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Plastics markets in transition – preparing for a new world

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Rising crude oil prices

US

Strong economy

2nd investment wave

New capacities

Trade war?



Trade issues

Strong demand

Plant Inspections & closures

China

Rise in imports

Ban on plastic waste imports

New capacities

India

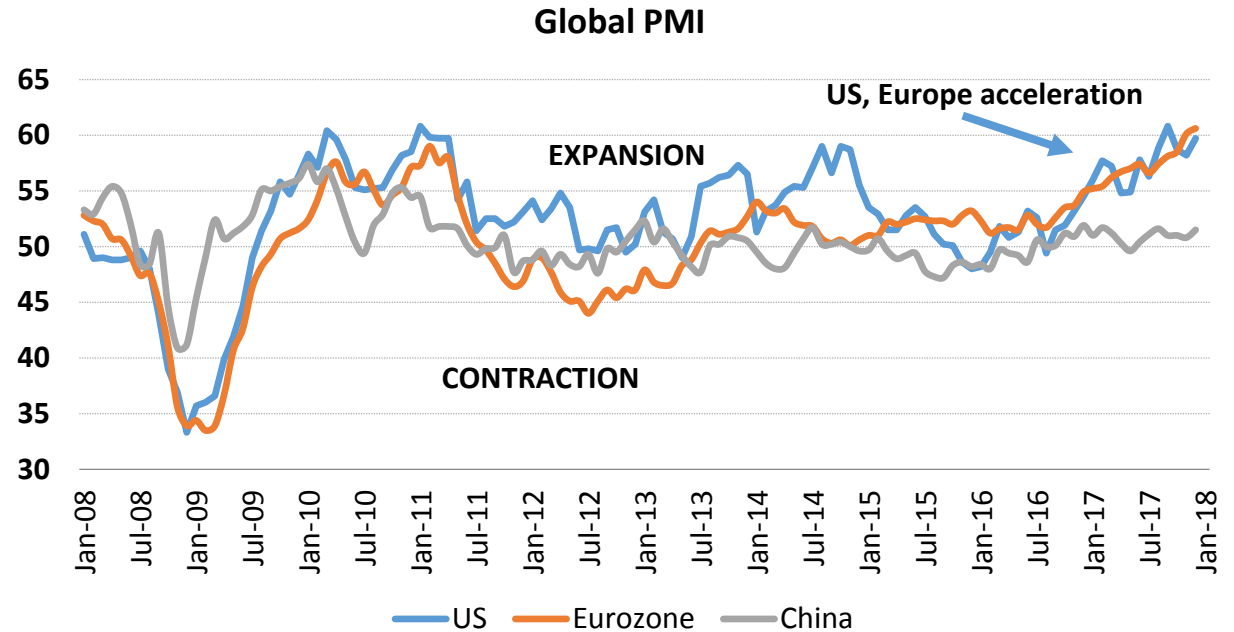
Demand recovery

Investment activity up

Start up of new plants

Global upswing underway

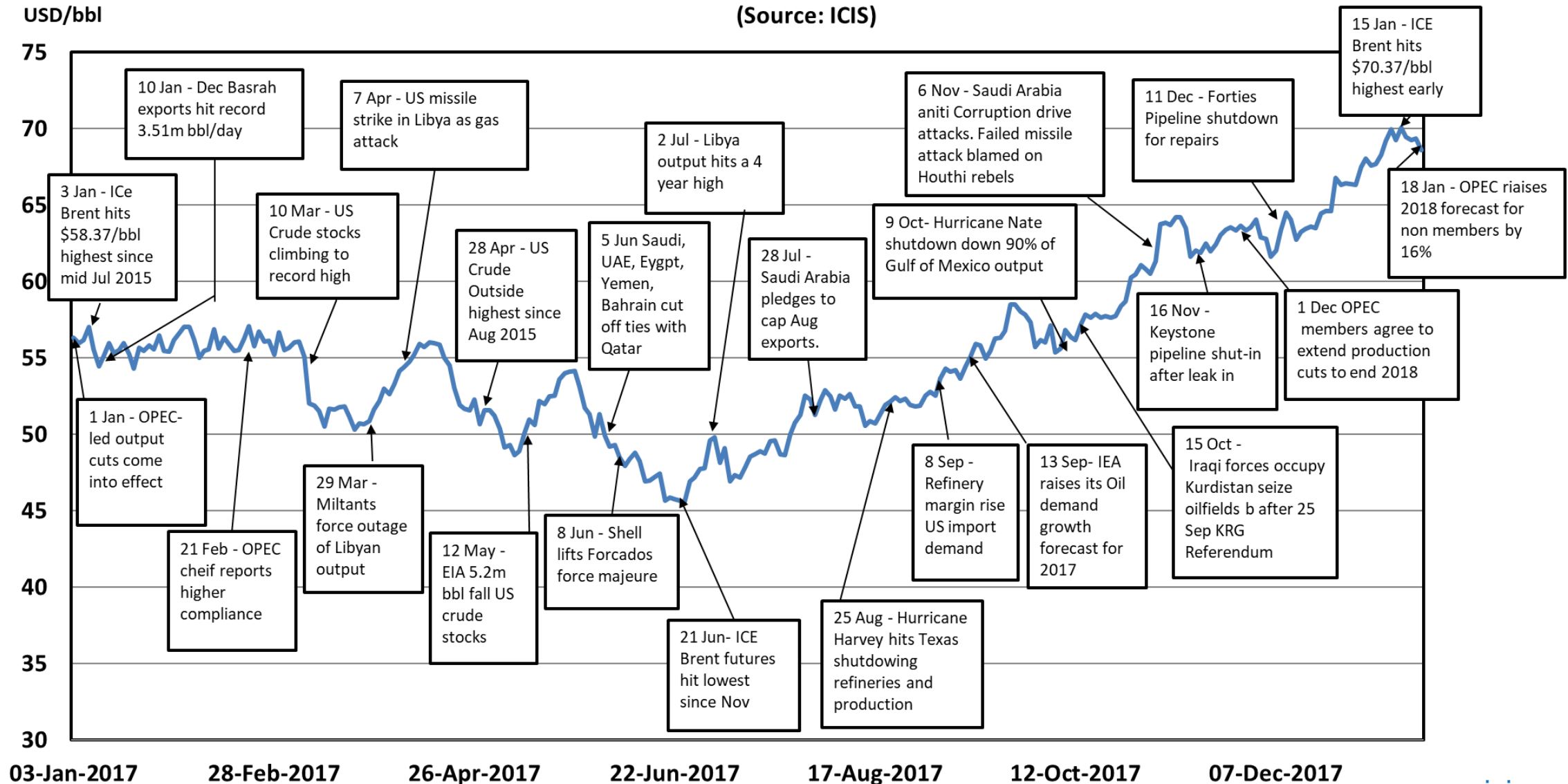
- ▶ Global GDP growth projections revised upwards - expected to hit 3.9% in 2018 & 2019, up from 3.7% in 2017
- ▶ Big boost from acceleration in economic activity in the US, Europe
- ▶ PMI numbers from US, Europe and China support outlook
- ▶ Faster economic expansion will boost demand for oil and other commodities and also support higher interest rates and tighter monetary policies



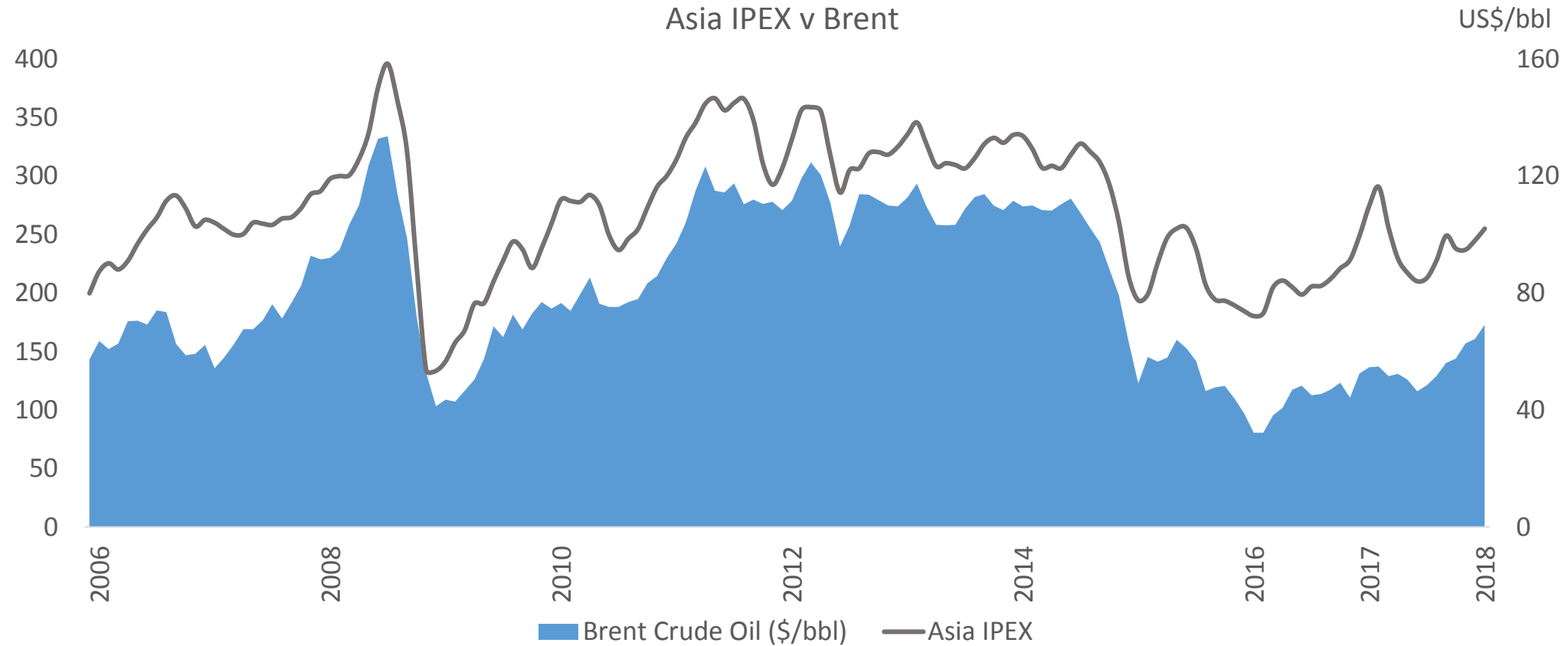
Crude surges as supply and demand move closer to balance

Benchmark Brent Crude Prices 2017-2018

(Source: ICIS)



Petrochemical prices were up in 2017 and most markets have seen a strong start to 2018



▶ Markets largely supported by demand and supply issues; Chinese buying and firmer crude oil prices

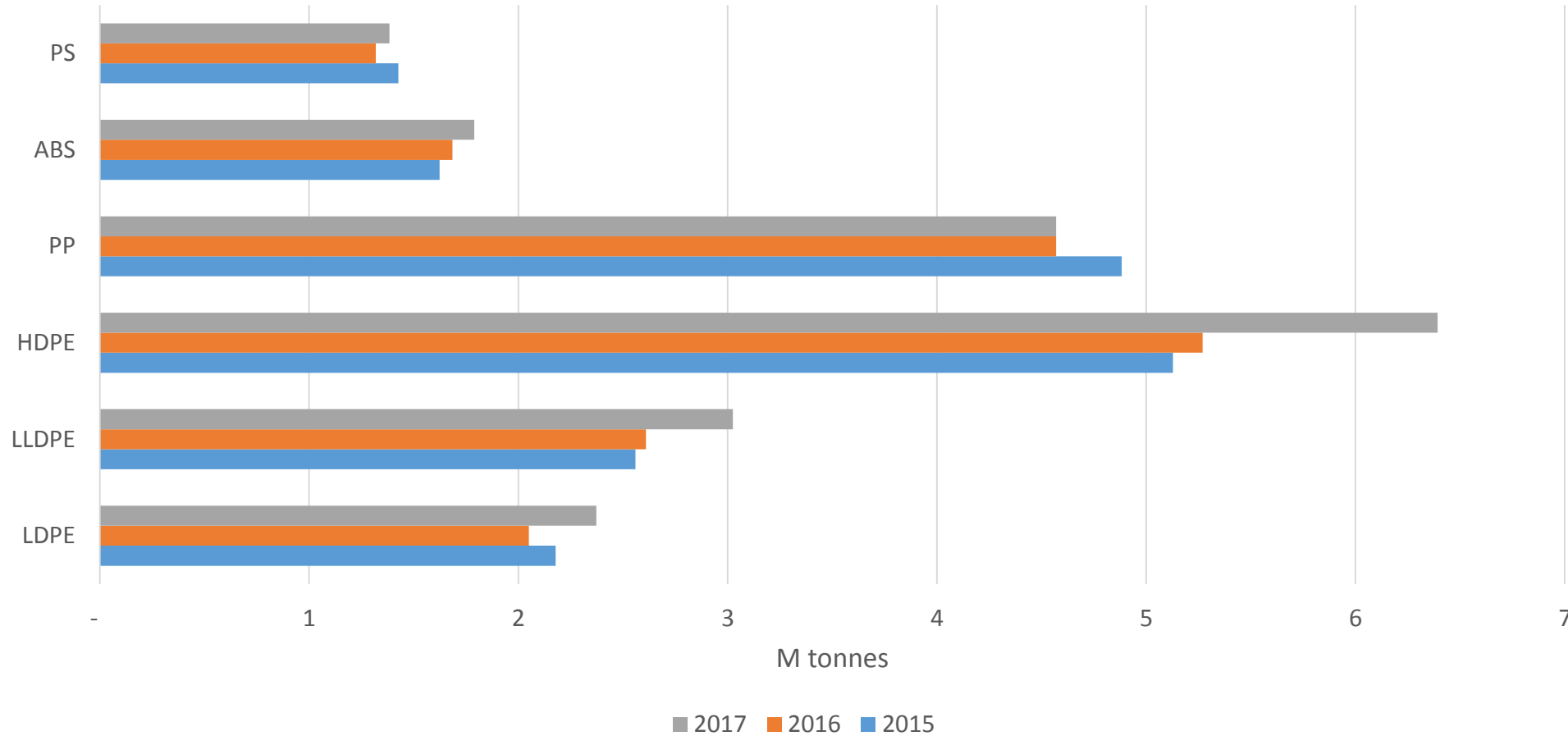
China crackdown on pollution – a game changer

- ▶ April 2017 – China begins air pollution inspections in Beijing, Tianjin and 26 other cities in the Northeast ('2+26 Plan') – 25 rounds in 1 year, intensifying in the winter
- ▶ Ban on imports of waste plastics announced July 2017, went into effect end of 2017
- ▶ More stringent environmental regulations have shut down chemical plants – some permanently
- ▶ Chemical markets have tightened. Only larger, well funded players can compete. China will export inflation vs deflation



Air monitoring in China can help forecast tightness

China imports show strong growth in 2017 even as the country adds new capacities

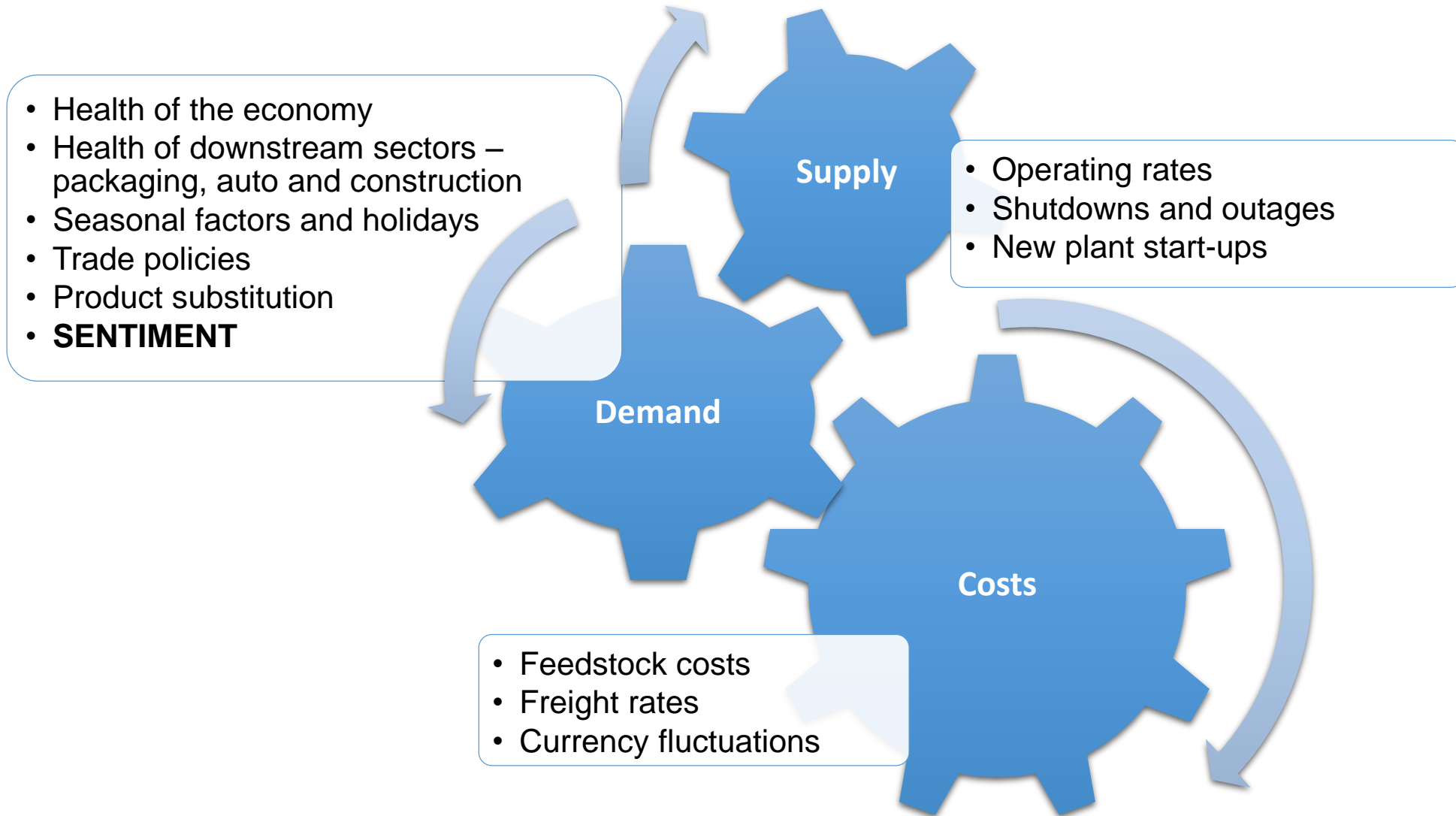


	2017 Vs 2016
LDPE	16%
LLDPE	16%
HDPE	21%
PP	4%
ABS	6%
PC	5%

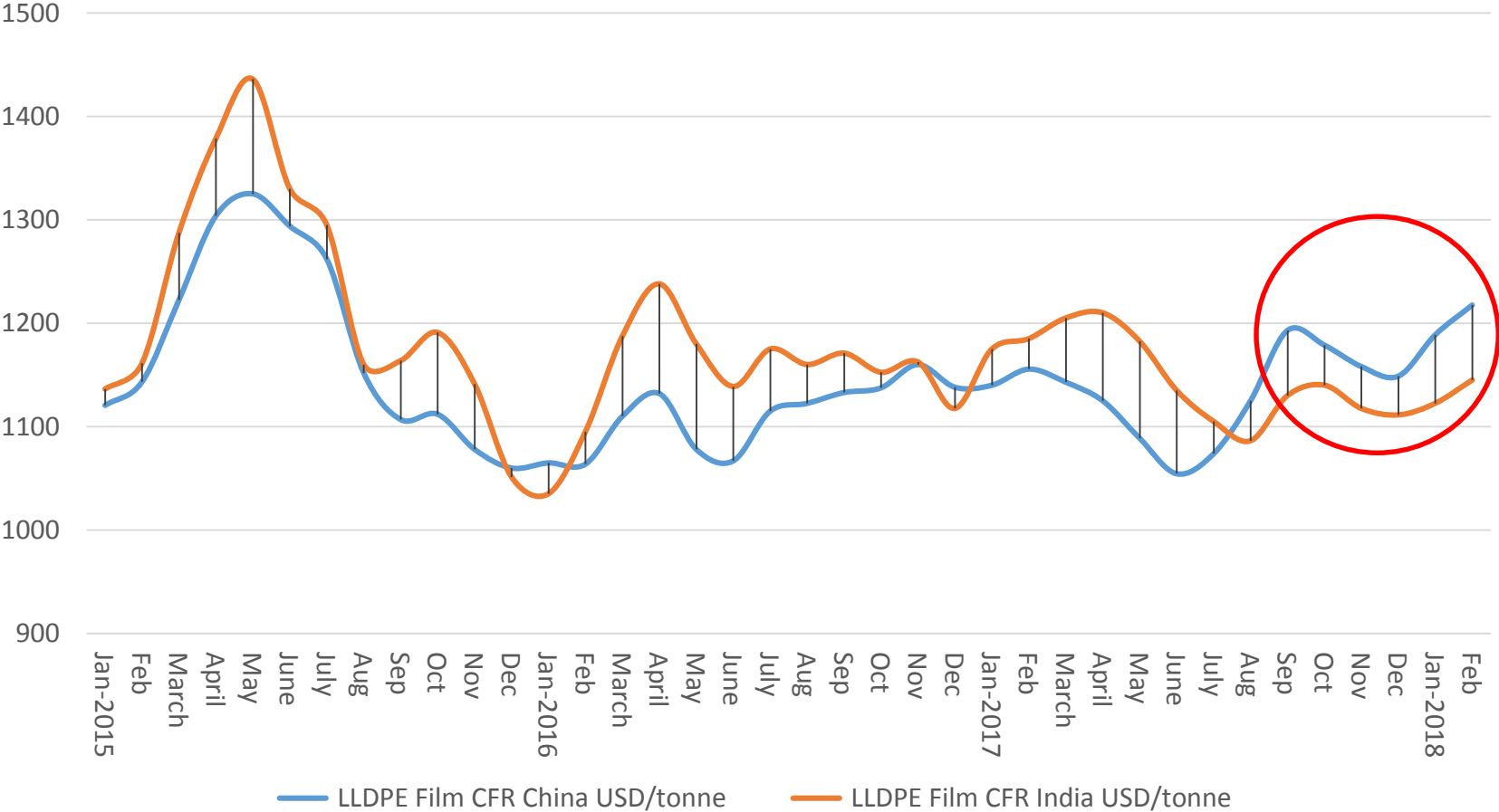
Polymer markets



A number of factors drive polymer prices



LLDPE - spread between India and China has widened



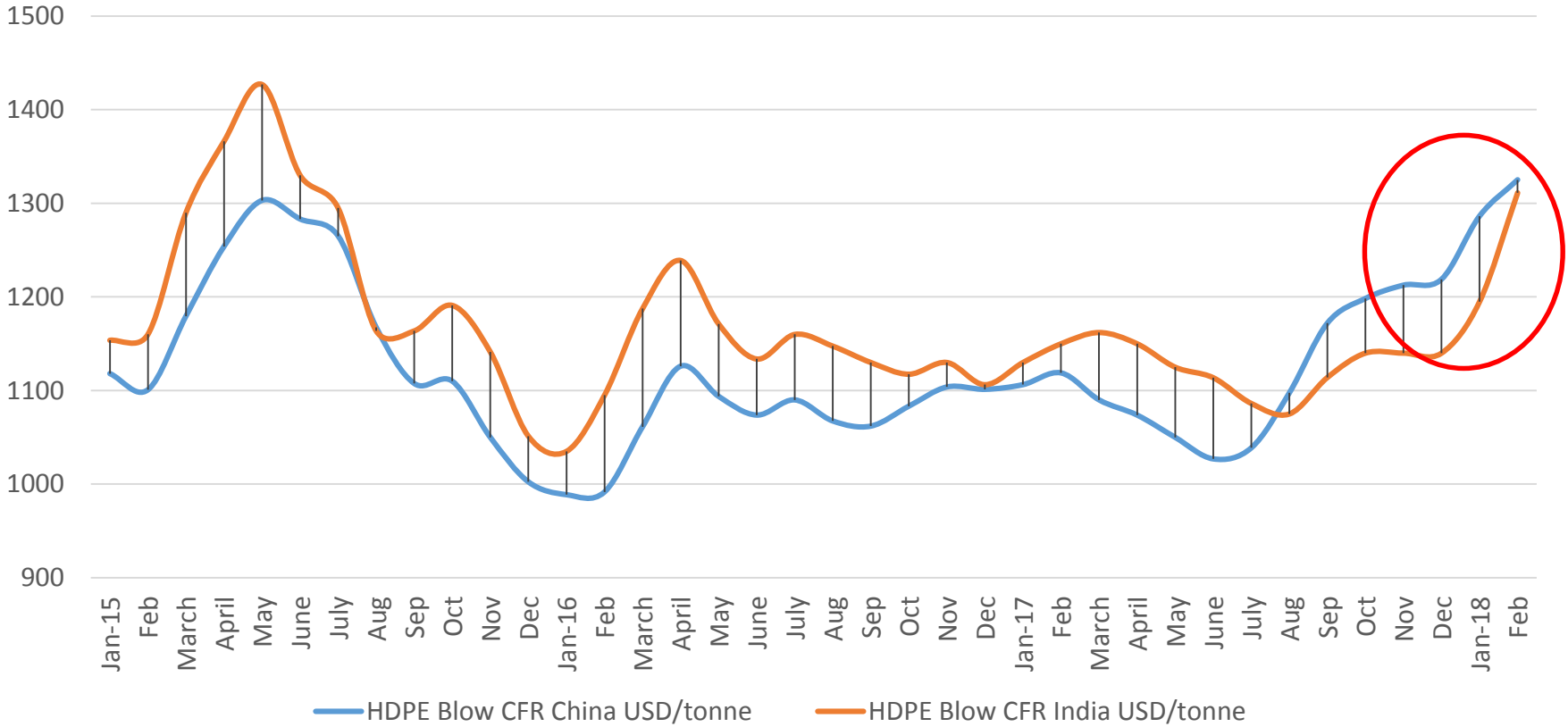
- ▶ India has moved from net deficit to surplus
- ▶ Commissioning of new capacities has pushed Indian prices below China
- ▶ Spread has widened to ~US\$70 this year

Average 2015
 USD 1180/cfr China
 USD 1230 cfr India

Average 2016
 USD 1110/cfr China
 USD 1150 cfr India

Average 2017
 USD 1130/cfr China
 USD 1150 cfr India

Similar trend for HDPE but delta between India and China has narrowed



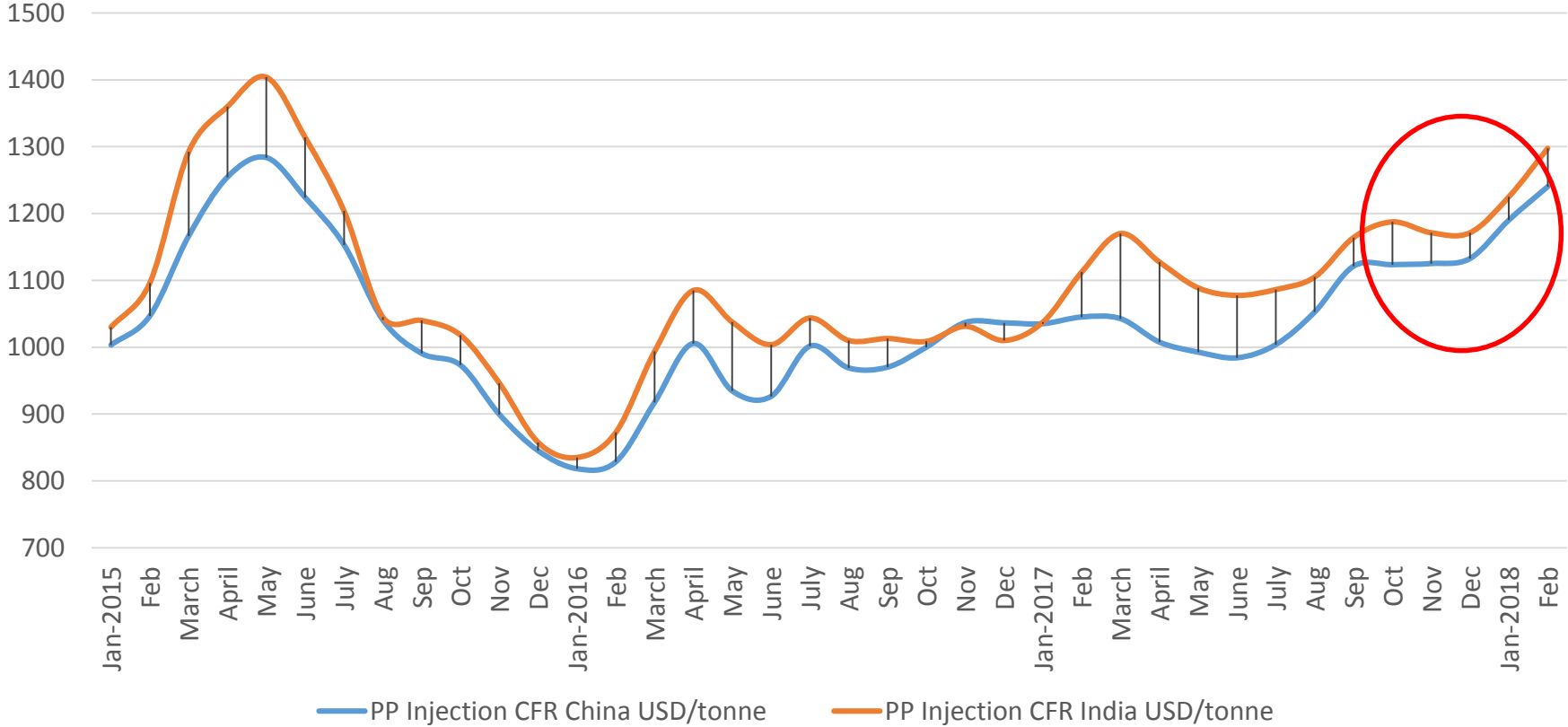
- ▶ China-India spread widened to over US\$80 end of last year but has since fallen
- ▶ Tight supply especially for pipe, blow moulding and film grades
- ▶ Pipe grade prices have increased by 30% in last year largely supported by China's shift from coal to gas policy shift
- ▶ Prices currently at a 8-year high

Average 2015
 USD 1160/cfr China
 USD 1230 cfr India

Average 2016
 USD 1070/cfr China
 USD 1140 cfr India

Average 2017
 USD 1120/cfr China
 USD 1130 cfr India

PP capacity growth in China; India's surpluses gradually getting absorbed



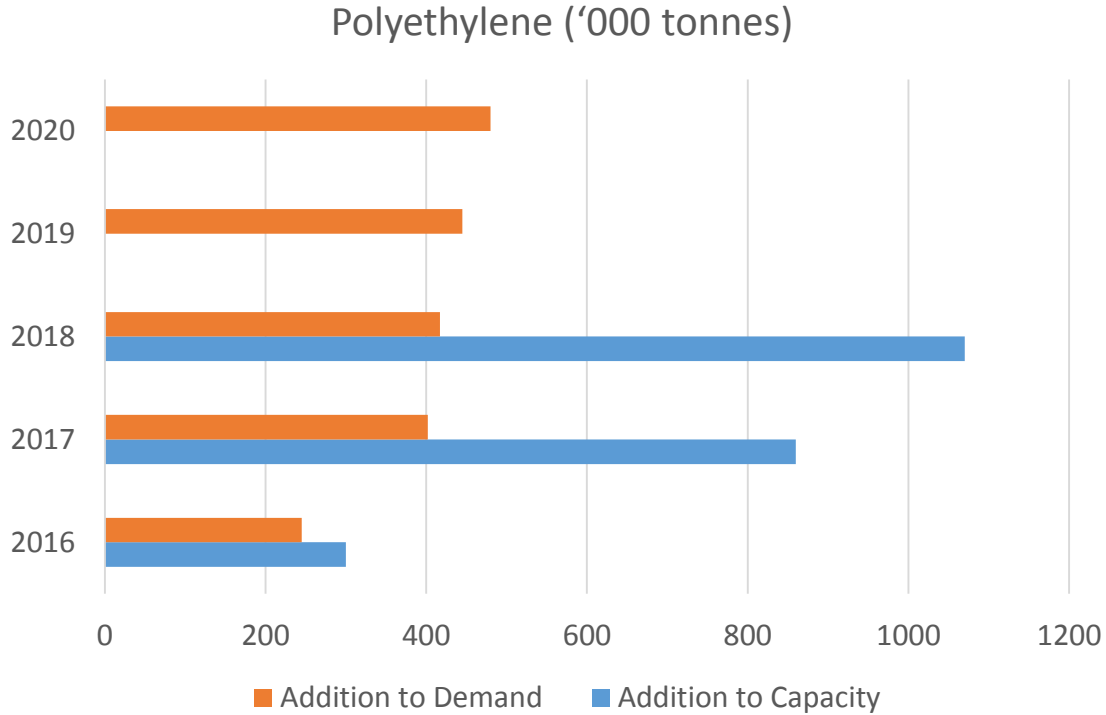
- ▶ PDH/CTO/MTO led capacity growth in China over the last few years
- ▶ India surplus gradually easing as the country turns to a net importer
- ▶ With propylene prices also moving up, PP faces upward pressure

Average 2015
 USD 1070/cfr China
 USD 1130 cfr India

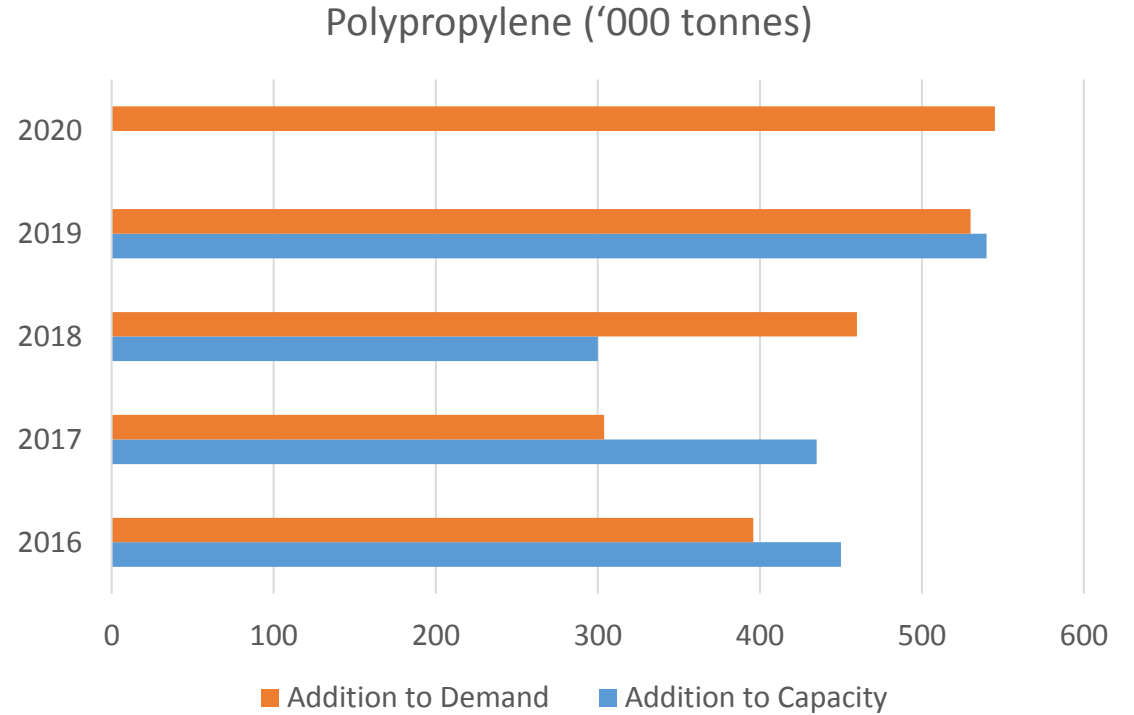
Average 2016
 USD 950/cfr China
 USD 995 cfr India

Average 2017
 USD 1055 cfr China
 USD 1125 cfr India

India PE growth outlook robust but surplus likely to take few years to digest

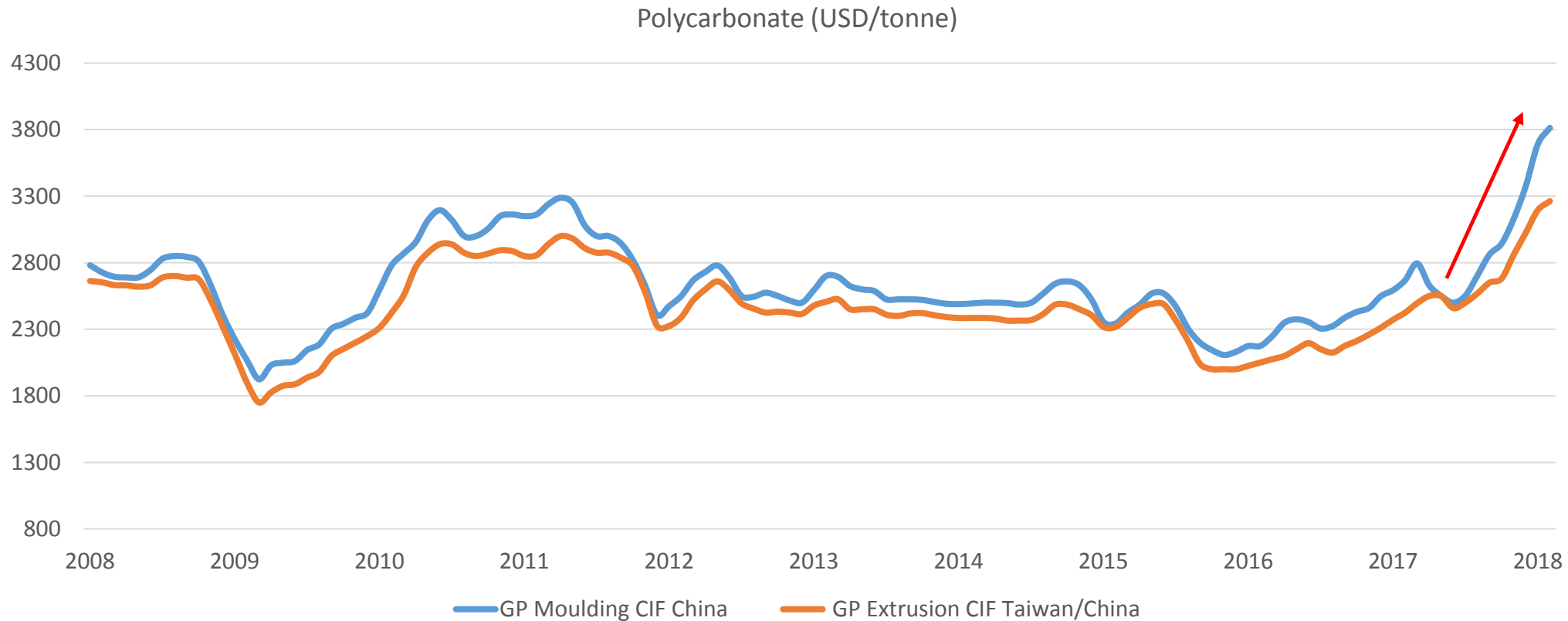


PE capacity additions at GAIL, BCPL, OPaL and Reliance



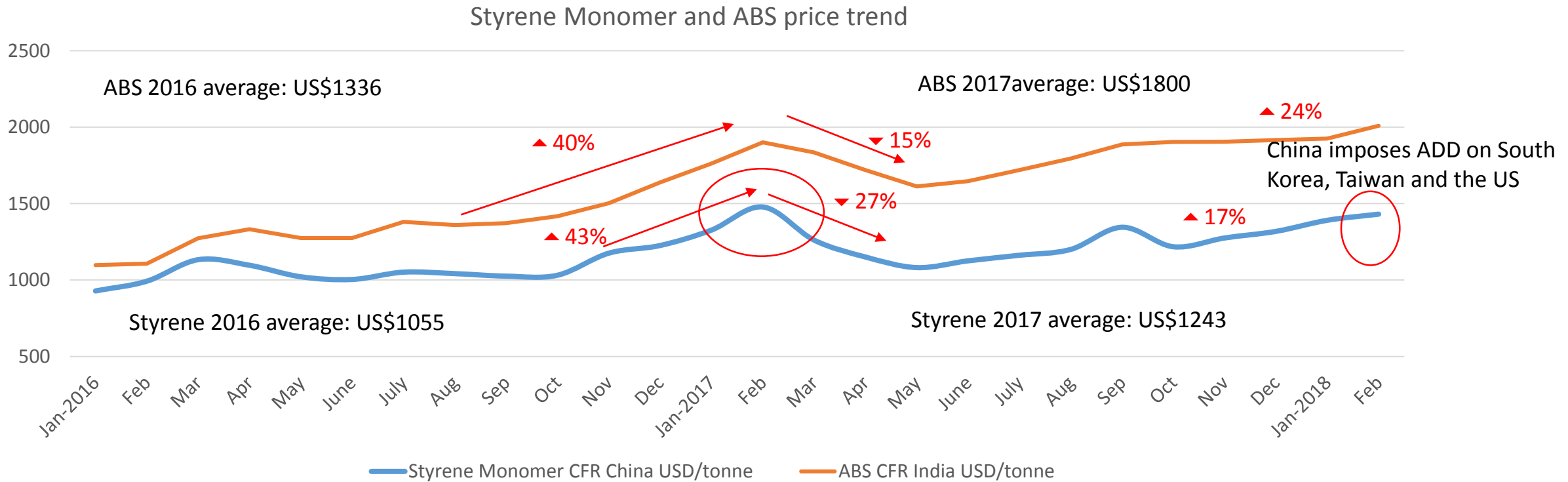
PP capacity additions at MRPL, OPaL, BCPL during 2016-2017
Due 2018-19: Indian Oil's 700kta plant at Paradeep

Polycarbonate at historic highs



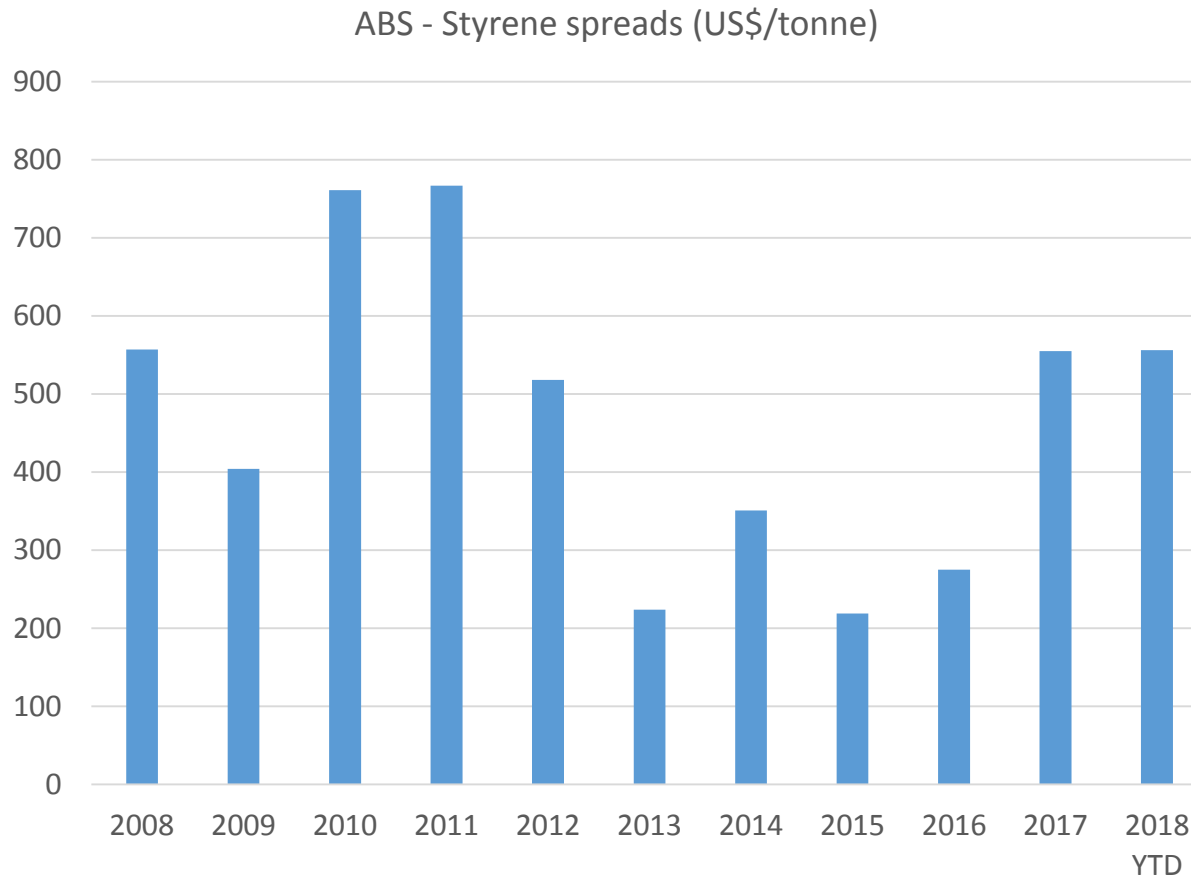
- ▶ Healthy global demand
- ▶ Multiple production issues (hurricane Harvey etc) tightened global supply
- ▶ Strong push from feedstock costs – bisphenol A prices also rose by 40% last year; but spread between PC and BPA widened to well above the typical US\$900 level

ABS has broadly followed styrene



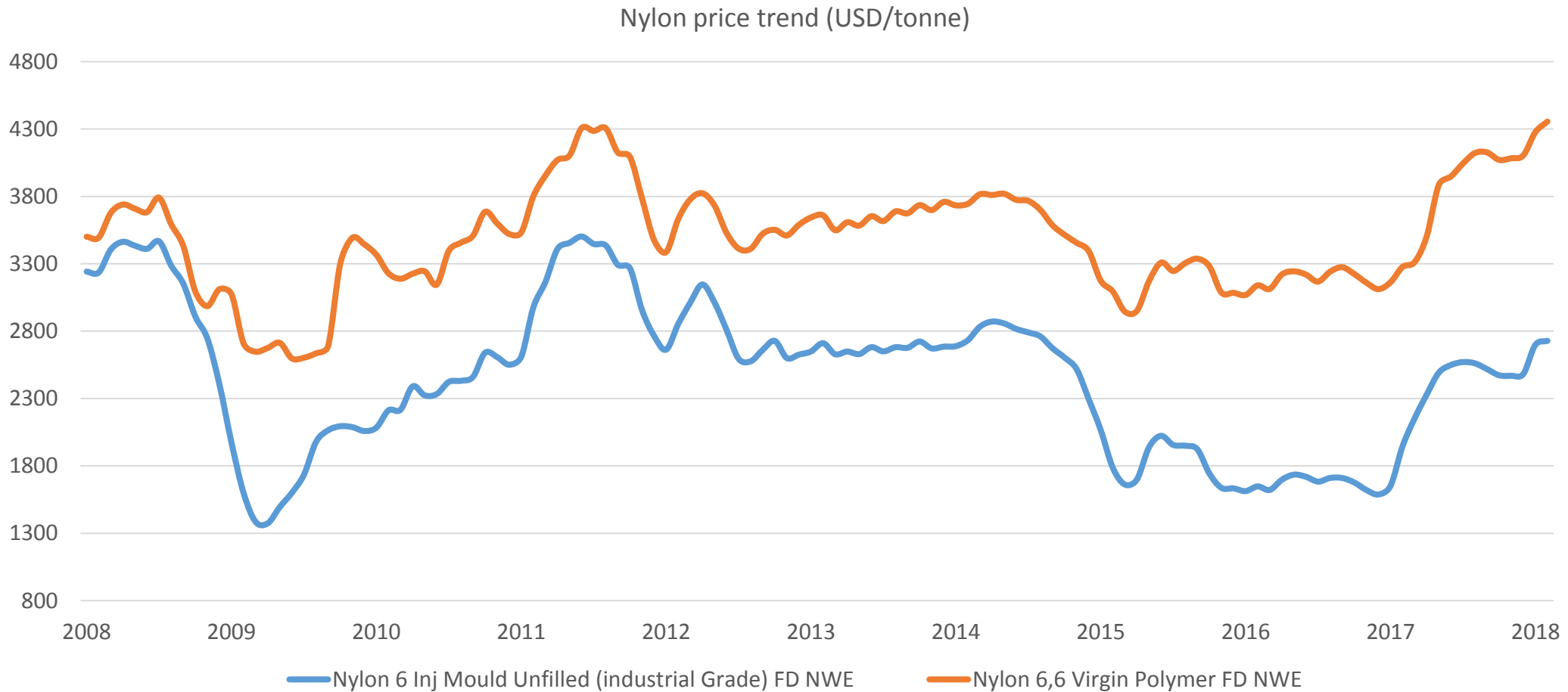
- ▶ Robust ABS demand (China imports up 6% to 1.789m tonnes)
- ▶ Environmental controls in China/restriction on imports of waste plastics - impact on local industry

ABS-styrene spreads widen



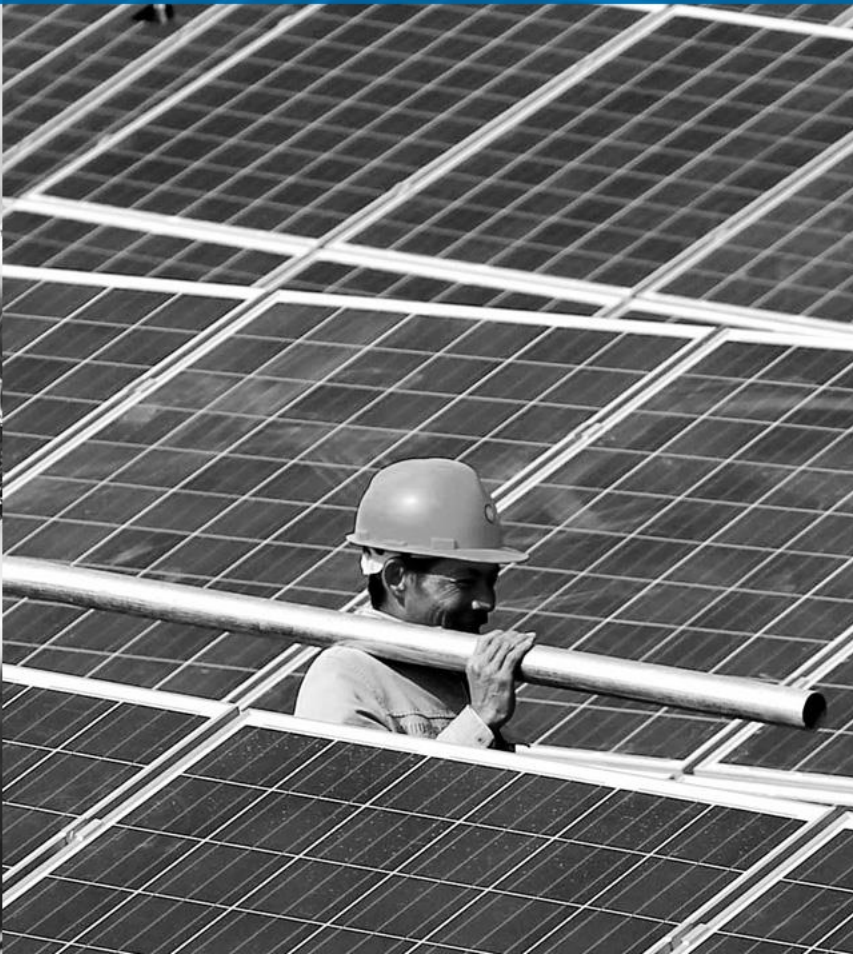
- ▶ ABS-Styrene spread has moved up sharply in 2017
- ▶ Butadiene prices have been running below the high of US\$2800 seen in early 2017; but volatile
- ▶ Supply constraints have pushed acrylonitrile higher

Supply issues in Europe and US spell trouble for nylon buyers



- ▶ Global markets experiencing shortages amid plant shutdowns and force majeure across the value chain
- ▶ Demand has been good; tightness expected to persist in 2018
- ▶ But threat of lower priced competing materials for certain applications

US capacity wave



New US crackers complete, under construction, FID made

Company	C2 capacity (kt/year)	Downstream (kt/year)	Location	Start-Up
OxyChem/Mexichem	544	Feed existing VCM plant of 1,050	Ingleside, Texas	Q1 2017 (done)
Dow Chemical	1,500	ELITE PE (400); LDPE (350) – Plaquemine, Louisiana; EPDM (200); elastomers (320)	Freeport, Texas	Q3 2017, LDPE Q4 2017, EPDM early 2018, elastomers late 2018
ExxonMobil Chemical	1,500	mLLDPE plus LLDPE (650 x2) at Mont Belvieu	Baytown, Texas	Q2 2018
Chevron Phillips Chemical	1,500	Bimodal HDPE (500), mLLDPE (500) both at Old Ocean	Cedar Bayou, Texas	Q1 2018
Formosa Plastics	1,200	HDPE (400), LDPE (400), EG (800)	Point Comfort, Texas	Q4 2018
Sasol	1,500	LDPE (450), LLDPE (450), EO/EG (300), ethoxylates, detergent alcohols (300)	Lake Charles, Louisiana	H2 2018, LDPE early 2019, alcohols H2 2019
Shintech	500	VCM (300), PVC (300), caustic soda (200)	Plaquemine, Louisiana	2018
Westlake/Lotte	1,000	MEG (700) by Lotte, feed into existing PVC for Westlake	St Charles, Louisiana	2019
Shell	1,500	HDPE/LLDPE (550 x2), HDPE (500)	Monaca, Pennsylvania	Early 2020s

9 new crackers = 10.7m tonnes/year

Through 2019 = 9.2m tonnes/year

North America PE expansions

Company	Capacity (kt/year)	Grade, breakdown	Location	Start-Up
Dow Chemical	400	ELITE PE	Freeport, Texas	Q3 2017
Dow Chemical	350	LDPE	Plaquemine, Louisiana	Q4 2017
Chevron Phillips Chemical	1,000	Bimodal HDPE (500), mLLDPE (500)	Old Ocean, Texas	Q3 2017
ExxonMobil Chemical	1,300	mLLDPE plus LLDPE (2 x 650)	Mont Belvieu, Texas	End 2017
INEOS/Sasol	470	HDPE	La Porte, Texas	Q4 2017
Formosa Plastics	800	HDPE (400), LDPE (400)	Point Comfort, Texas	H2 2018
Dow Chemical	125	Bimodal HDPE/MDPE	Seadrift, Texas; St Charles, Louisiana	2018
Sasol	890	LLDPE (470), LDPE (420)	Lake Charles, Louisiana	H2 2018 (LLDPE), 2019 (LDPE)
LyondellBasell	500	HDPE	La Porte, Texas	Mid-2019
ExxonMobil Chemical*	650	PE (unspecified)	Beaumont, Texas	2019
Total/Borealis/NOVA*	625	Borstar PE	Bayport, Texas	End 2020
Shell	1,600	HDPE/LLDPE (2x 550), HDPE (500)	Monaca, Pennsylvania	Early 2020s
PTT Global Chemicals*	700	HDPE (2x 350)	Belmont County, Ohio	2021 (FID Q4 2017)
NOVA Chemicals*	430	LLDPE	Sarnia, Canada	Late 2021
SABIC/ExxonMobil*	NA	PE unspec (2 units)	Corpus Christi, Texas	NA
Dow Chemical*	600	PE (unspec)	US Gulf Coast	2020s
Dow Chemical*	350	PE (unspec)	Various debottlenecks	2020s

*No FID yet

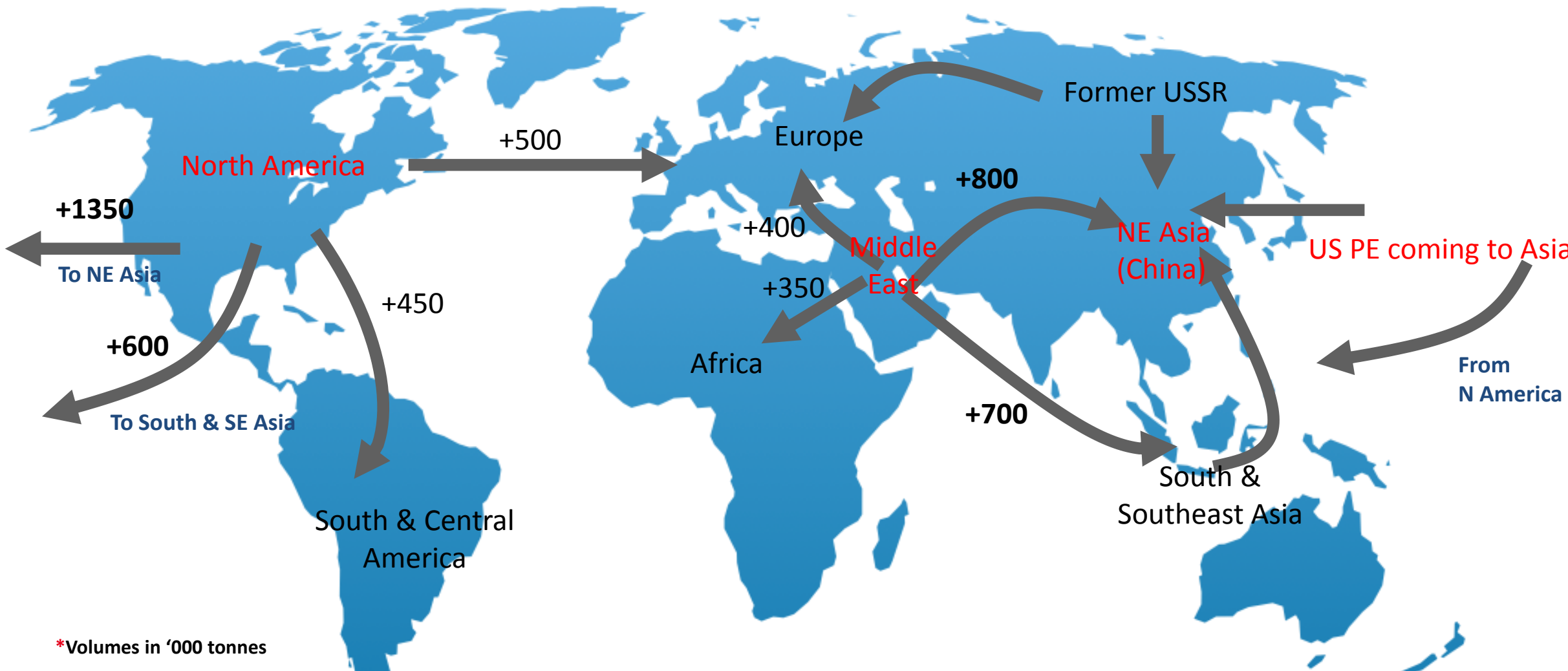
** Assuming 1,300kt PE for SABIC/ExxonMobil, start-up by 2022

Through 2019 = 6.5m tonnes/year (+42% US capacity)

Through 2022 = 12.1m tonnes/year (+77% US capacity)**

Asia PE market competition set to intensify

Global Polyethylene Trade Flow Key Development (2016 vs 2020)

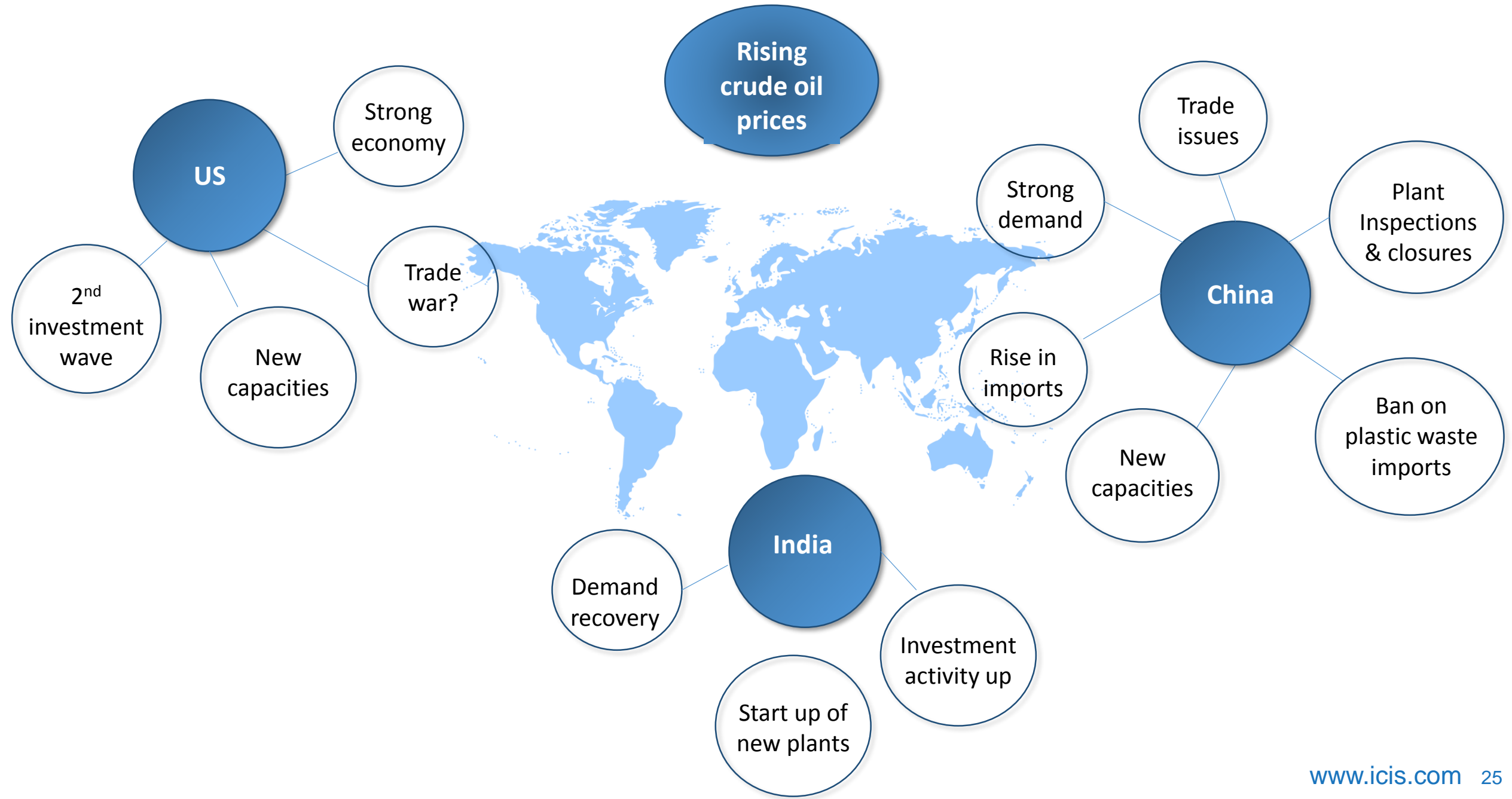


*Volumes in '000 tonnes

Note: potential to challenge positions of SEA Producers

2nd wave of US cracker projects

Company	Capacity (kt/year)	Downstream (kt/year)	Location	Start-up	Status
Total/Borealis/NOVA	1,000	Borstar PE (625) + existing PE (400)	Port Arthur, Texas	End 2020	FID pending
Shell	1,500	HDPE/LLDPE (2x 550), HDPE (500)	Monaca, Pennsylvania	Early 2020s	Under construction
SABIC/ExxonMobil	1,800	PE (2 units), MEG	Corpus Christi, Texas	---	FID 2018
PTT Global Chemicals	1,000	HDPE (700), MEG (500), EO (100)	Belmont County, Ohio	2021	FID Q1 2018
Formosa Plastics	1,200	LDPE (400), HDPE (400), EG (800)	Louisiana	---	Evaluating, permitting



THANK YOU

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