Global PET: Supply, Demand and Trade Dynamics
ICIS PET Value Chain Conference

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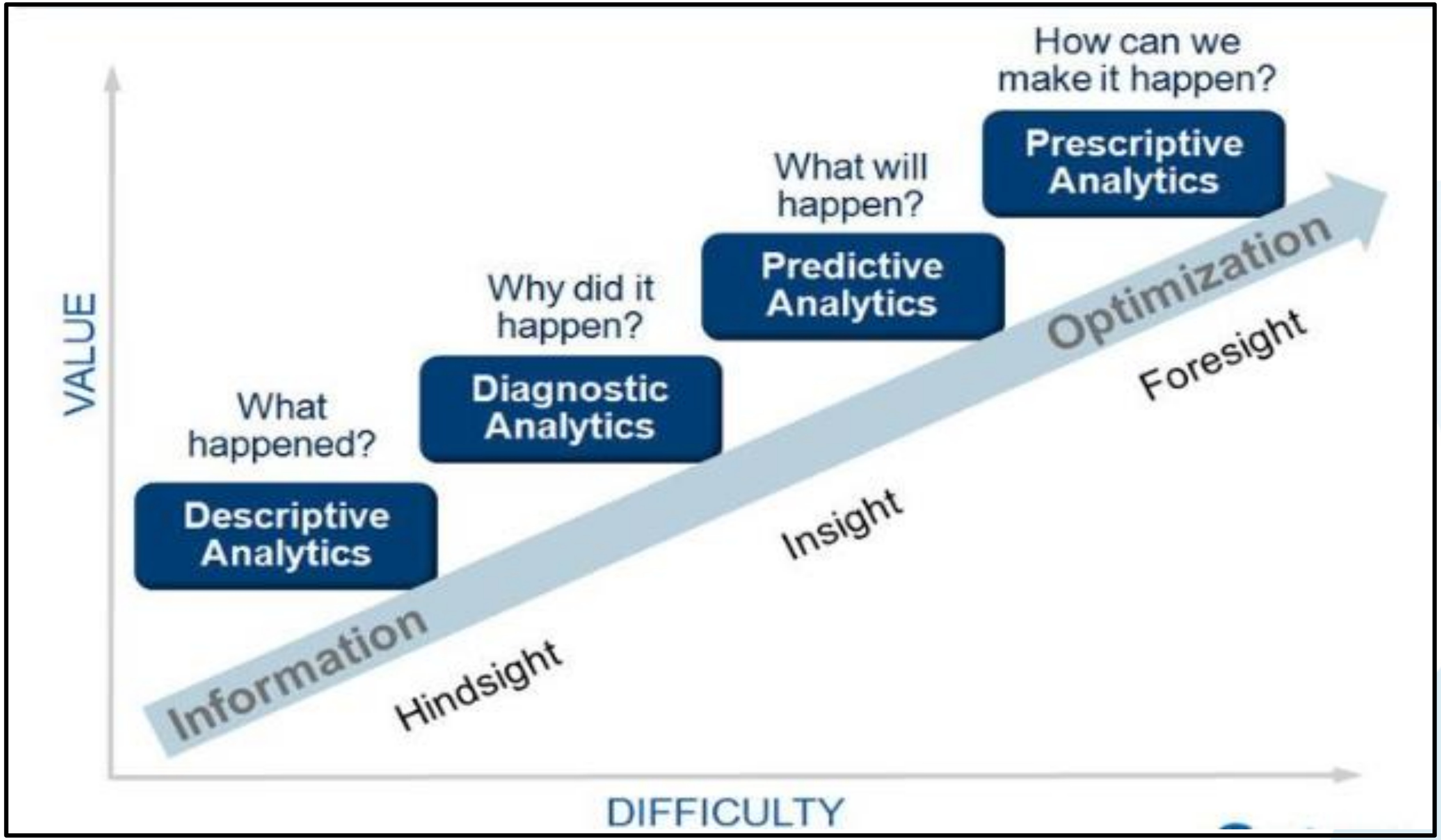

Source: Gartner

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- PET Value Chain
- Macroeconomic Trend for PET
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- Global PET Supply Outlook
- Impact of R-PET Ban in China
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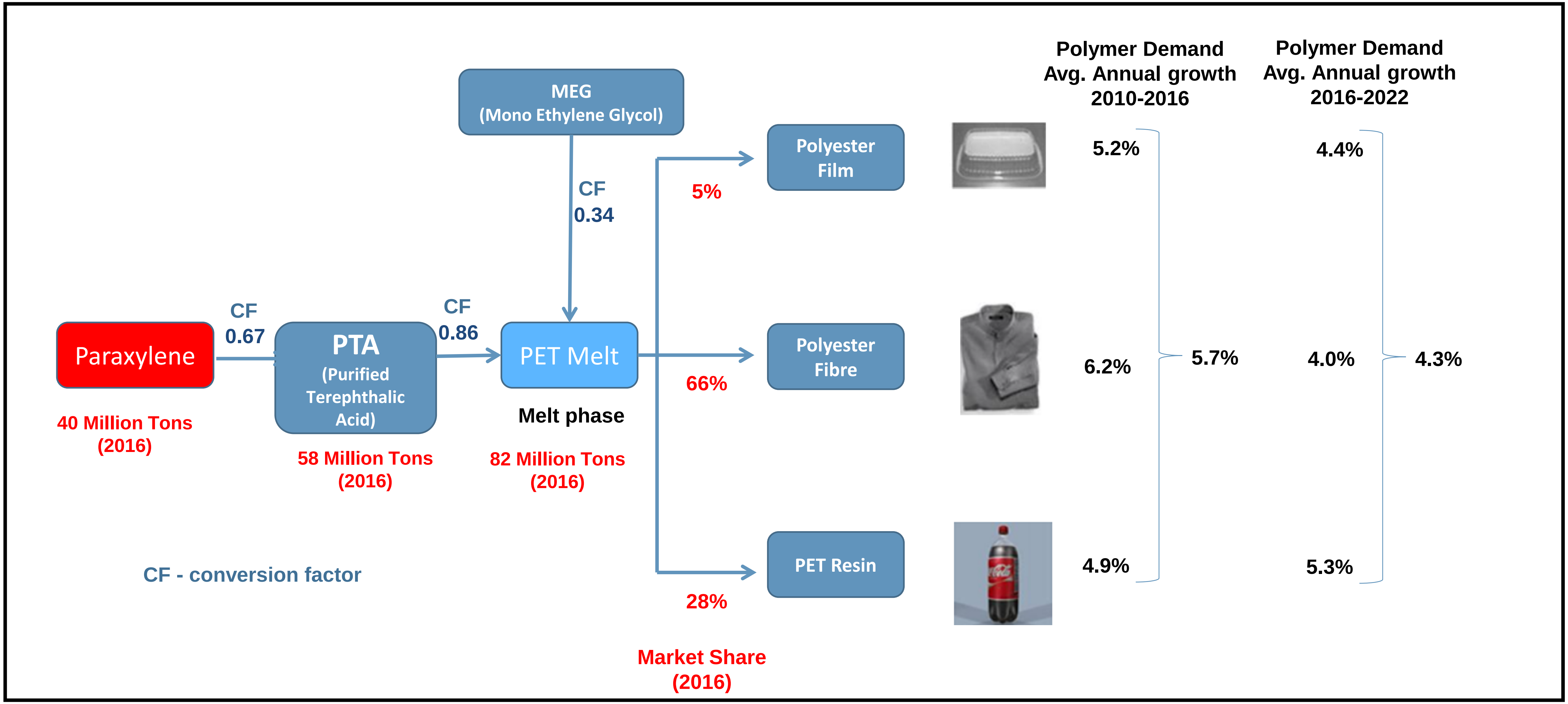
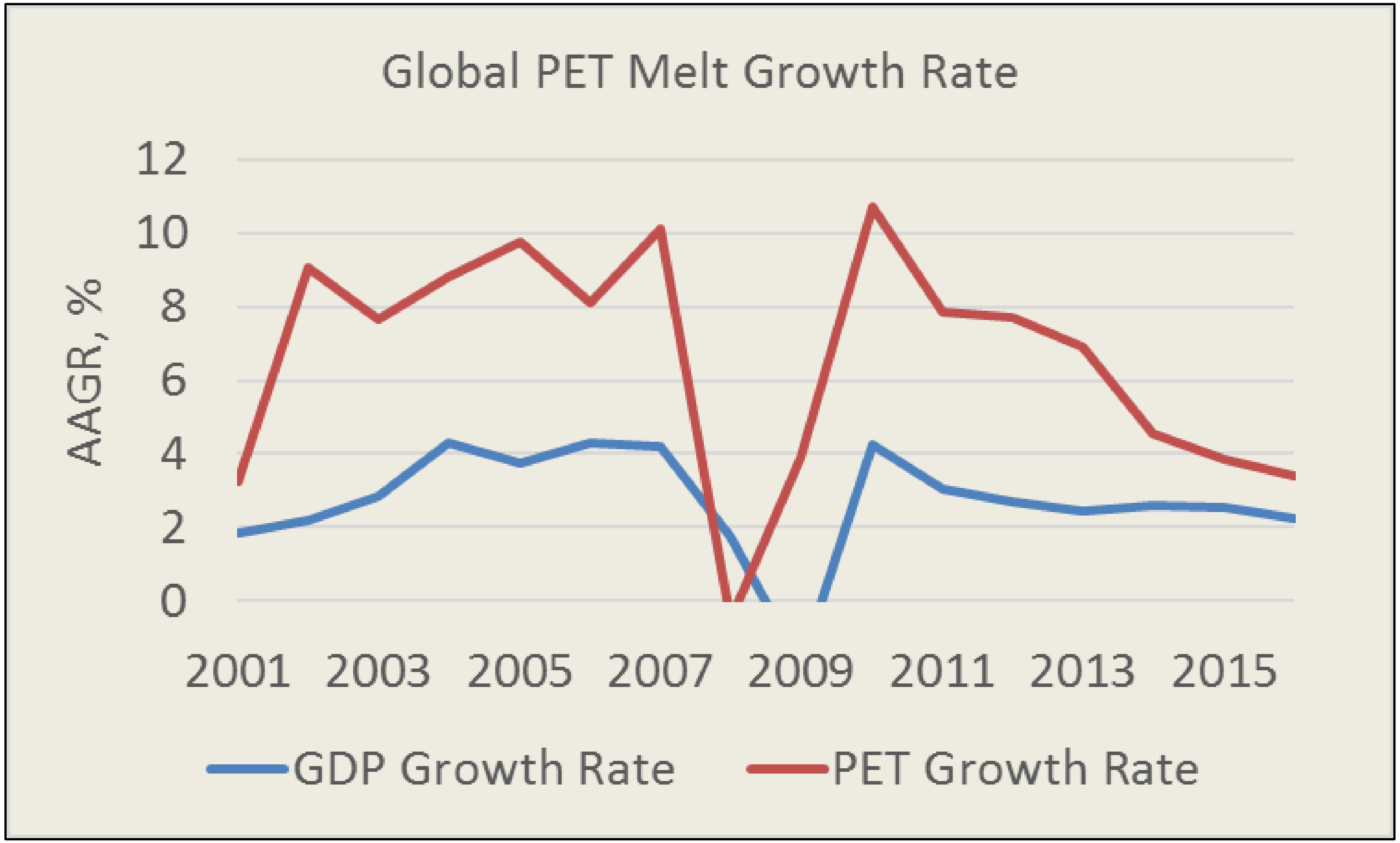
PET Value Chain

Polyester fibre and PET resins are the key consumer of PET melt with a combined market share of >90%



Macroeconomic Trend for PET

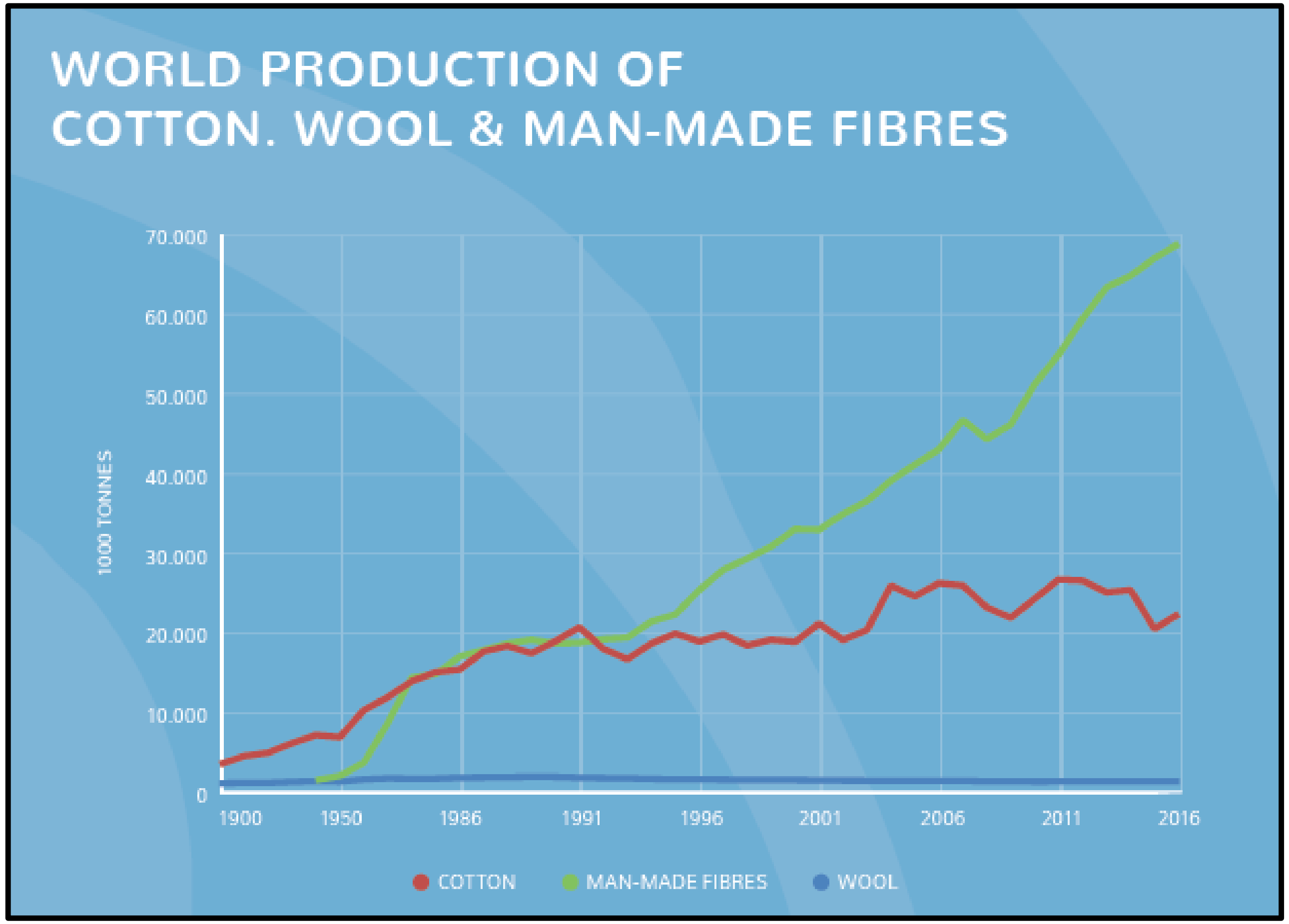
Global PET melt phase growth continues to outpace global GDP growth although the pace has reduced in 2015 and 2016

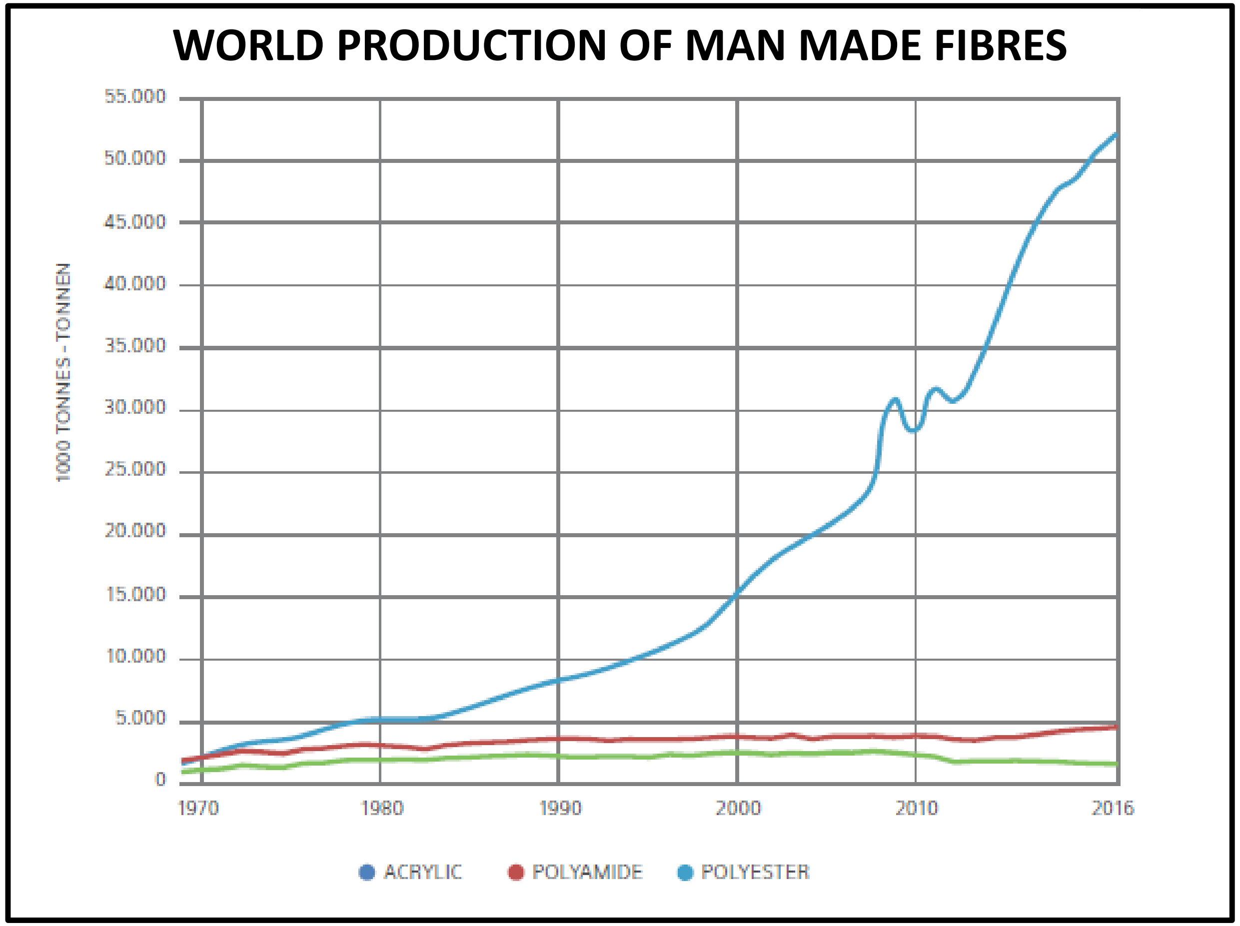


Source: ICIS Supply & Demand Database

Population growth and better quality living continue to drive PET demand growth.

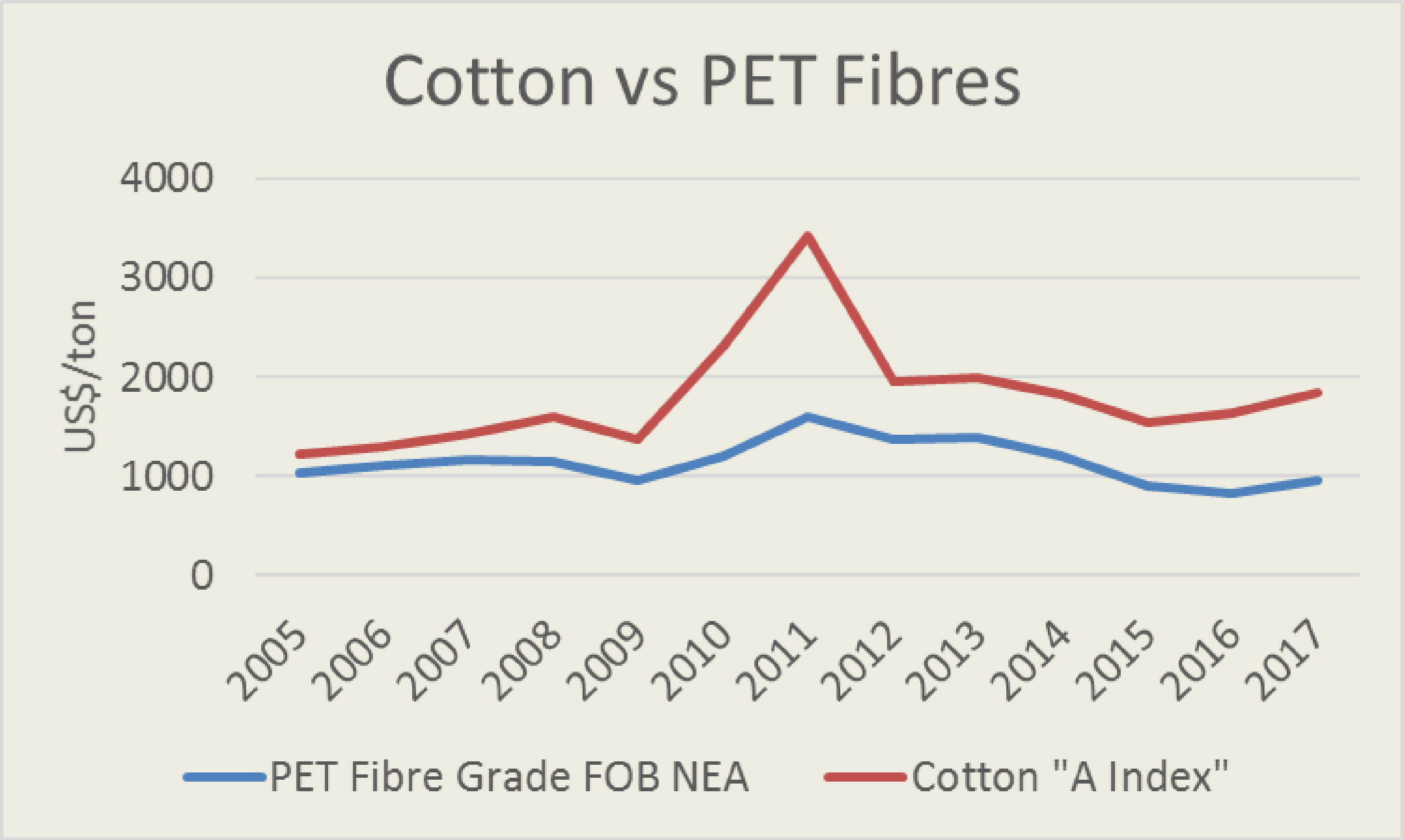
Synthetic fibres lead the fibres market while polyester lead the synthetic fibres market





Source: EU Fibre Association

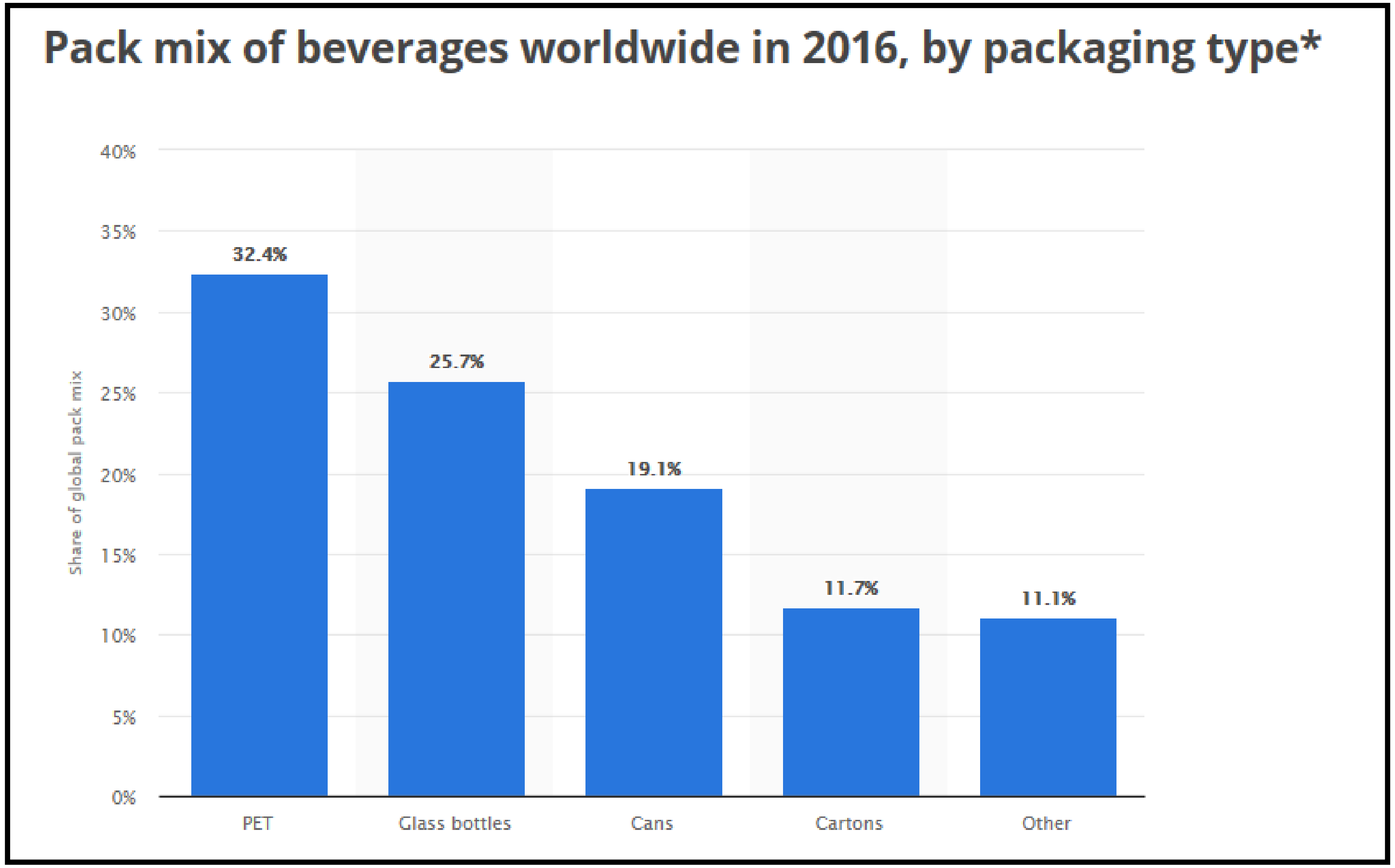
PET Fibre is preferred relative to cotton due to lower cost and predictable availability



Source: ICIS & National Cotton Council or America

Note: "A" Index-is a proxy for the world price of cotton.

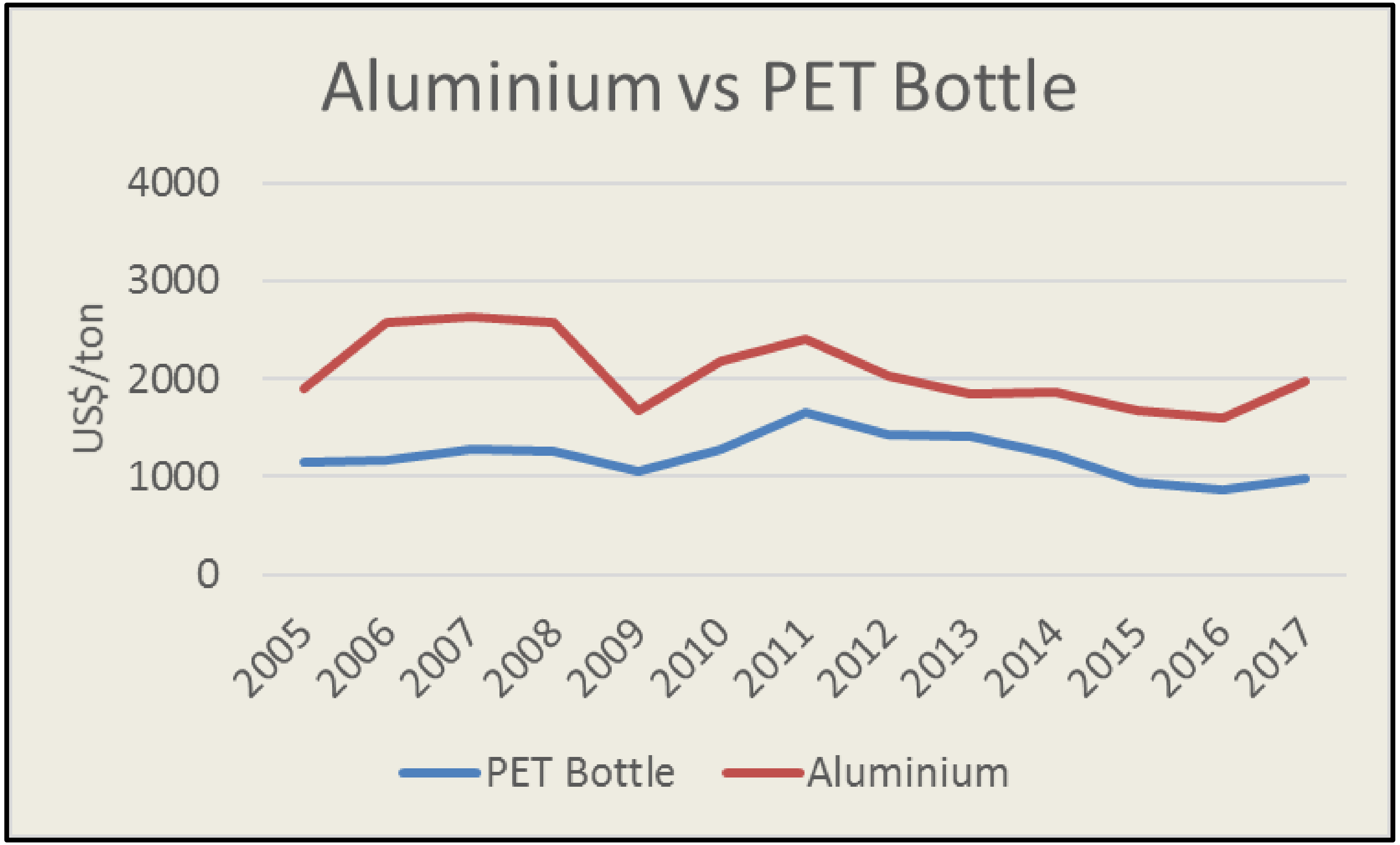
PET bottle lead the packaged beverage business, primarily driven by awareness for healthy living



Source: Statista 2018

- **Concerns for ground water contamination and quality of tap water drives consumption for bottled water**
- **Concerns for sugar intake drives consumption for smaller soft drinks packaging**

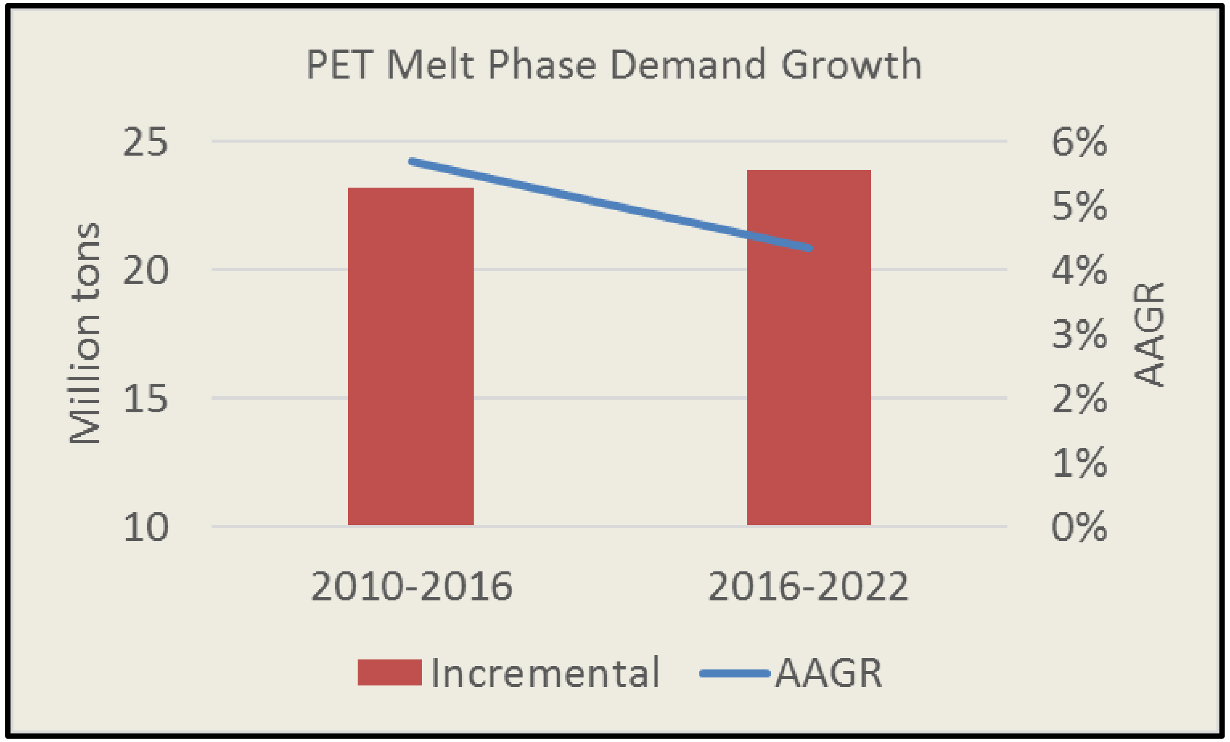
Among other alternatives, PET Bottle is preferred due to lower cost and weight

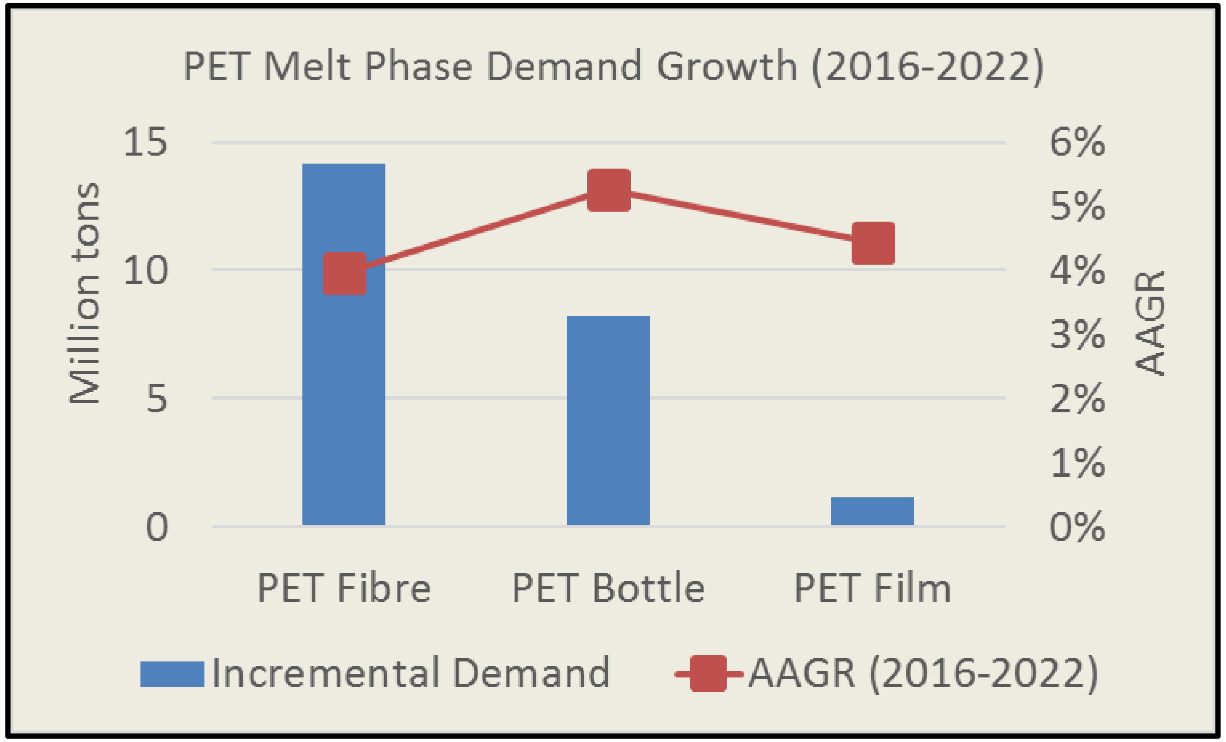


Source: ICIS & London Metal Exchange

Global PET Consumption Outlook

Global PET melt phase forecast growth continues to outpace global GDP growth driven by consumption into PET fibres and PET bottle

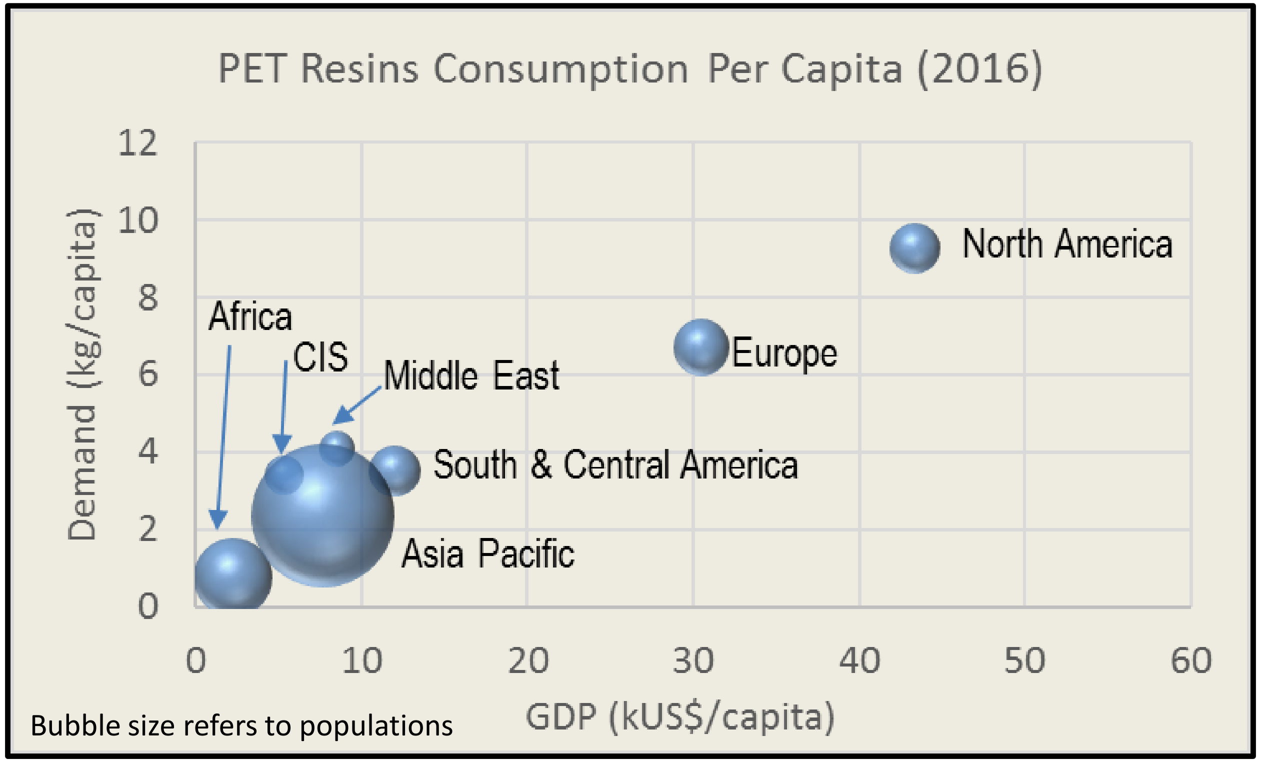


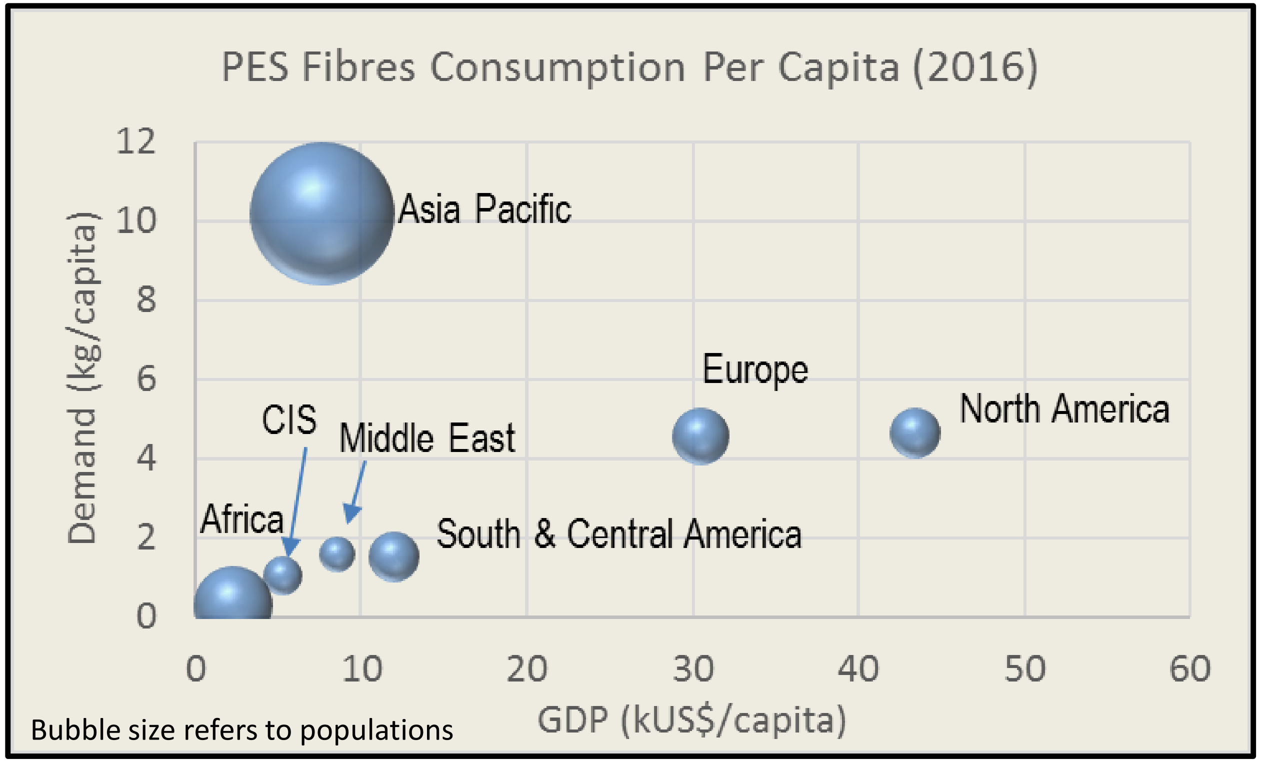


Source: ICIS S&D Database

- **Even at tapered growth rate scenario into the future, it will be based on a much bigger base.**
- **Hence, from absolute quantity perspective, incremental demand in the next 6 years is expected to be higher than the previous last 6 years**

PET resins consumption per capita in Asia is below global average and represent opportunity for further growth

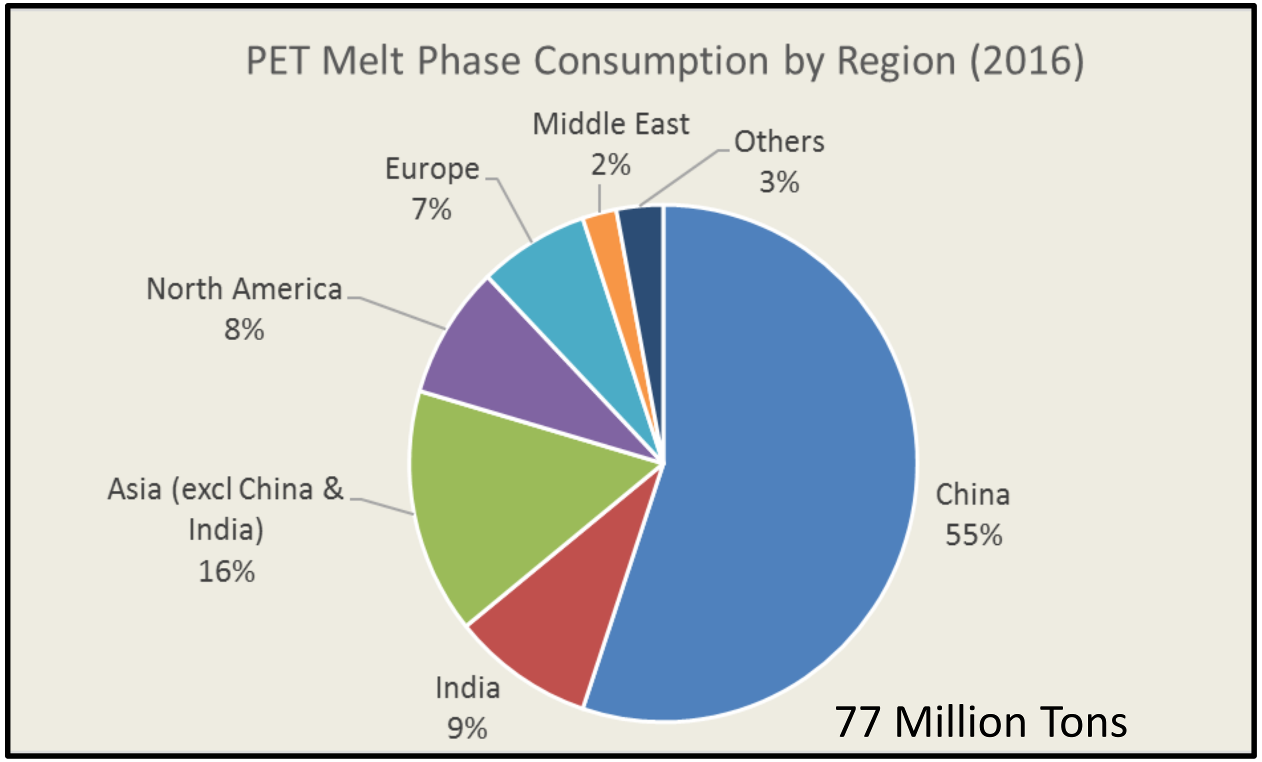


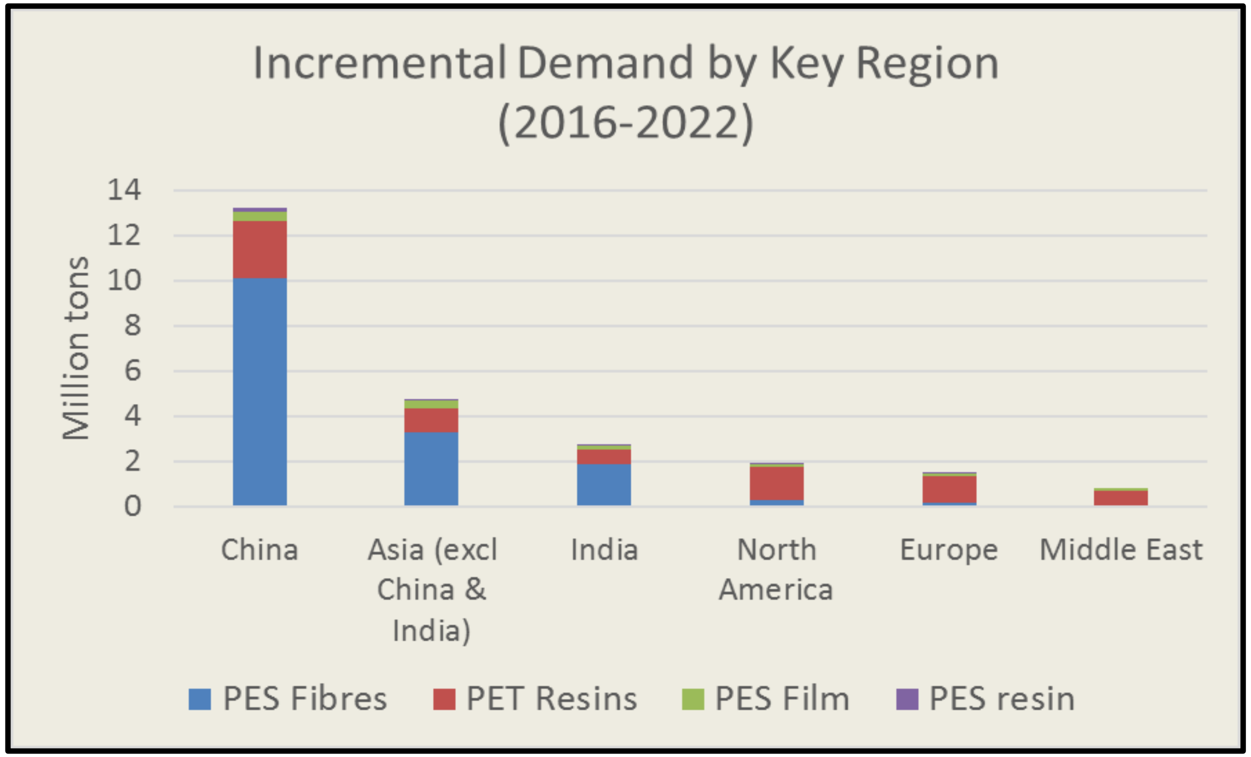


Source: ICIS S&D Database

- **Average global PET resins consumption is approximately 3 kg/capita in 2016**
- **Average global PES fibres consumption is approximately 6.5 kg/capita in 2016**

PET melt phase consumption is led by Asia (80% share), predominantly China and is forecast to remain the same in the forecast period



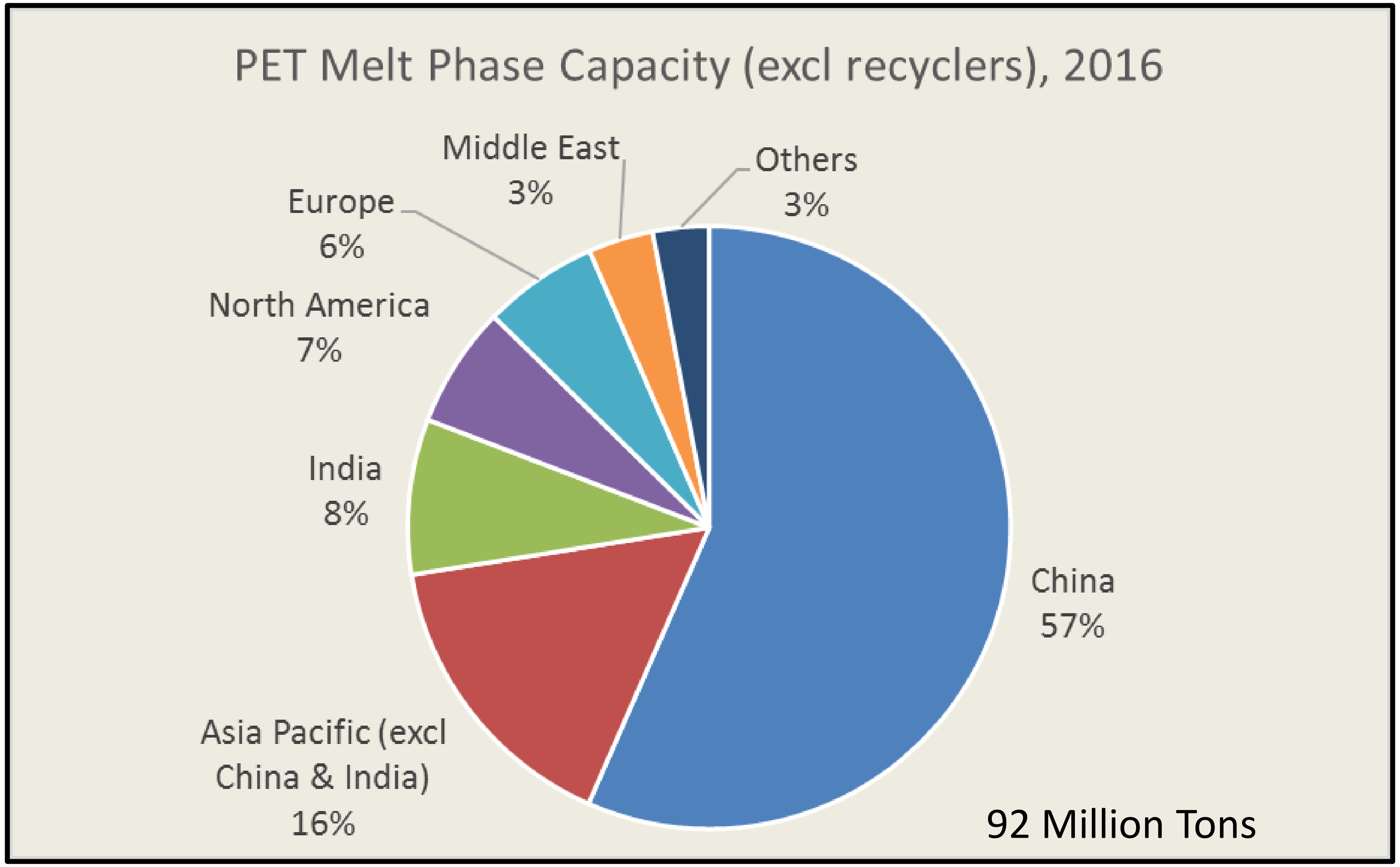


Source: ICIS S&D Database

Potential shift in PES Fibre demand to low cost manufacturing countries due to R-PET ban in China

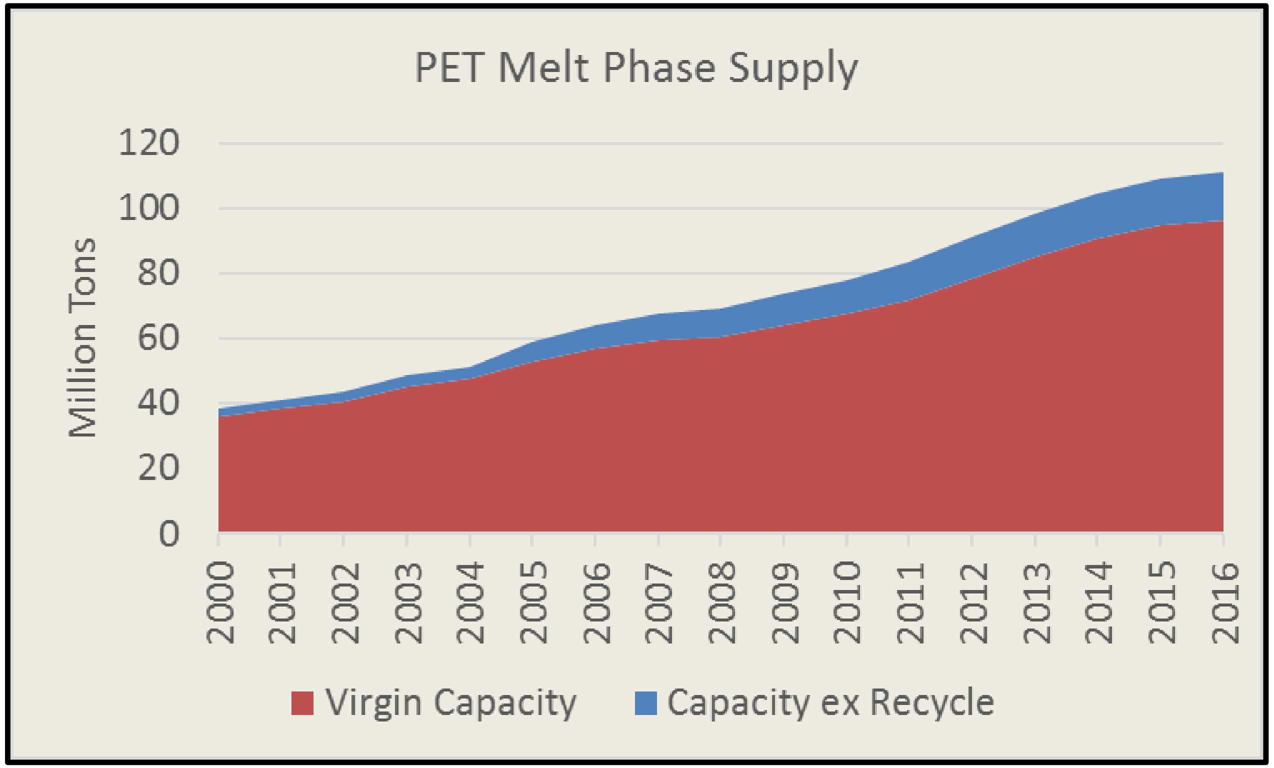
Global PET Supply Outlook

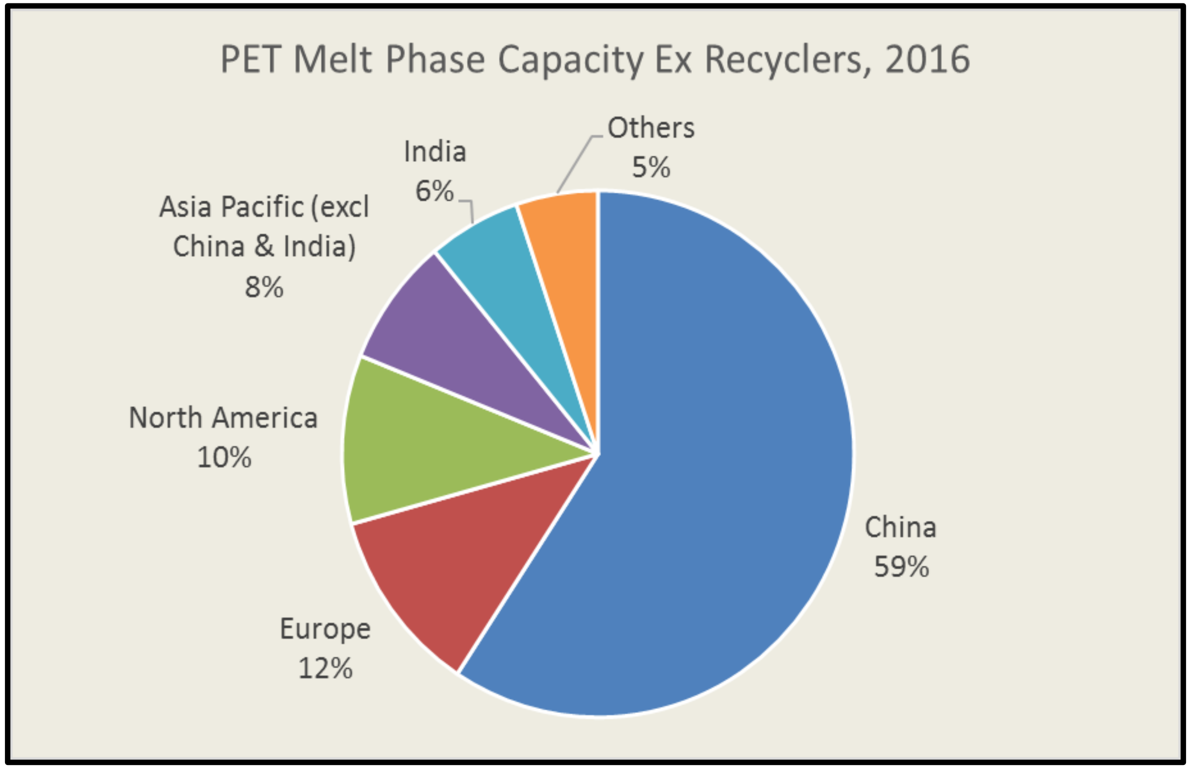
PET melt phase supply by region is very similar to demand as most PET melt phase capacities are forward integrated with PET Resins, PET Fibres and PET film manufacturing



Source: ICIS S&D Database

Capacity ex recyclers in 2016 is dominated by China, followed by Europe and North America





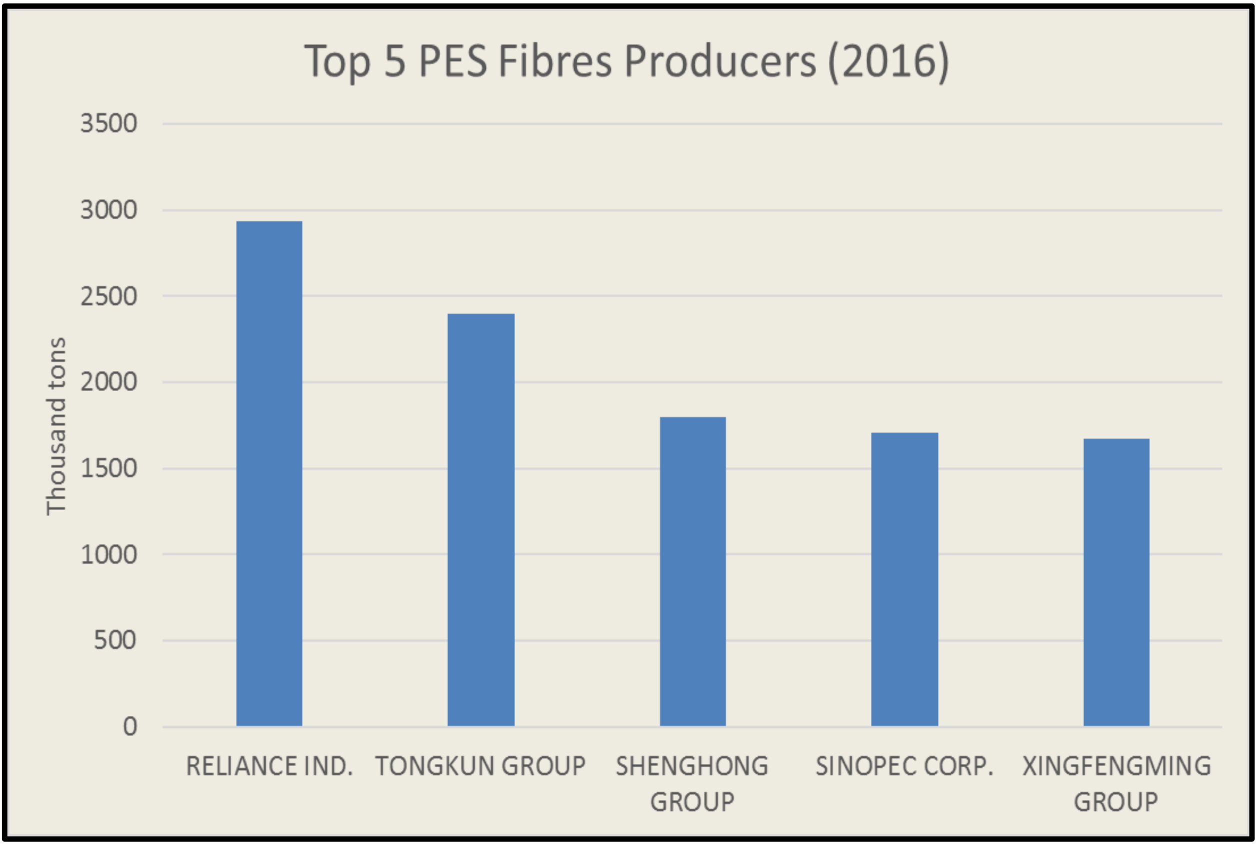
Source: ICIS S&D Database

Incremental capacity for PET Melt Phase is dominated by China predominantly into PET resins.

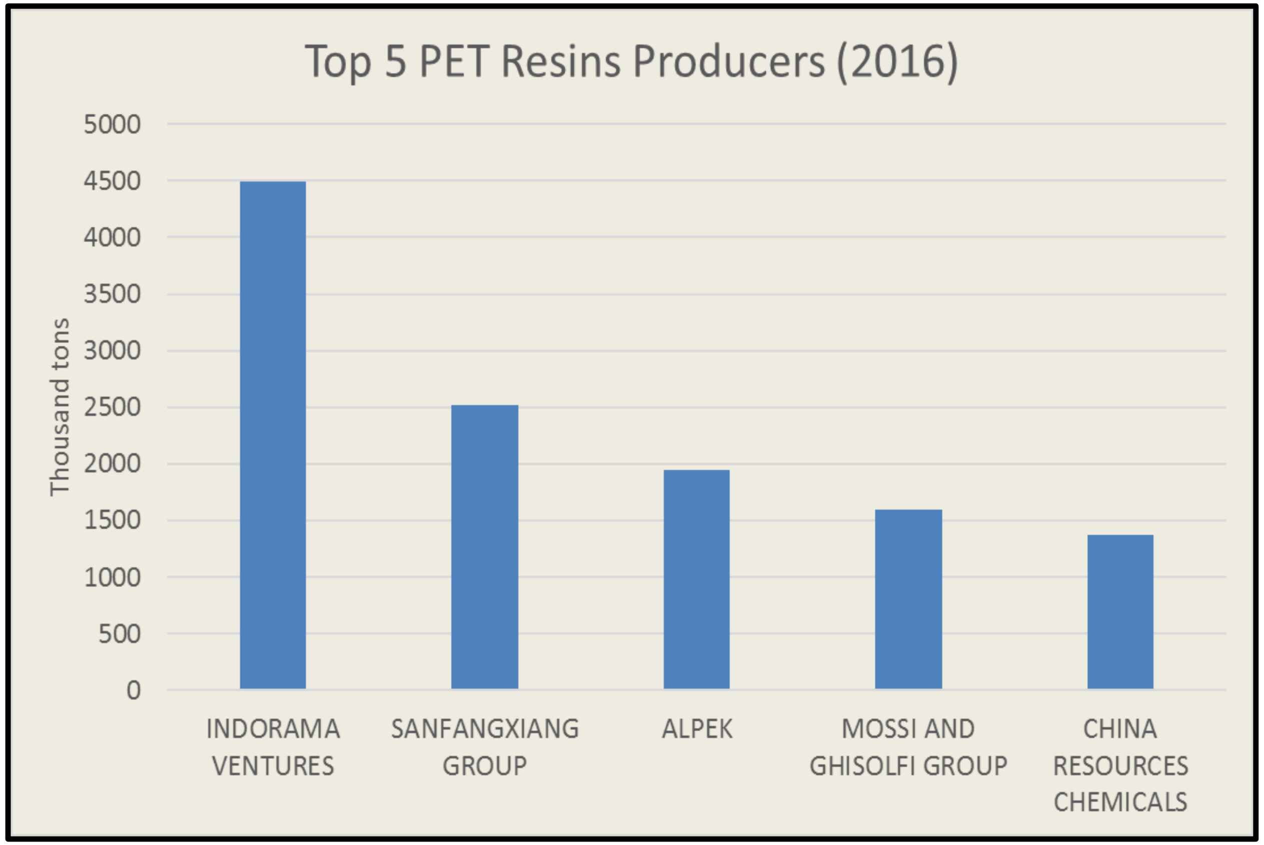
Key Announced Additional Capacity (2016-2022)					
Country	Company	Location	Capacity (kta)	Applications	Status
UNITED STATES	MOSSI AND GHISOLFI GROUP	CORPUS CHRISTI/TX	1100	For PET	Bankruptcy auction in early March 2018
UNITED STATES	ALPHAPET	DECATUR/AL	500	For PET	Not confirmed
EGYPT	EGYPT INDIA POLYESTER	AIN SOKHNA	450	For PET	Company in financial difficulties. Line 1 stopped, Line 2 never started
CHINA	HUBEI LIFENG SCI-TECH COMPANY	HUANGJINSHAN, SHANXI	400	For PES Fibres	Not confirmed
CHINA	JIANGYIN CHENGXIN IND. GRP	JIANGYIN, JIANGSU	600	For PET	2017
CHINA	ZHEJIANG WANKAI NEW MATERIALS	HAINING, ZHEJIANG	550	For PET	2017
CHINA	**SANFANGXIANG GROUP**	**JIANGYIN, JIANGSU**	**500**	**For PET**	**Q2 2018**
CHINA	YISHENG PETROCHEMICAL	YANGPU, SHANGHAI	500	For PET	2017
INDIA	SHUBHALAKSHMI POLYESTERS	DAHEJ	274	For PES Fibres	2017
TURKEY	**KOKSAN**	**GAZIANTEP**	**216**	**For PET**	**end 2019**

- **Start up of announced capacity addition has been affected by unfavourable economic conditions and financial difficulties**

PES Fibres producers are fragmented while PET Resins is relatively less fragmented. Lesser bargaining power for PES Fibres producers



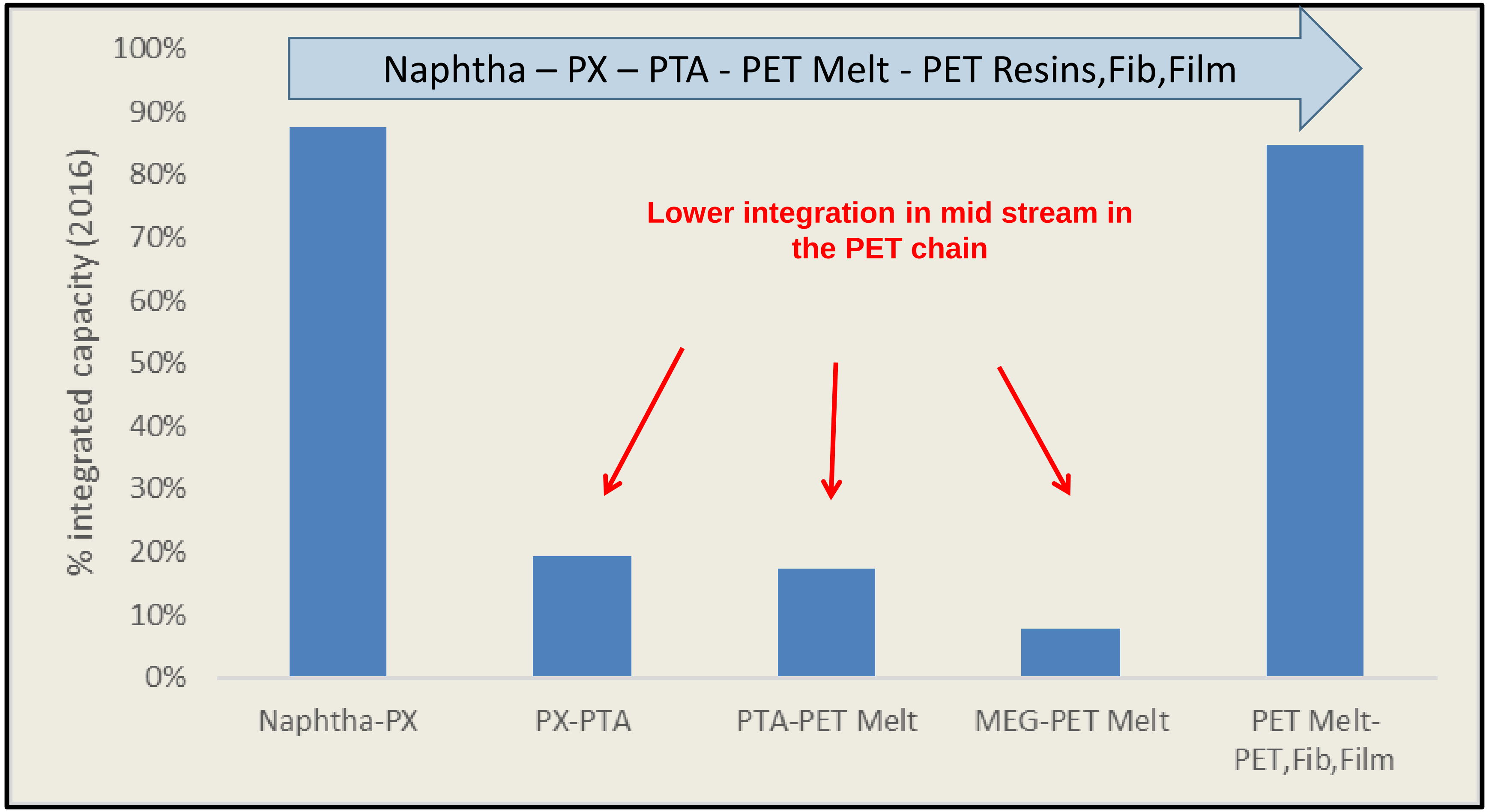
Combined top 10 capacity forms 32% of total virgin capacity



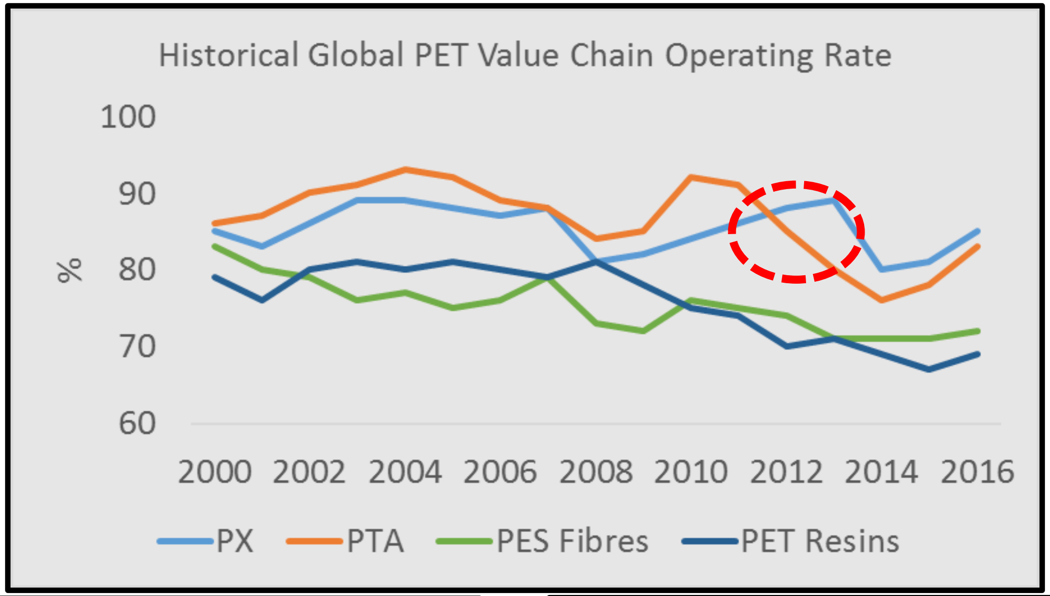
Combined top 10 capacity forms 56% of total virgin capacity

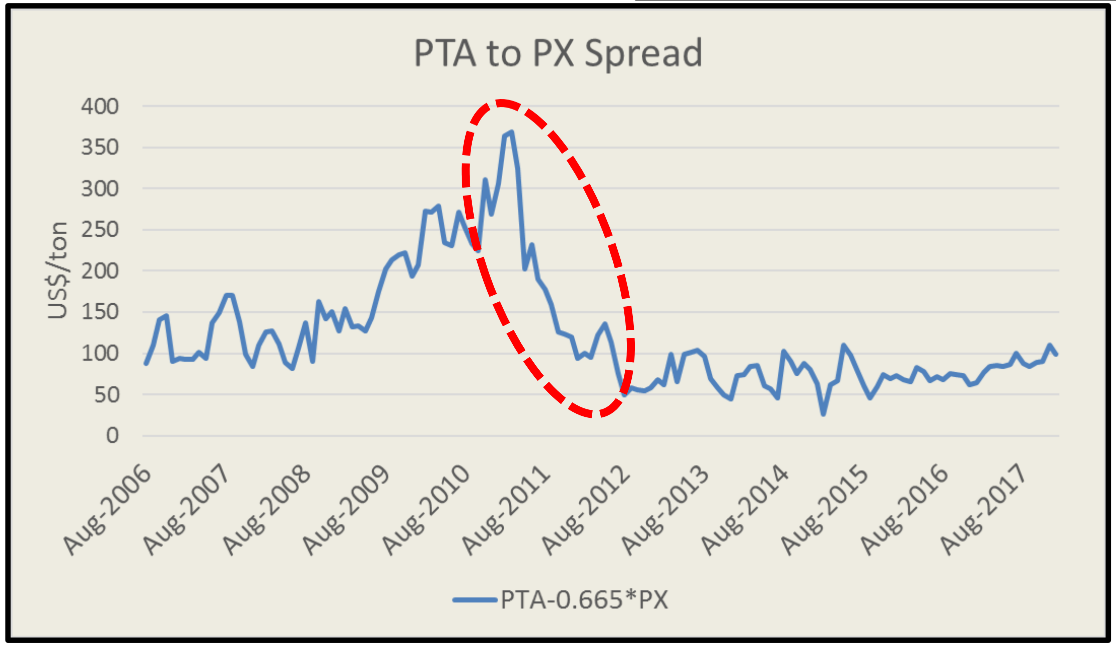
Indorama Ventures is the top PES Melt Phase and PET Resins producer in 2016 by shareholding
Reliance is the top PES Fibres producer in 2016 by shareholding

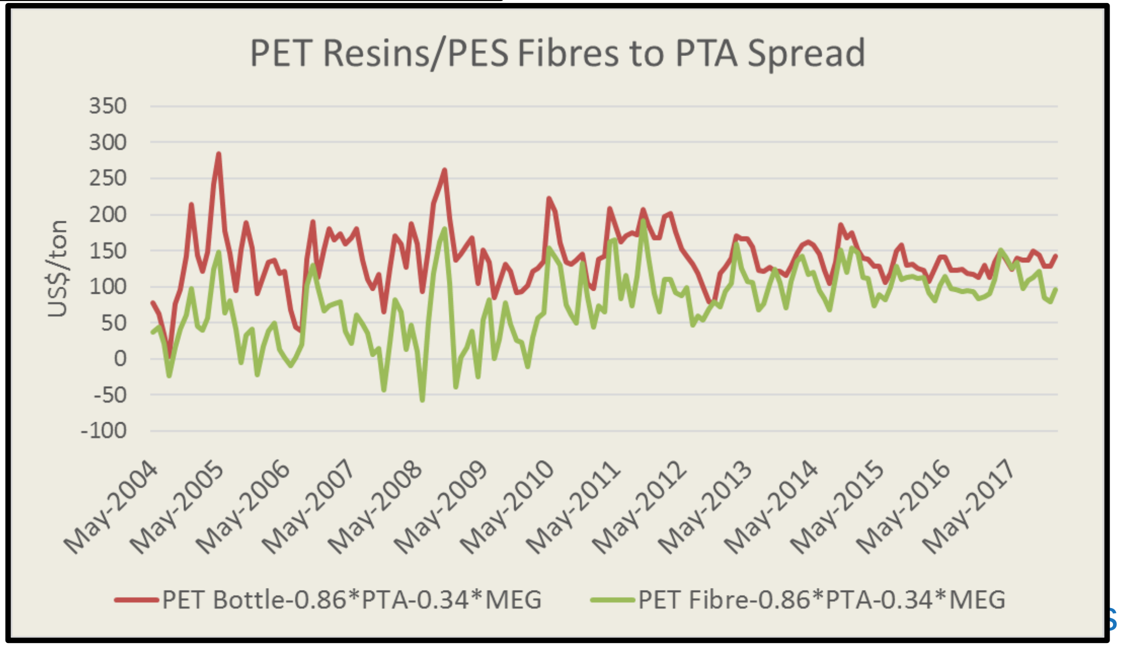
Lower integration in the mid stream is likely to result in heavy influence of supply-demand fundamental on the mid stream price spread



The influence of supply and demand on PET bottle – feedstock price spread is relatively lower than PTA/PET fibres – feedstock price spread.



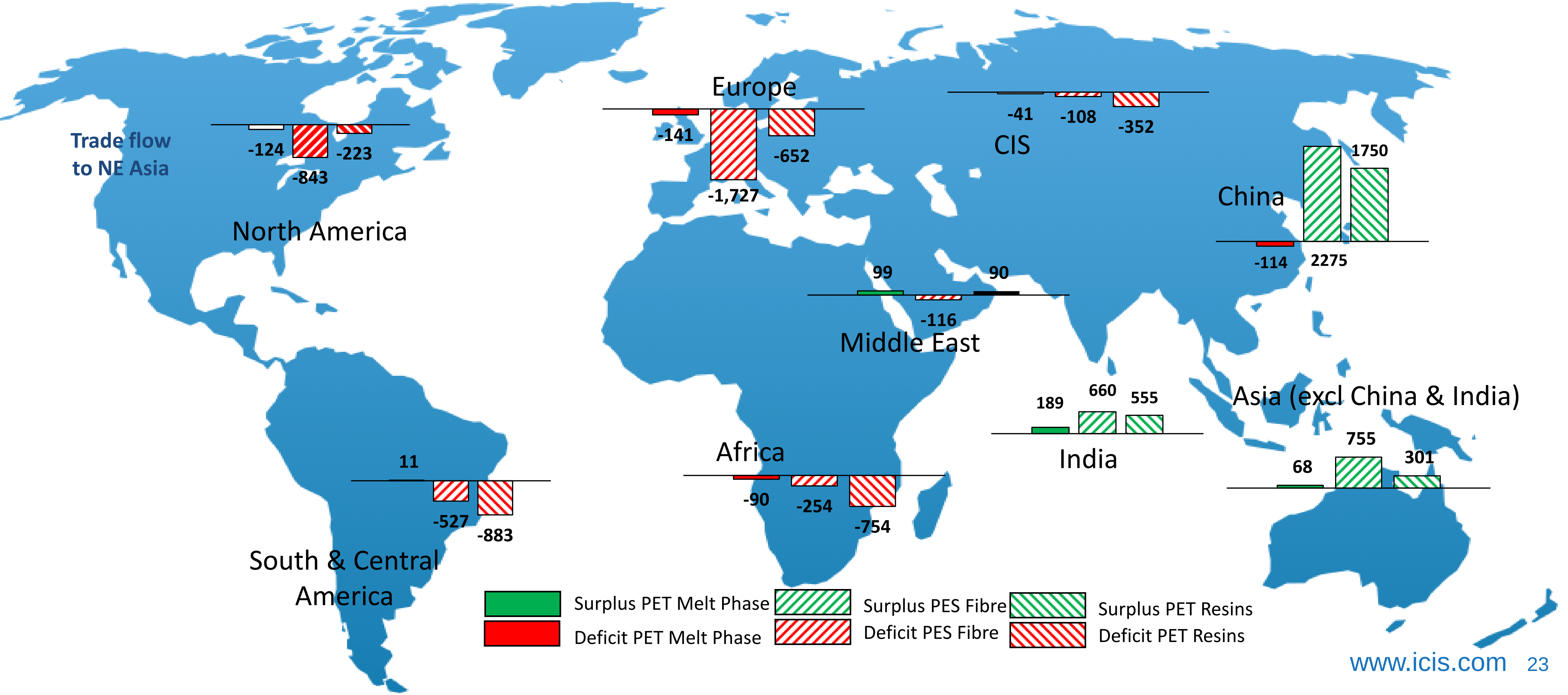




Note: Prices are based on China and NEA benchmark

PET Melt Phase is roughly balance as it is typically forward integrated while PES Fibres and PET Resins net trade flows from Asia to rest of the world.

Polyester Net Surplus / Deficit by Key regions ('000 tonnes) (2016)

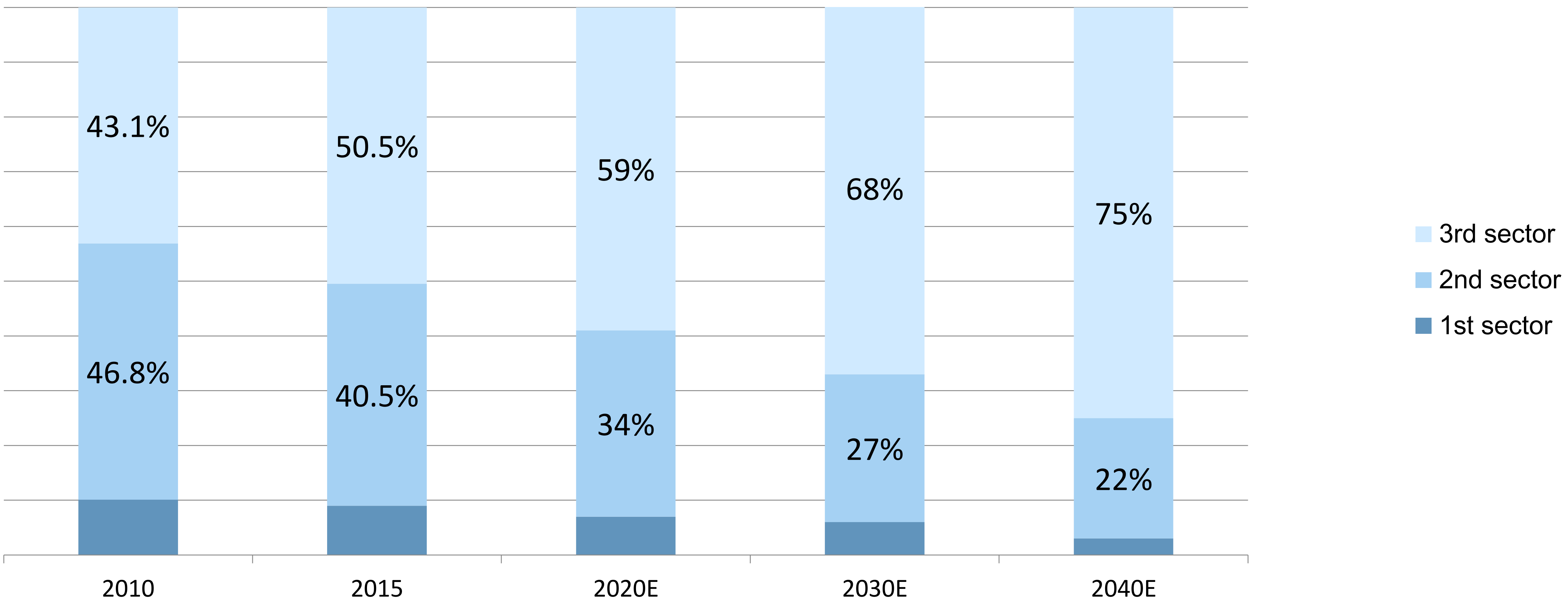


Impact of R-PET Ban in China

China's energy consumption growth to slow down amid economic model of "new normal"

- Economic growth: aggressive vs. sustainable
- Economic growth model: extensive vs. intensive
- Economic drivers: basic production elements & investment vs. innovation-driven
- Economic structure: heavy industry & manufacturing sector vs. high-end manufacturing & modern service industry

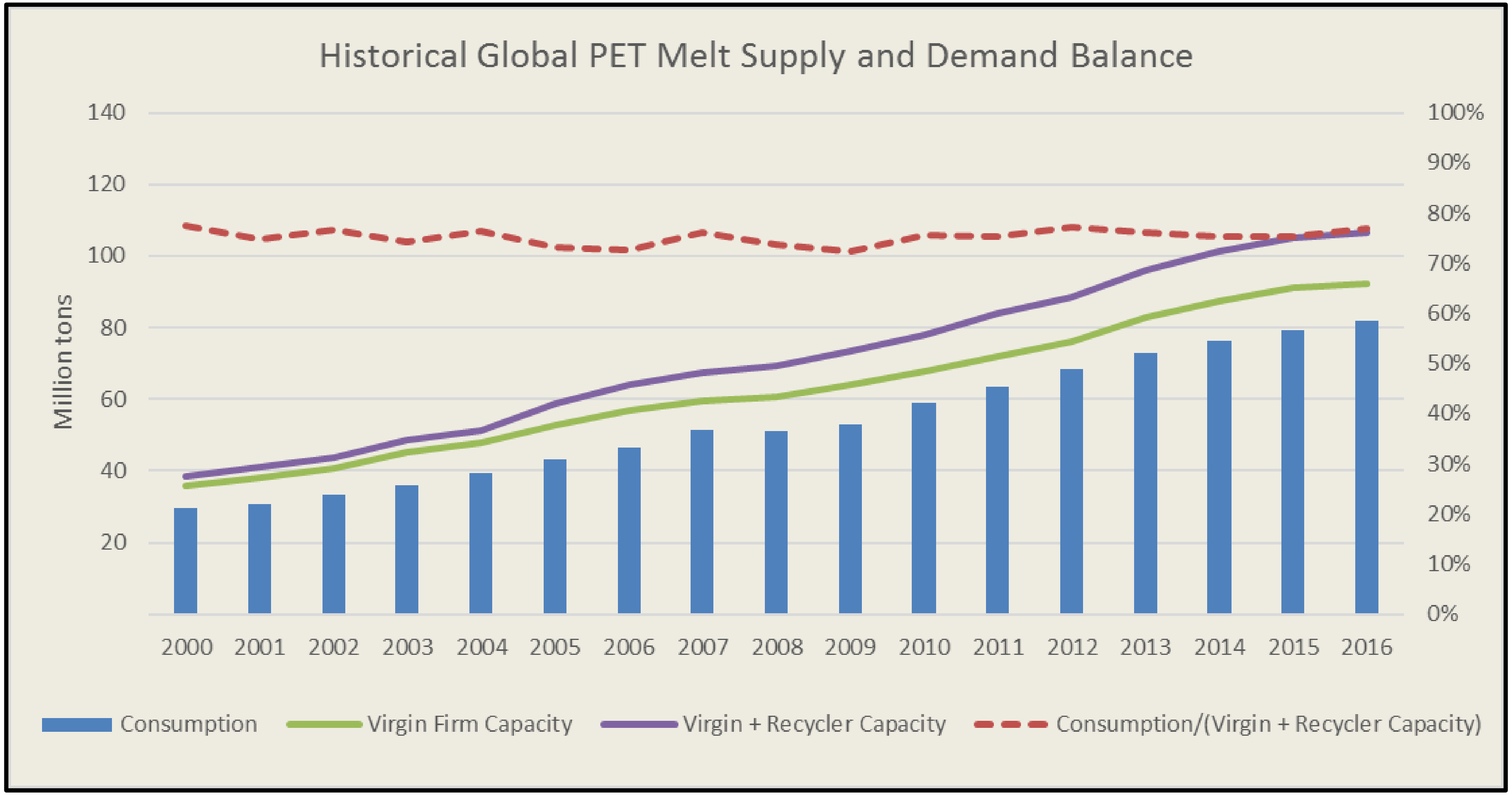
Economic driver shifts from secondary to tertiary



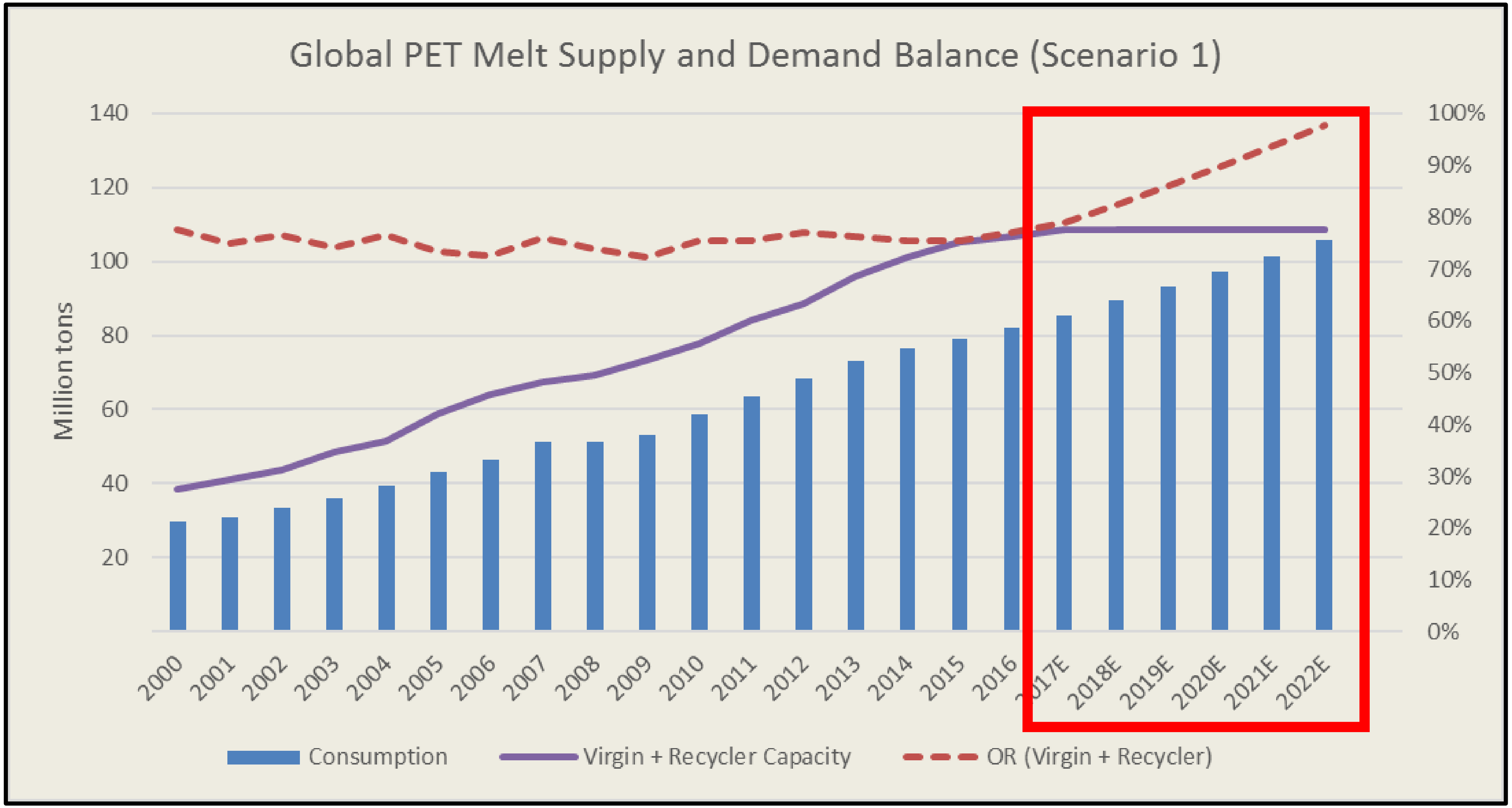
Note: 1st sector – agriculture; 2nd sector – industry & manufacturing; 3rd sector - service

Source: NBS, Academy of Social Sciences, PetoChina Research Institute

Global PET melt operating rates has historically hovers around 75% with increase in recycler capacity over the years

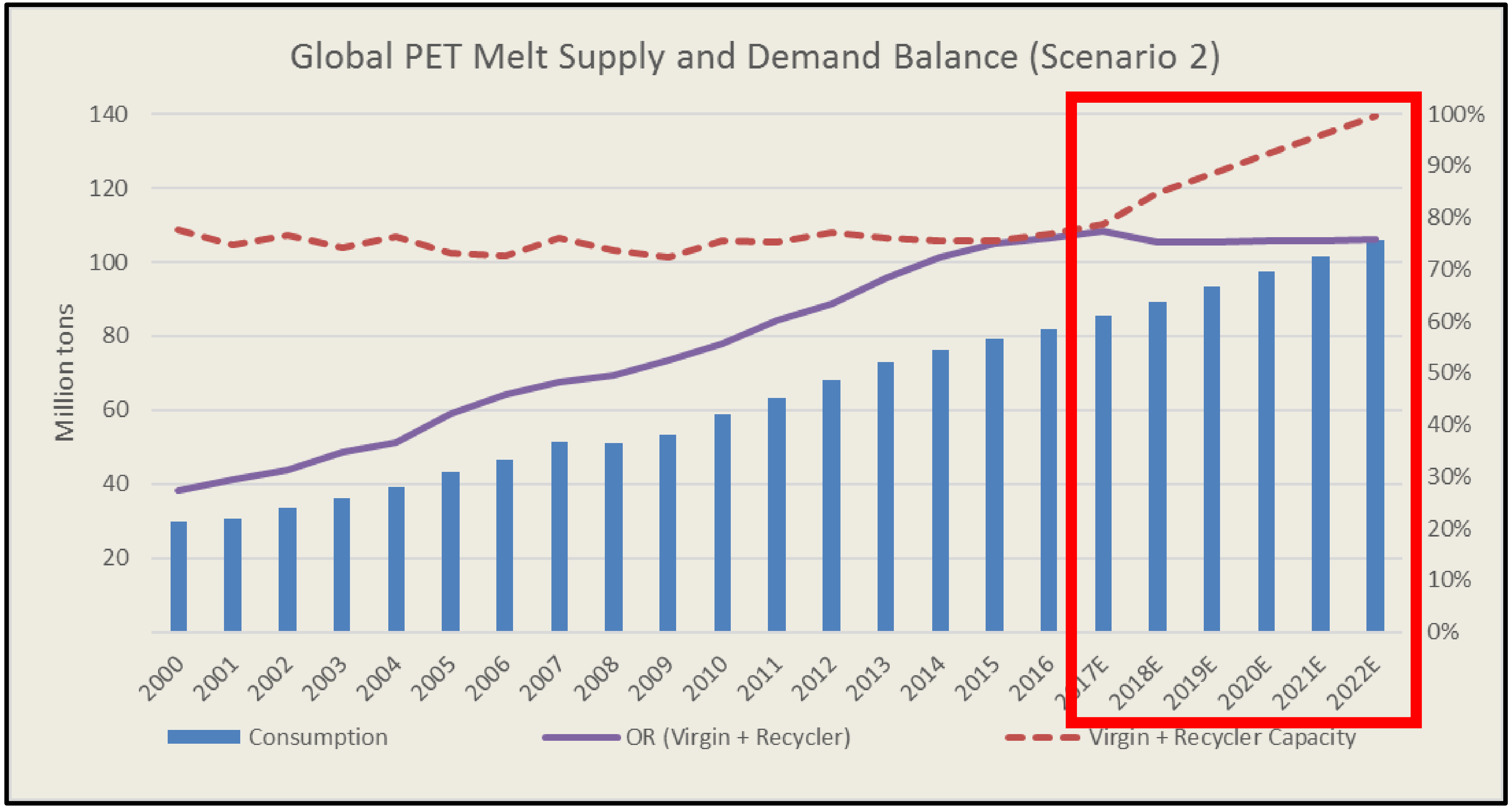


Scenario 1: Assuming 2017 R-PET capacity to remain in the forecast period, global operating rate is expected to reach 90% by 2020



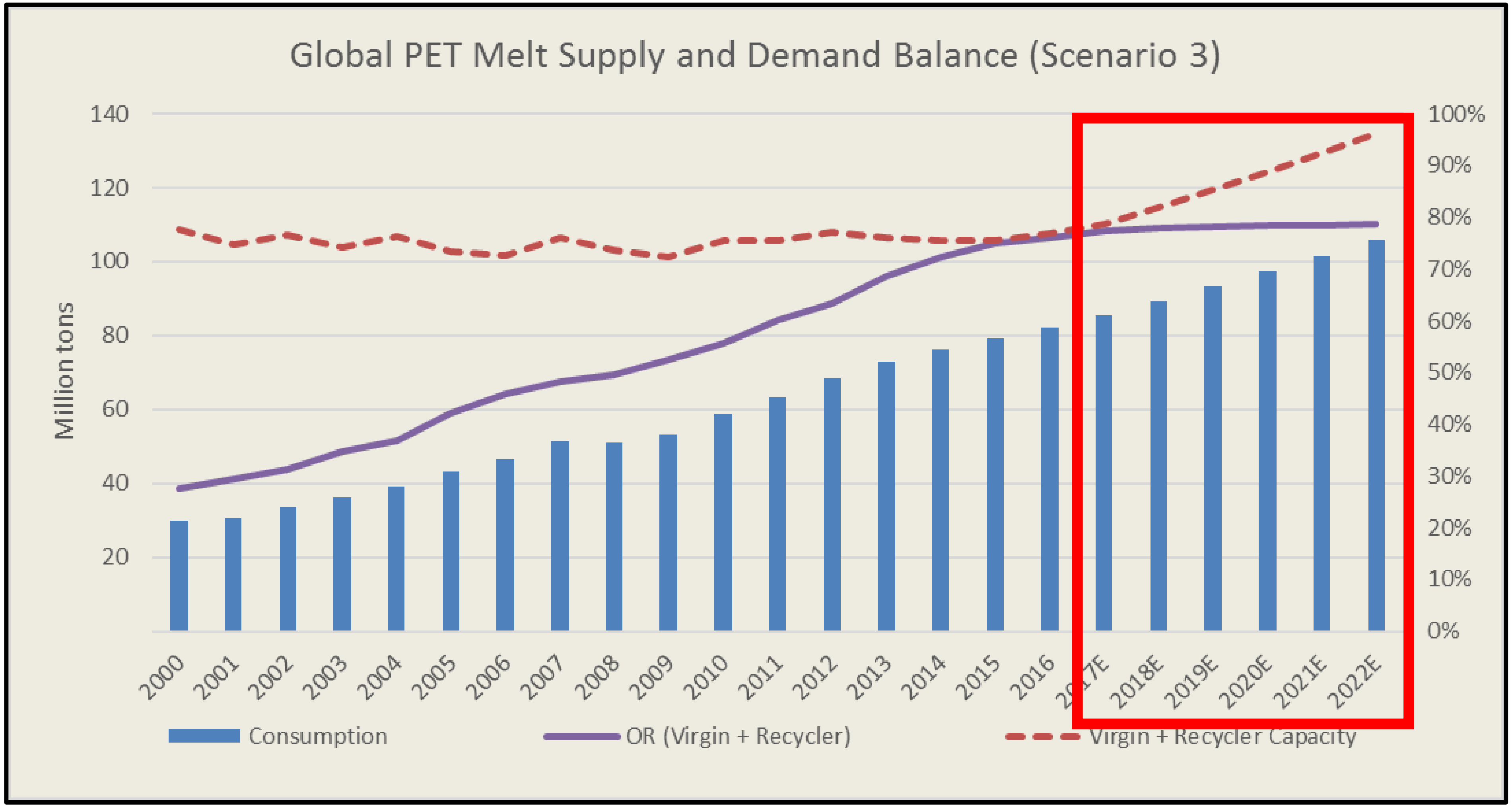
Unlikely Scenario

Scenario 2: Assuming 50% of China domestic PET bottle is recycled, global operating rate is expected to reach 92% by 2020



Assuming no additional virgin capacity post 2018

Scenario 3: Assuming 50% of China domestic PET bottle is recycled + additional 2000kta capacity, global operating rate is expected to reach 90% by 2020



Potential Impact of R-PET Ban

- Global PET melt phase operating rates is expected to go above 80% in 2018
- Recovery in polyester price is likely in order to increase supply availability and justify investment
- Consumption growth rates may be reduced as a result of government policy of developed countries to reduce plastic waste
- Polyester manufacturing may shift to lesser developed countries in Asia, which allows the import of R-PET
- The impact of antidumping duties on import of PET resins and PES Fibre into US from China, India and a few other countries may influence the location of new virgin polyester plant although antidumping duties into Europe from China was terminated in 2017

Key take-aways

Key take-aways

- Global PET melt phase forecast growth continues to be driven by population growth, increasing income, higher standards of healthy living
- Substitution of other materials into PET Bottle and PES Fibre is likely to be limited due to lower cost, availability and quality
- PET resins consumption per capita in Asia is below global average and represent opportunity for further growth
- PES fibre producers are fragmented while PET Resins is relatively less fragmented. Lesser bargaining power for PES fibre producers
- Incremental capacity for PET Melt Phase is dominated by China predominantly into PET resins.
- PET Melt Phase is roughly balance as it is typically forward integrated while PES Fibres and PET Resins net trade flows from Asia to rest of the world.
- China economic growth to focus on sustainability and this may represent a structural shift global
- PET spread is expected to improve as demand catches up with supply and PTA feedstock is likely to remain oversupply (OR approx 73% vs current at around 80%) in the next couple of years.

Dank u!
Thank You!