt PP	2020
Fujian Gulei PC	Zhangzhou, Fujian	490	Naphtha	350kt PP, 200kt PO	1H21
Shenghong Ref & Chem	Jiangsu, Lianyungang	650	Naphtha	270kt ACN, 180kt AA ester, 240kt SAP	2022
Petrochina/PDVSA	Jieyang, Guangdong	600	Naphtha	600kt PP, 130kt ACN	2023
Sinopec Hainan PC	Yangpu, Hainan	500	Naphtha	250kt PP	End-2023
Huajin Aramco PC	Panjin, Liaoning	700	Naphtha	300kt PP, 190kt Acetone, 310kt Phenol, 260kt ACN, 200kt PO	2024



# Olefin Developments in China: New focus on ethane cracking

Company	Ethane supplier	Ethylene (kt/a)	Derivatives	Comments
Dalian Huikun	-	2000		Application submitted to CDRC, undergoing basic engineering design work
Eversun Holdings	AEC	1500	900kt PE	Framework agreement with AEC
Ganergy Group	AEC	2000		Framework agreement with AEC, MoU signed with KBR
Guangxi Investment	-	1000	300kt LLDPE, 300kt HDPE	Approval process ongoing
Nanshan Group	AEC	2000	Fully integrated to PE & MEG	Framework agreement with AEC, application submitted to CRDC
Qingdao Hengyuan Chemical	AEC	1500		Framework agreement with AEC, undergoing feasibility study
Satellite Petrochemical	Orbit (ETP & Satellite)	2500 (2x1250)	500kt LLDPE, 500kt EG, 500kt styrene	Construction began end-2018 Due on-stream 2021 and 2023 Signed ethane supply deal with ETP
SP Chemical	INEOS	650	320kt styrene, 320kt EDC, 500kt VCM	Due on-stream 2019 Ethane/LPG feedstock Long term ethane supply deal involves construction of VLEC
Tianjin Bohua	-	1000		Timeline 5yrs+
Yutime Petroleum	-	2600		Timeline 5yrs+
Petrochina Tarim Oilfield	Domestic	600	2x300 kt HDPE/ LLDPE swing	Expected on-stream 2023
Ningbo Huatai Wealthy Polymer	Domestic	600	200kt LLDPE, 200kt HDPE, 400 kt PP, 300kt styrene	Under construction, start-up due 2020 Feedstock ethane 27%, propane 73% Feed source is refinery gas and merchant propane

- ▶ Majority of projects speculative, units highlighted in proceeding
- ▶ 25% import tariffs have significant effect on economics

# Olefin Developments in China:

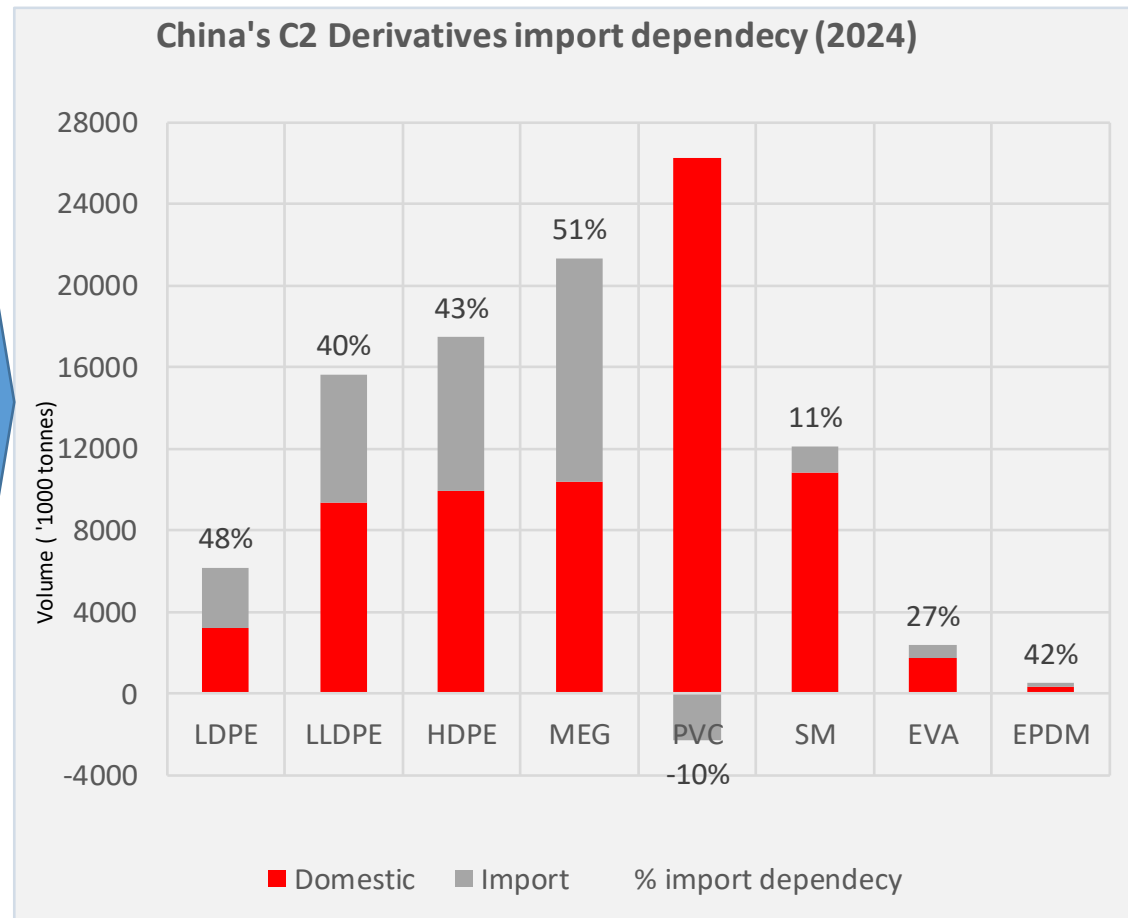
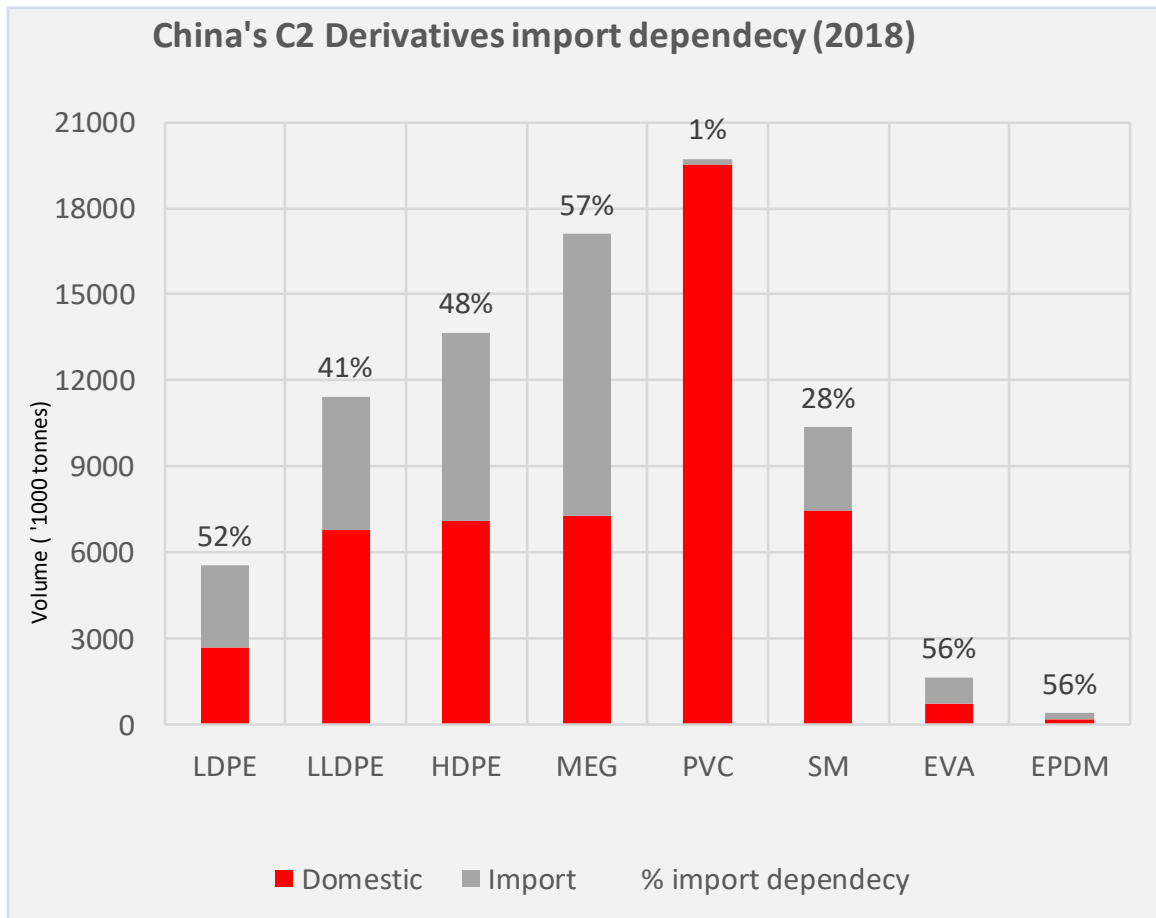
- ▶ CTO projects come back after a strict environmental protection approval. Few MTO would be on-line regarding relatively poor economy.
- ▶ Most CTO/MTO units are integrated with polyolefins.

Company	Location	Technology	Start-up year	Ethylene (kt/a)	Ethylene derivatives	Propylene (kt/a)	Propylene derivatives
ZHONG AN UNITED COAL CHEMICAL CO	HUAINAN,ANHUI	CTO	Jul, 2019	350	350kt LLDPE	350	350kt PP
QINGHAI DAMEI COAL INDUSTRY	XINING,QINGHAI	CTO	Sep, 2019	300	300kt LLDPE	300	400kt PP
NINGXIA BAOFENG ENERGY	YINCHUAN,NINGXIA	CTO	H2, 2019	300	300kt LLDPE	300	300kt PP
SHANXI COKING COAL GROUP	HONGDONG,SHANXI	CTO	2020	300	300kt LLDPE	300	300kt PP
SHAANXI YANCHANG COAL YULIN EN. AND CH.	JINGBIAN,SHAANXI	CTO	2021	300	150kt EVA, 150kt LDPE	300	300kt PP
SHENHUA BAOTOU COAL CHEM. INDUSTRY	BAOTOU,INNER MONGOLIA	CTO	2021	300	350kt LLDPE	300	400kt PP
SINOPEC GUIZHOU ZHIJIN	ZHIJIN,GUIZHOU	CTO	2021	300	300kt LLDPE	300	400kt PP
HEILONGJIANG LONGTAI COAL CHEMICAL	SHUANGYASHAN,HEILONGJIANG	CTO	2021	280	200kt LLDPE, 100kt EVA	320	300kt PP
PINGLIANG HUAHONG HUIJIN COAL CHEMICAL	PINGLIANG,GANSU	CTO	2022	350	200kt LLDPE	350	300kt PP
QINGHAI MINING CO	GOLMUD,QINGHAI	CTO	2022	300		300	400kt PP
JIUTAI ENERGY GROUP	ORDOS CITY,INNER MONGOLIA	MTO	May, 2019	250	250kt LLDPE	350	350kt PP
NANJING CHENGZHI CLEAN ENERGY	NANJING,JIANGSU	MTO	July, 2019	240		360	
JILIN CONNELL CHEMICAL	JILIN,JILIN	MTO	H2, 2019	135		165	
LIAOCHENG MEIWU NEW MATERIALS TECHCORP	LIAOCHENG,SHANDONG	MTO	H2, 2019	120		170	
TIANJIN BOHAI CHEM. GROUP	TIANJIN,TIANJIN	MTO	2020	300	300kt LLDPE, 450kt SM	300	300kt PP
DAQING LIANYI PETROCHEMICAL	DAQING,HEILONGJIANG	Olefins conversion/FCC	2020	400	400kt LLDPE	350	350kt PP

## Olefin Developments in China: Enthusiasm for PDH obviously dropped from 2018 with narrowed margin on higher feedstock cost.

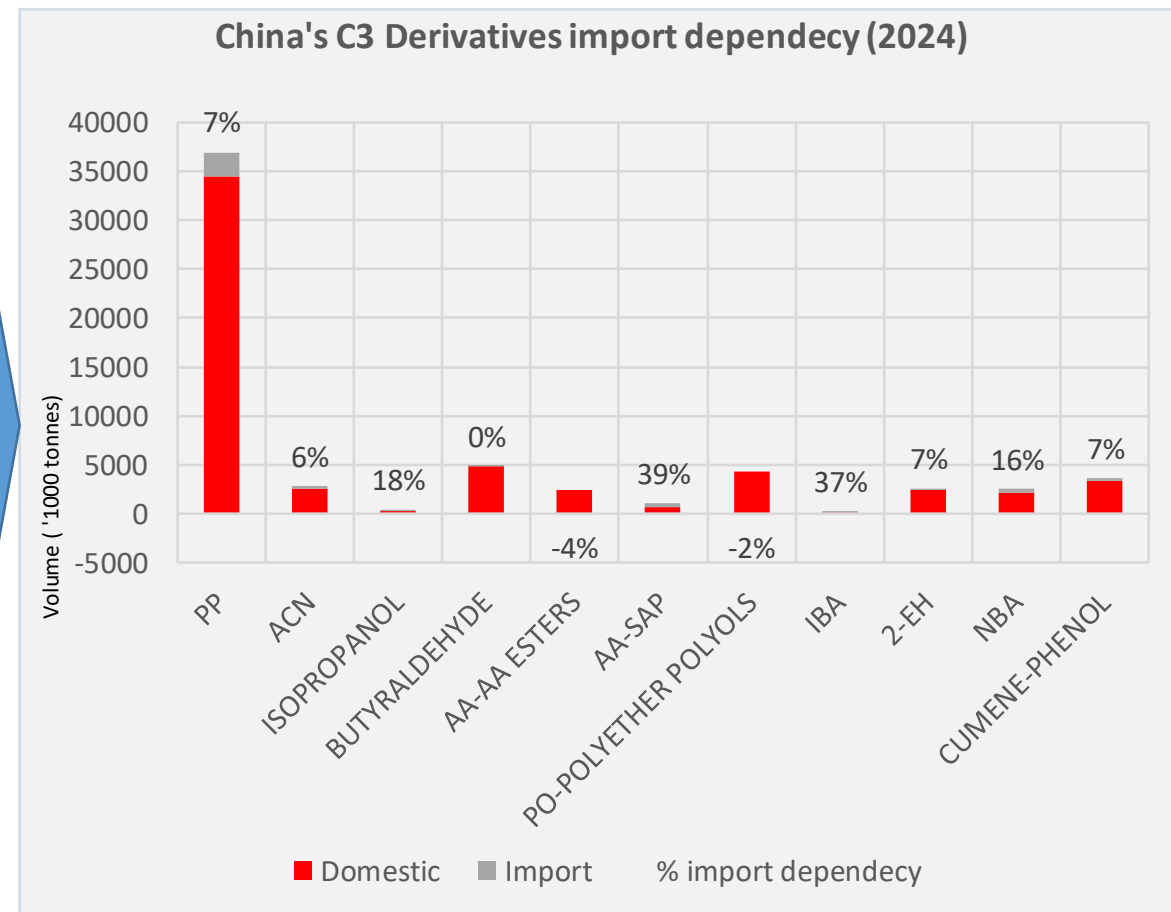
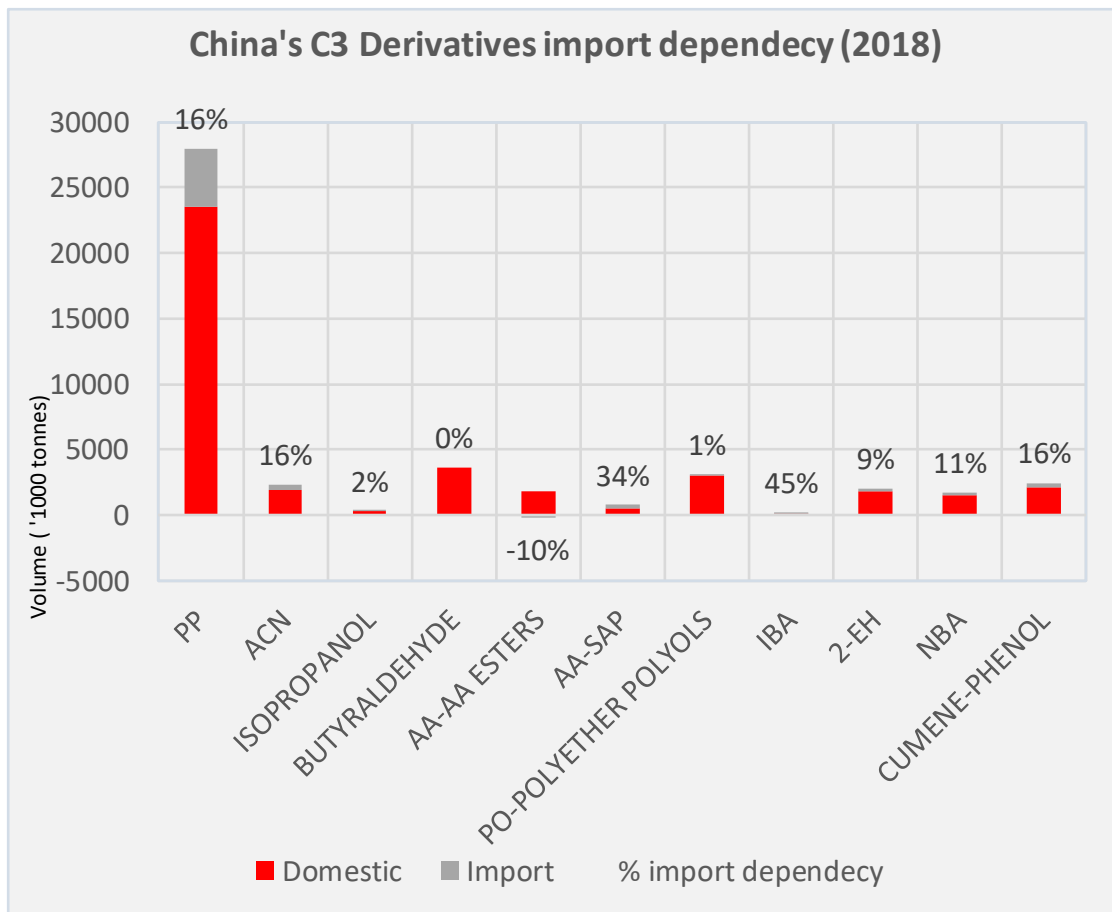
Company	Location	Feedstock	Start-up year	Propylene (kt/a)	Propylene derivatives
DONGGUAN GRAND RESOURCE SCIENCE AND TECH	DONGGUAN, GUANGZHOU	Propane	Aug, 2019	600	PP
FUJIAN MEIDE PC	FUZHOU, FUJIAN	Propane	end 2019	660	PP
HENGLI PC	CHANGXING ISLAND, LIAONING	Propane	2019	450	integrated with crackers
ZHEJIANG SATELL. ENERGY CO. LTD.	PINGHU, ZHEJIANG	Propane	2019	450	PP
ZHEJIANG PETROCHEMICAL	ZHOUSHAN, ZHEJIANG	Propane	H1, 2020	600	integrated with crackers
ORIENTAL ENERGY	NINGBO, ZHEJIANG	Propane	2020	660	PP
JINNENG SCIENCE AND TECHNOLOGY	QINGDAO, SHANDONG	Propane	2021	900	PP, ACN

# Import Dependency



- ▶ Import dependency for C2 derivatives (except PVC) expected to around 29.8 million tonnes in 2024, slightly up from 28.0 million tonnes in 2018.
- ▶ LDPE, LLDPE, HDPE and MEG are expected to remain import dependent at over 40%

# Import Dependency



- ▶ Import dependency for most C3 derivatives expected to around 4.3 million tonnes in 2024, continuously down from 6.2 million tonnes in 2018.
- ▶ SAP and IBA are expected to remain import dependent at around 40%

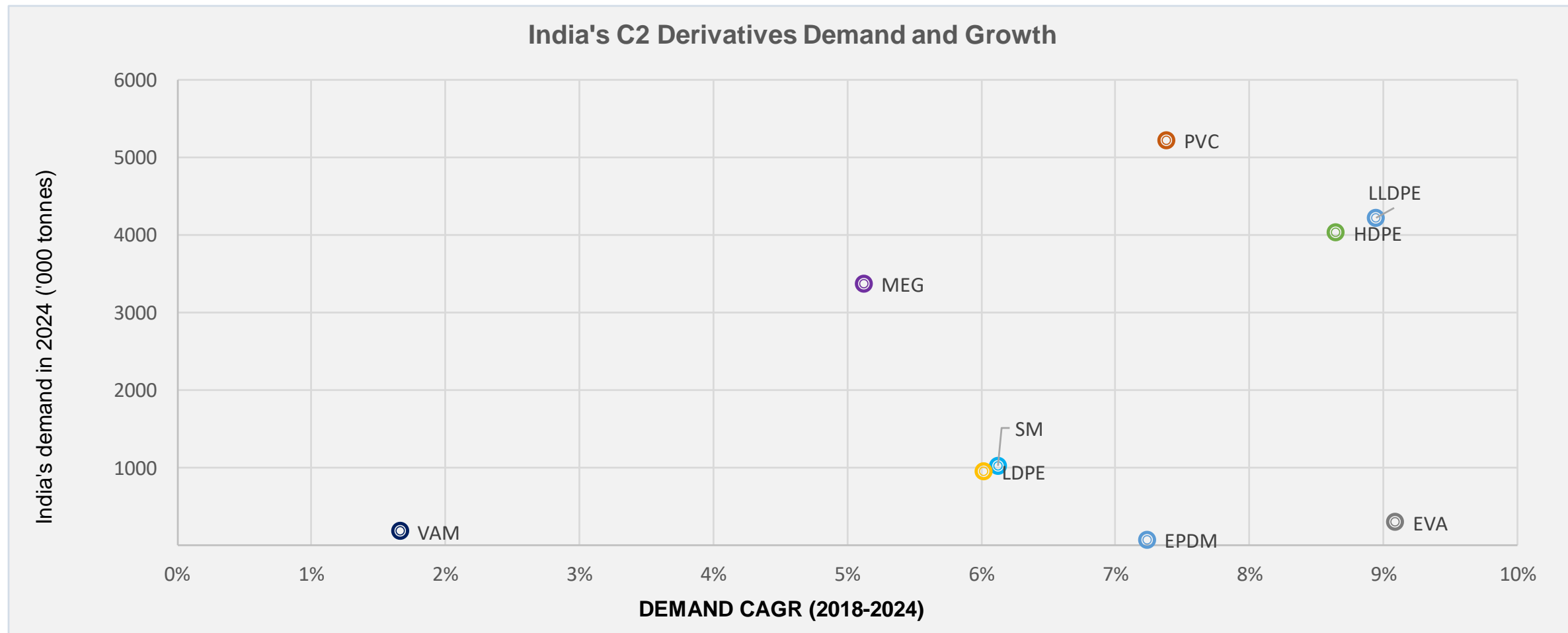


India development



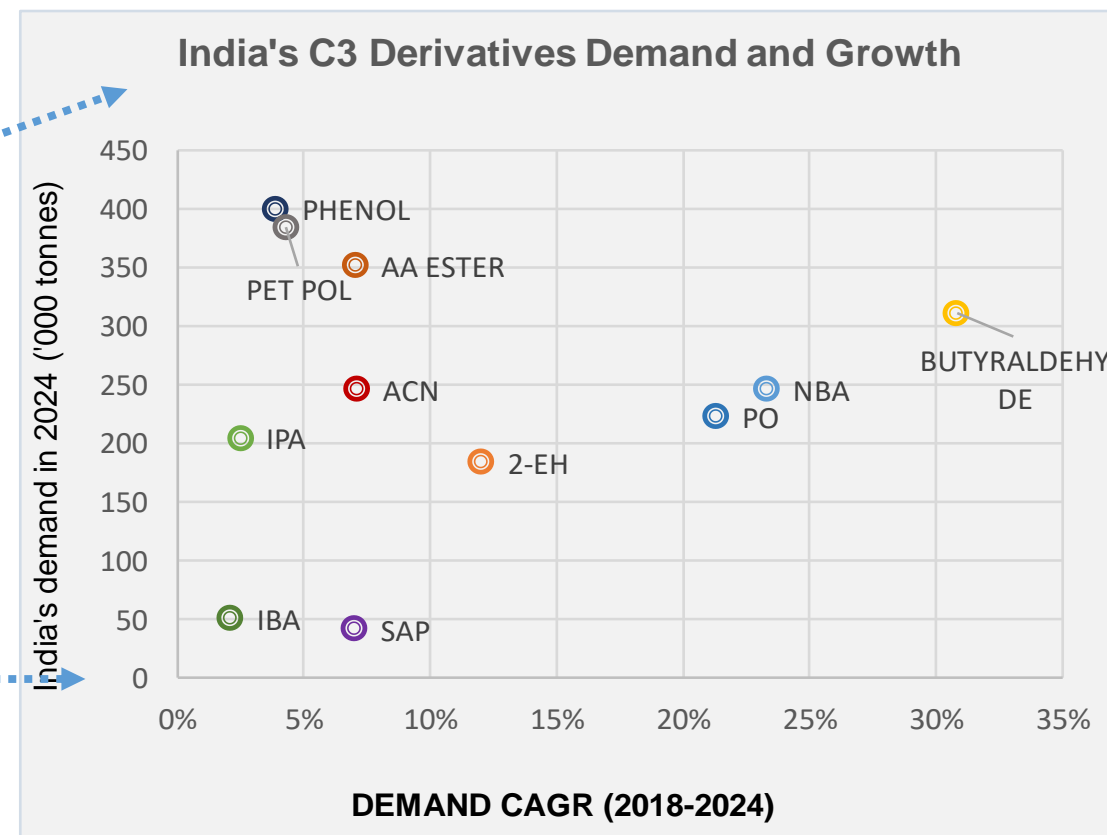
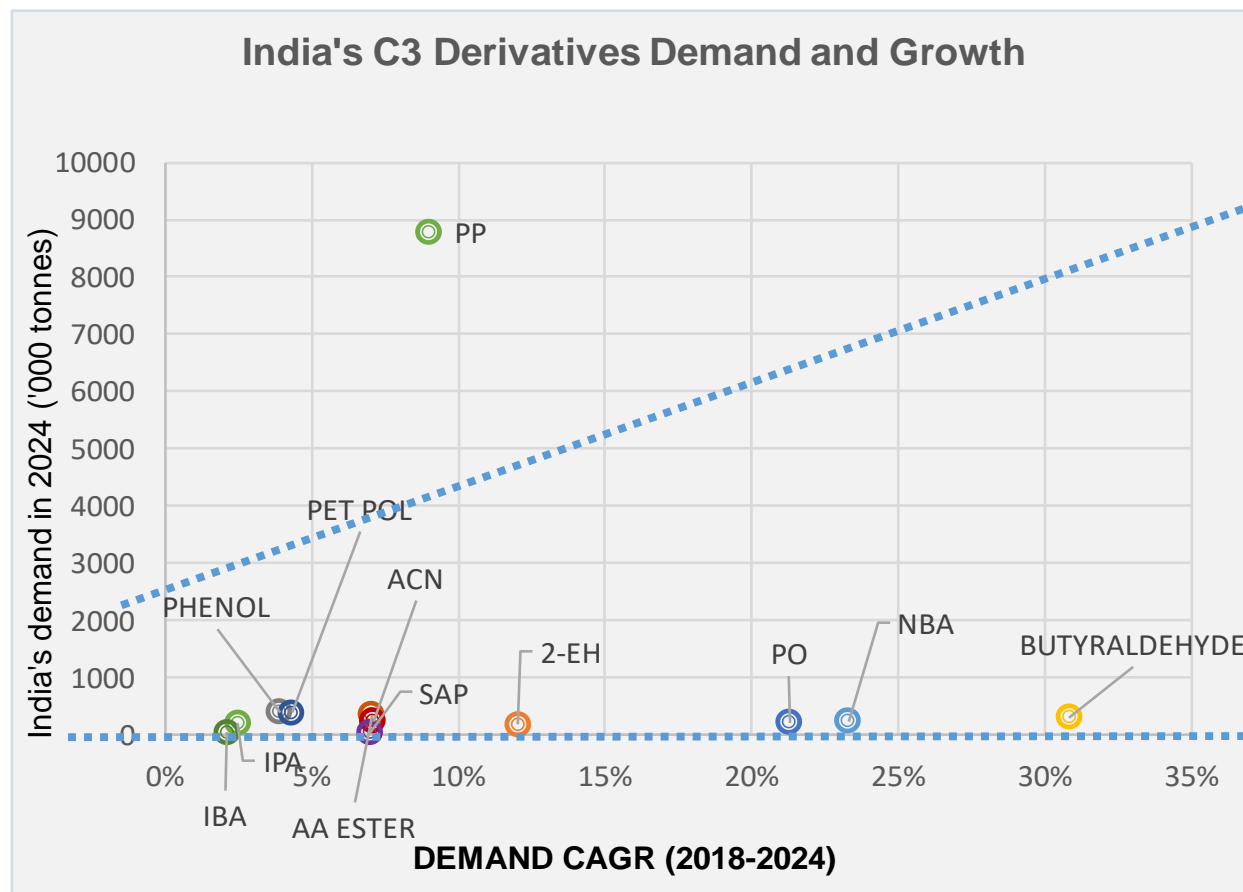
# India Ethylene Derivatives Demand Outlook

- ▶ All C2 derivatives poised for demand growth rates over 5% except VAM. EVA has the highest demand among all C2 derivatives followed by LLDPE HDPE and PVC. Other derivatives like Styrene, LLDPE and MEG also offer moderate demand volumes and stable growth outlook.

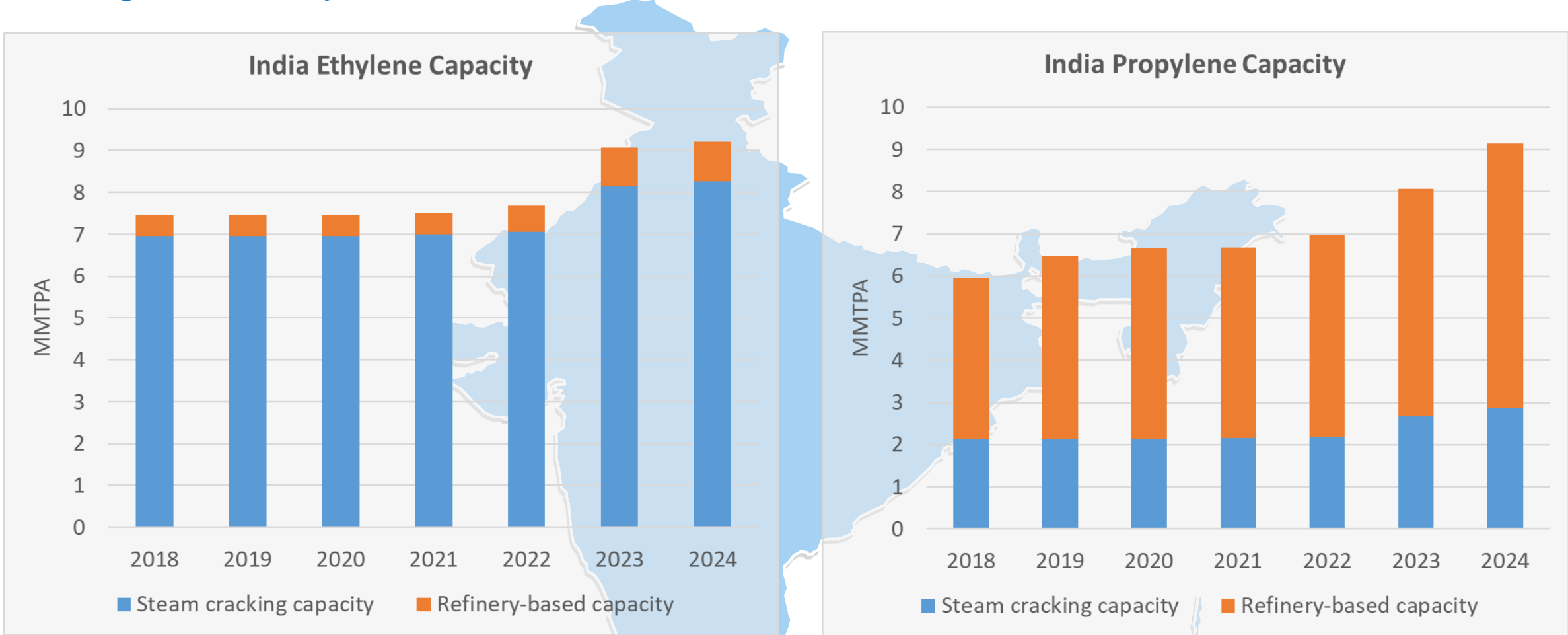


# India Propylene Derivatives Demand Outlook:

- Polypropylene clearly stands out amongst C3 derivatives dwarfing demand for other derivatives. However, other C3 derivatives like Acrylic Acid Esters, SAP and Oxo-Alcohols (NBA and 2-EH) exhibit moderate demand volumes and stable growth rates in excess of 7%.



# Indian Olefin Developments: Significant growth in propylene coming through refinery linked investments



Majority of propylene being paired with new investments in PP

# India Ongoing Investments- Ethylene & C2 Derivatives

Company	Location	Technology	Ethylene (kt/a)	Start-up Year	Derivatives
IOCL	PANIPAT	Steam-cracking	+90	2021	MEG
HMEL	PHULOKHARI	Steam-Cracking/Refinery Gas	1200	2021	HDPE/LLDPE/LinearOlefins/Butene-1
IOCL	PARADEEP	Refinery Gas	200	2022	MEG
BPCL	COCHIN	Refinery Gas	75	2023	MEG
HPCL	PACHPADRA	Steam-Cracking/Refinery Gas	897	2023/2024	HDPE/LLDPE/Butene-1
RRPL	RATNAGIRI	Steam-Cracking	>5000		LLDPE/HDPE/LDPE/MEG/PVC/Butene-1/EPDM
Nayara	VADINAR	Steam-Cracking	900		HDPE/LLDPE/LDPE/EVA
Kakinada	AVNAGARAM	Steam-Cracking	1000		HDPE/LLDPE/Butene-1
HALDIA	HALDIA	Steam-Cracking	770 (+70)		HDPE/Butene-1

- Majority of firm investments in C2 derivatives are towards PE with 2.37 million tons of Ethylene capacity additions by 2024

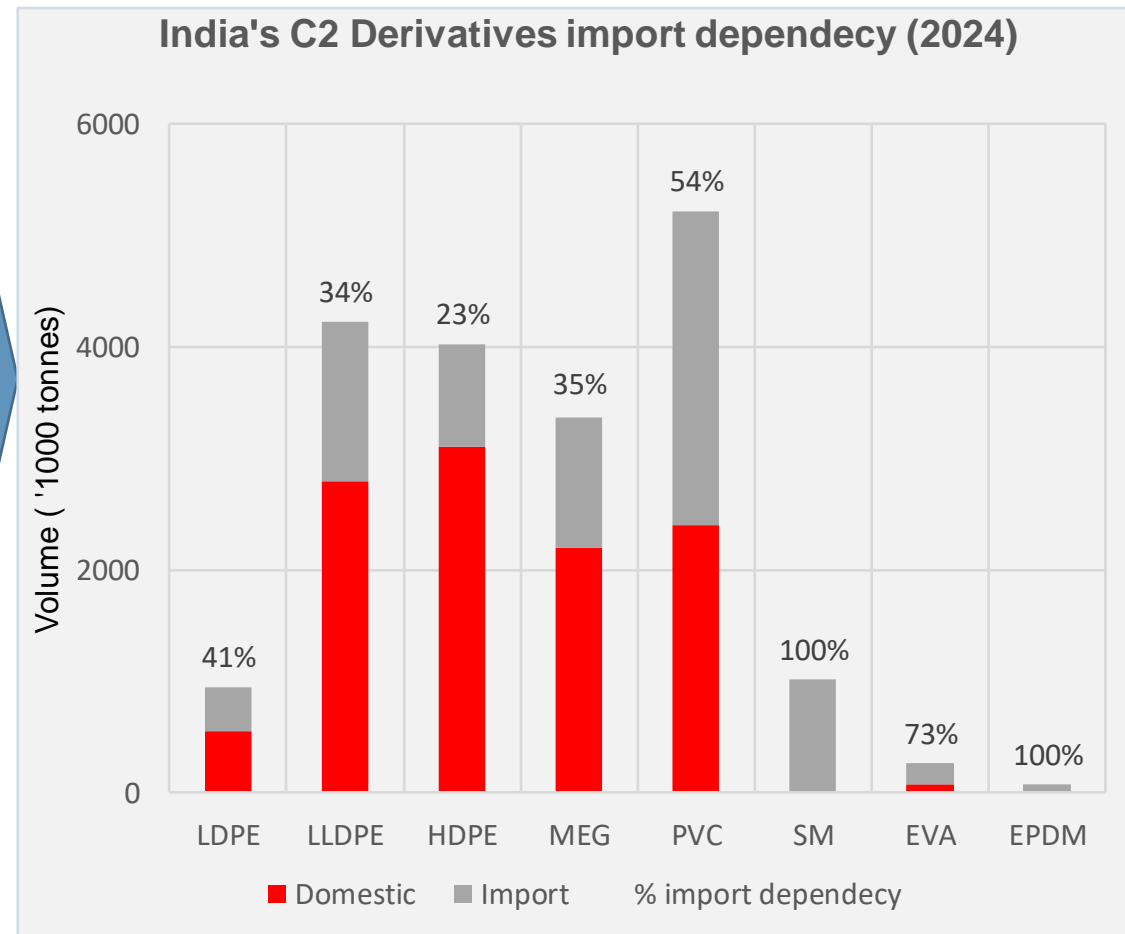
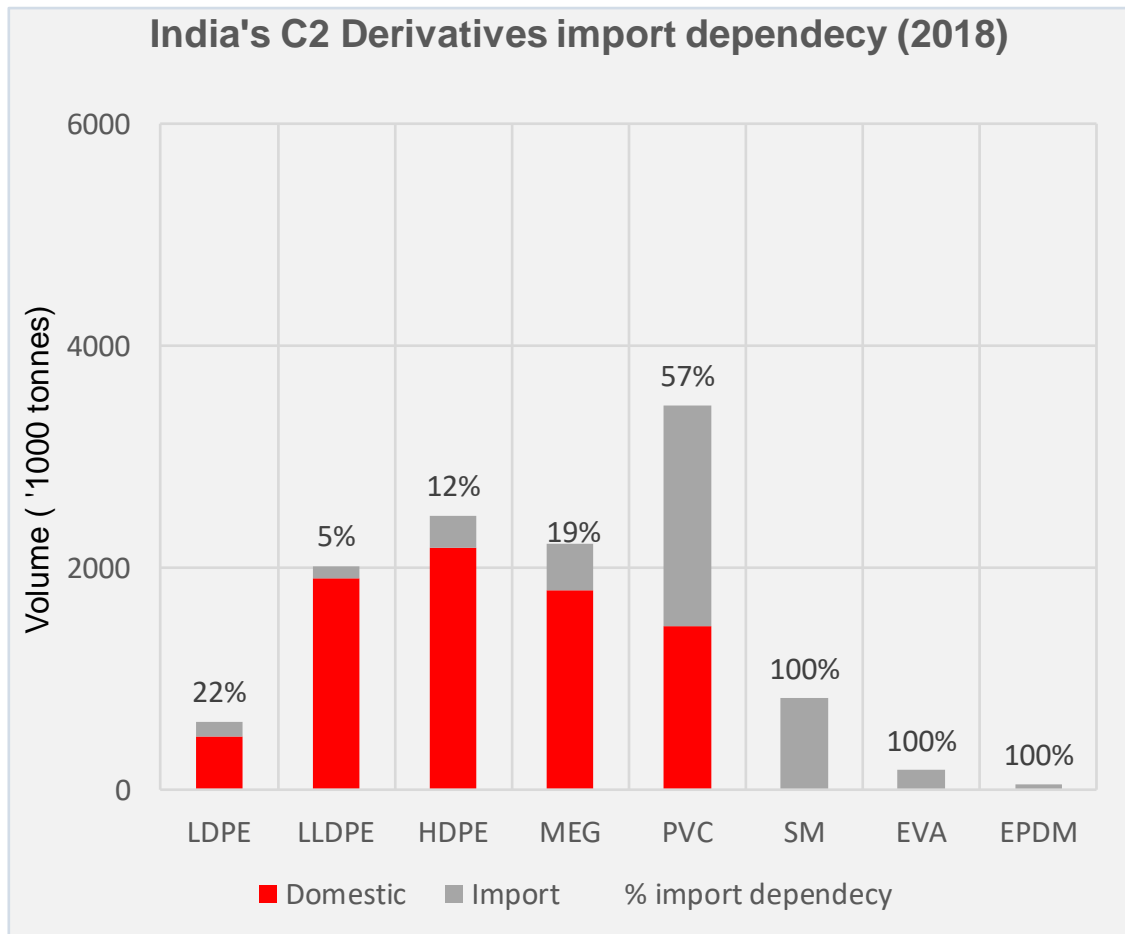
# India Ongoing Investments- Propylene & C3 Derivatives

Company	Location	Route	Propylene (kt/a)	Start-up Year	Derivatives
IOCL	KOYALI	FCC	400	2023	PP
IOCL	PANIPAT	Steam-cracking	+40	2021	
IOCL	PARADEEP	FCC	700	2019	PP
HPCL	PACHPADRA	Steam-cracking/FCC	965	2023/2024	PP
HMEL	PHULO KHARI	SteamCracker/FCC	750	2021	PP
BPCL	MUMBAI	FCC	450	2023	PP

- ▶ Around 2.5 MT of Propylene capacity additions by 2024, majority of investments are towards PP. Phenol/Acetone, Polyols are some other firm investments, however India is expected to remain import dependent for all C3 derivatives



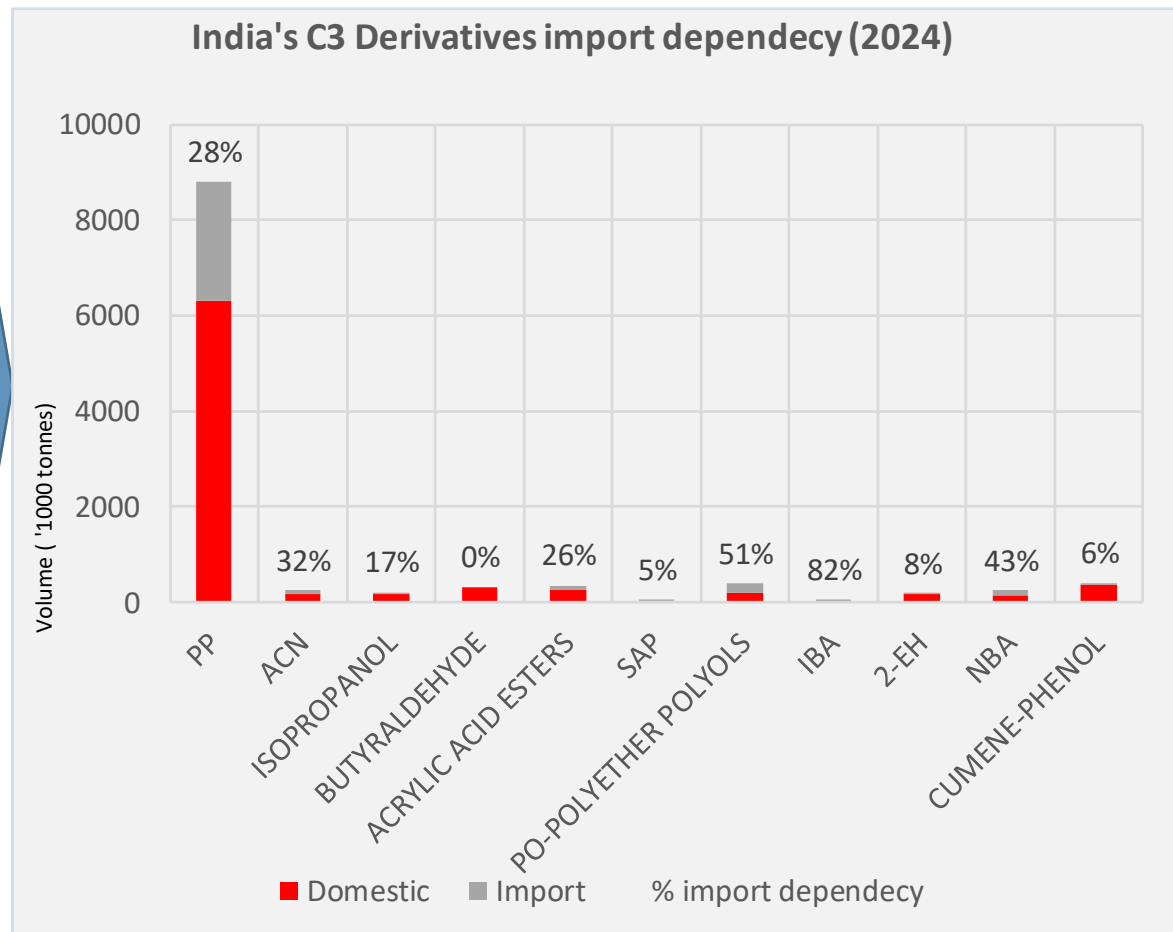
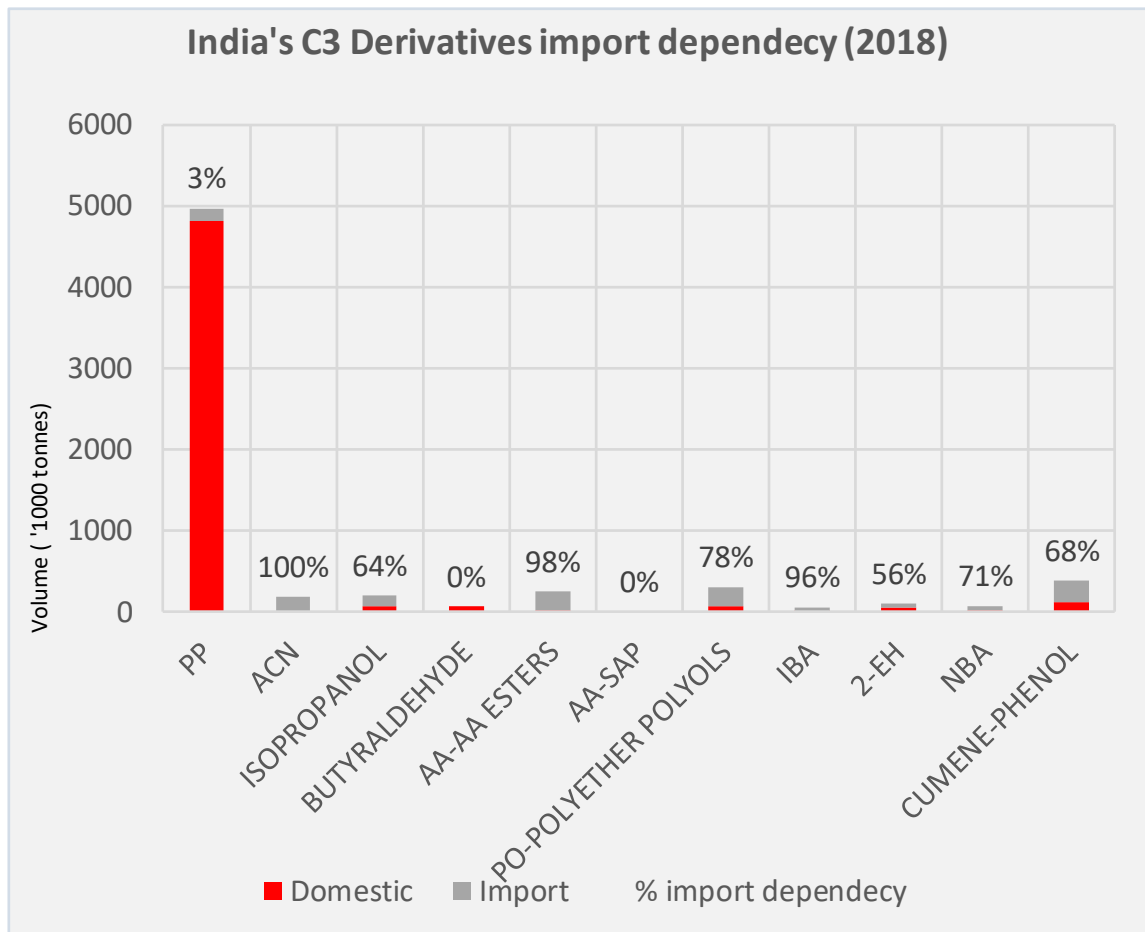
# Import Dependency



- ▶ Import dependency for C2 derivatives expected to be around 5.2 million tonnes in 2024 from under 4 million tonnes in 2018. Most derivatives are expected to have import dependency at 23-41%.
- ▶ Styrene and EPDM are expected to remain almost entirely import dependent.



# Import Dependency



- ▶ Import dependency for C3 derivatives expected to exceed 3 million tonnes by 2024 from 1.4 million tonnes in 2018. Import dependency for most derivatives is over ~60%, with exception of Phenol, Isopropanol and NBA. EPDM and SAP are entirely dependent on imports.

# Conclusions

- ▶ Demand growth for olefins remains relatively strong, which is a key reason we are continuing to see investment decisions being made
- ▶ In a period of capacity investment and expect to see reduced operating rates over next few years – likely to be pressures on older, non-integrated/standalone steam crackers
- ▶ Olefin demand continues to be centred around Asia, with capacity investments following; increased self-sufficiency for a number of governments is a key driver
- ▶ Ethane crackers attract investment in China regarding high import dependency on ethylene derivatives but which would depend on the negotiation between China and US
- ▶ China ethylene derivatives would still rely on import to some extent but propylene derivatives would mostly reach self-sufficient and must export to other regions
- ▶ Sheer dominance of PE & PP investments in India cannot be denied

# THANK YOU

## Contact us

**Amber Liu**

ICIS Product & Analytics

[amber.liu@icis.com](mailto:amber.liu@icis.com)

+86-21-5155 0140

ICIS Supply and Demand Services

[www.icis.com/services/analysis/supply-and-demand](http://www.icis.com/services/analysis/supply-and-demand)

**Powered by Data. Driven by Insight.**