

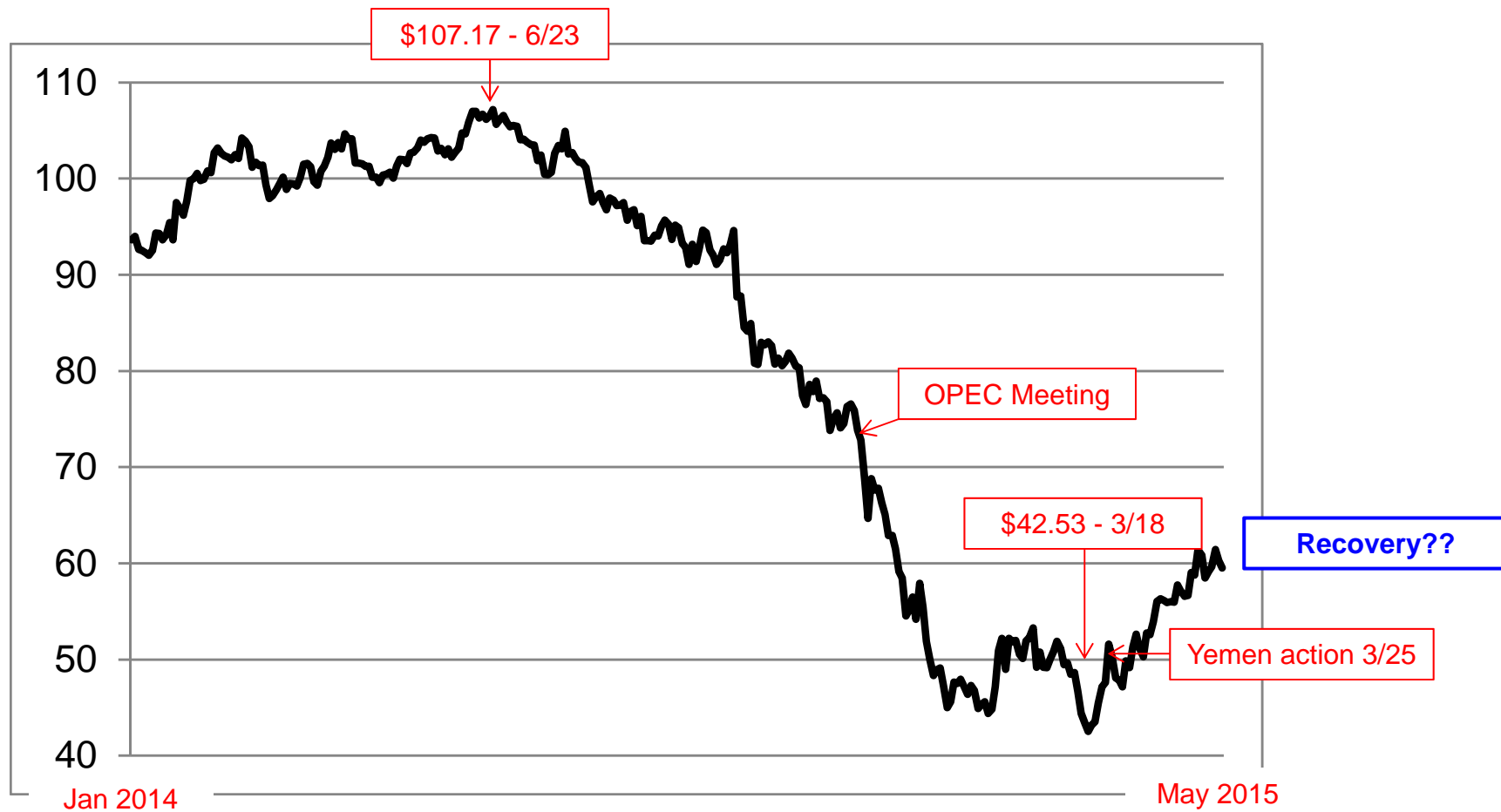
The Impact of Oil Prices on Fibers



Alasdair Carmichael – PCI Fibres
864 583 6868

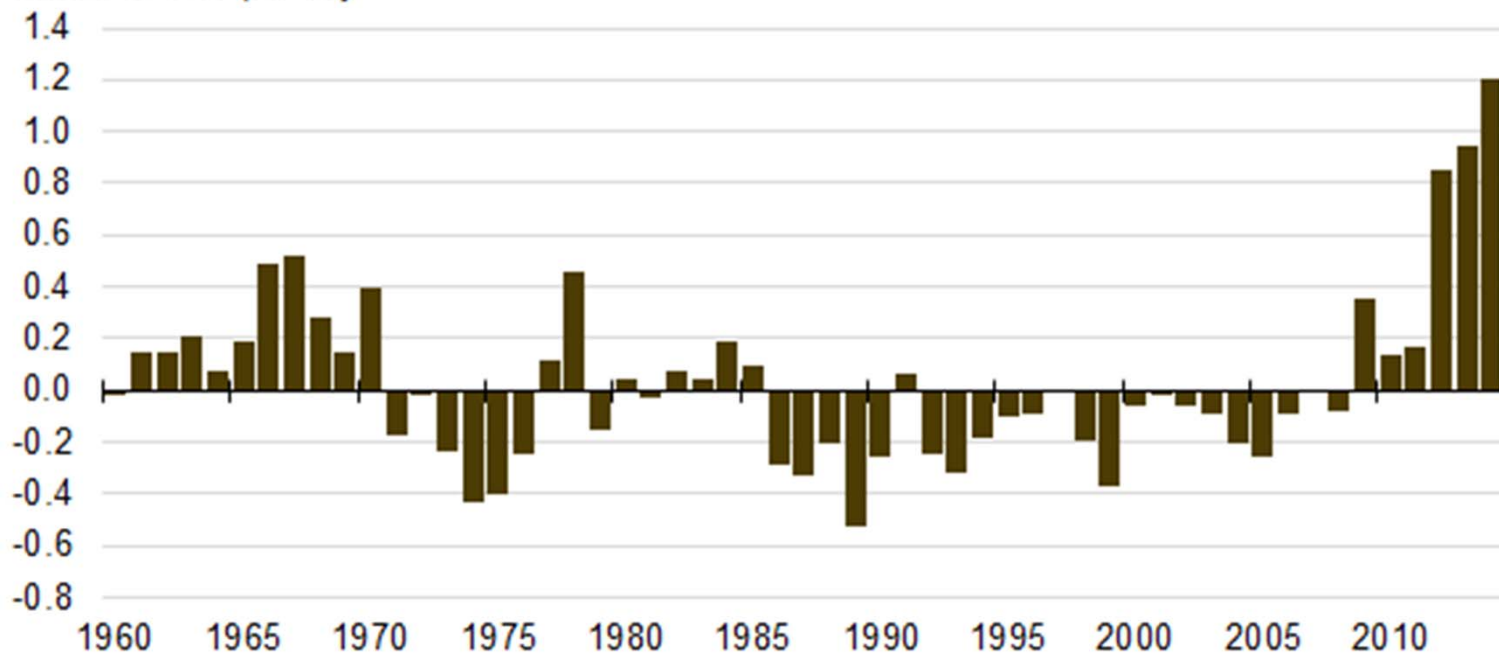


Daily Oil Prices – WTI \$/Barrel



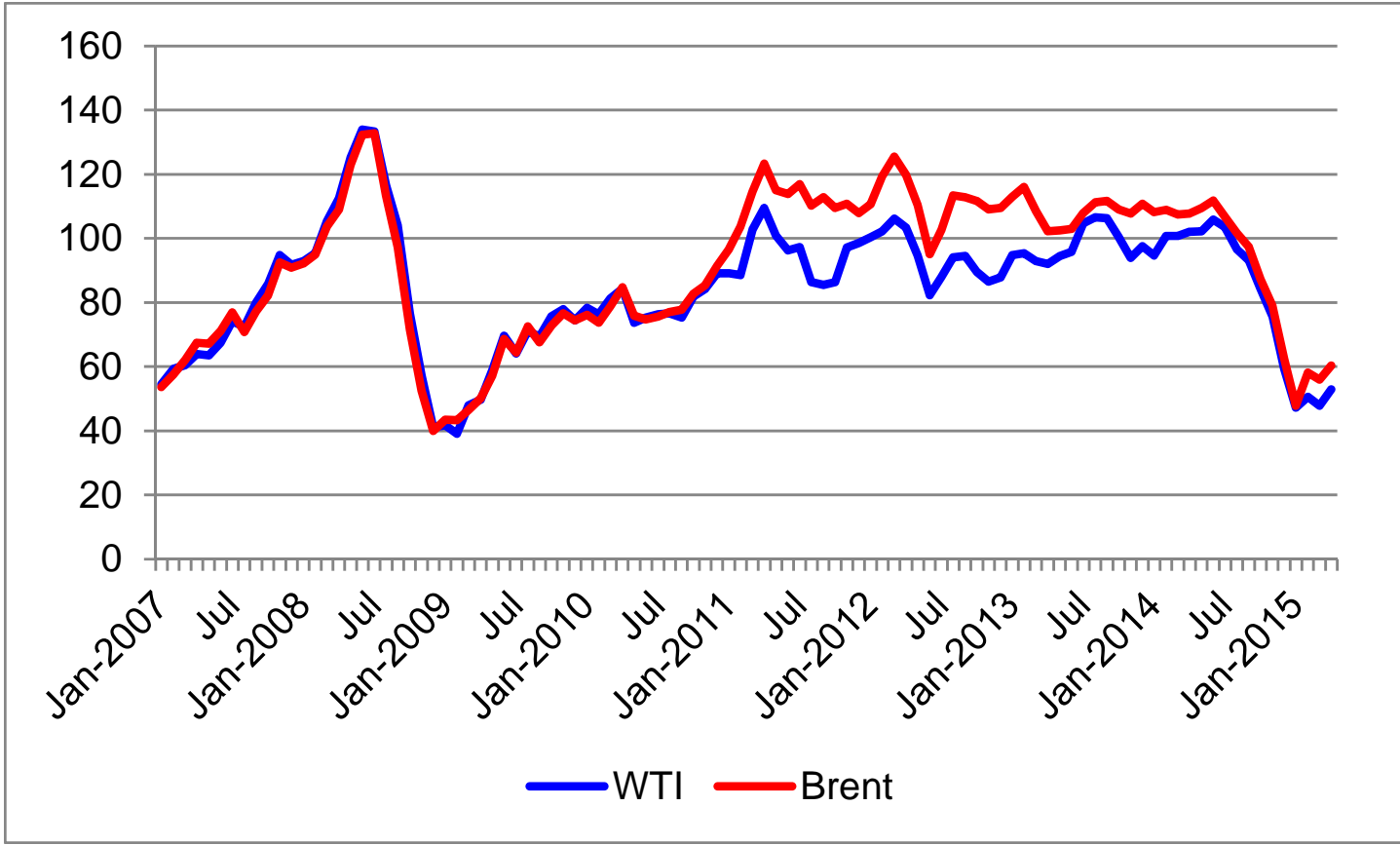
US Oil Production Annual Change (million barrels/day)

Annual change in U.S. field production of crude oil (1960-2014)
million barrels per day



Oil production growth in 2014 in the US was the largest in over 100 years

West Texas (WTI) vs Brent Oil (\$/barrel)



As WTI cannot be exported it is not so relevant to Polyester raw materials as Asia drives prices and Brent oil is a better indication of Asian oil prices.

Sage Advice on Oil Prices

" A man who would pay money for an oil price forecast is a man with too much money."

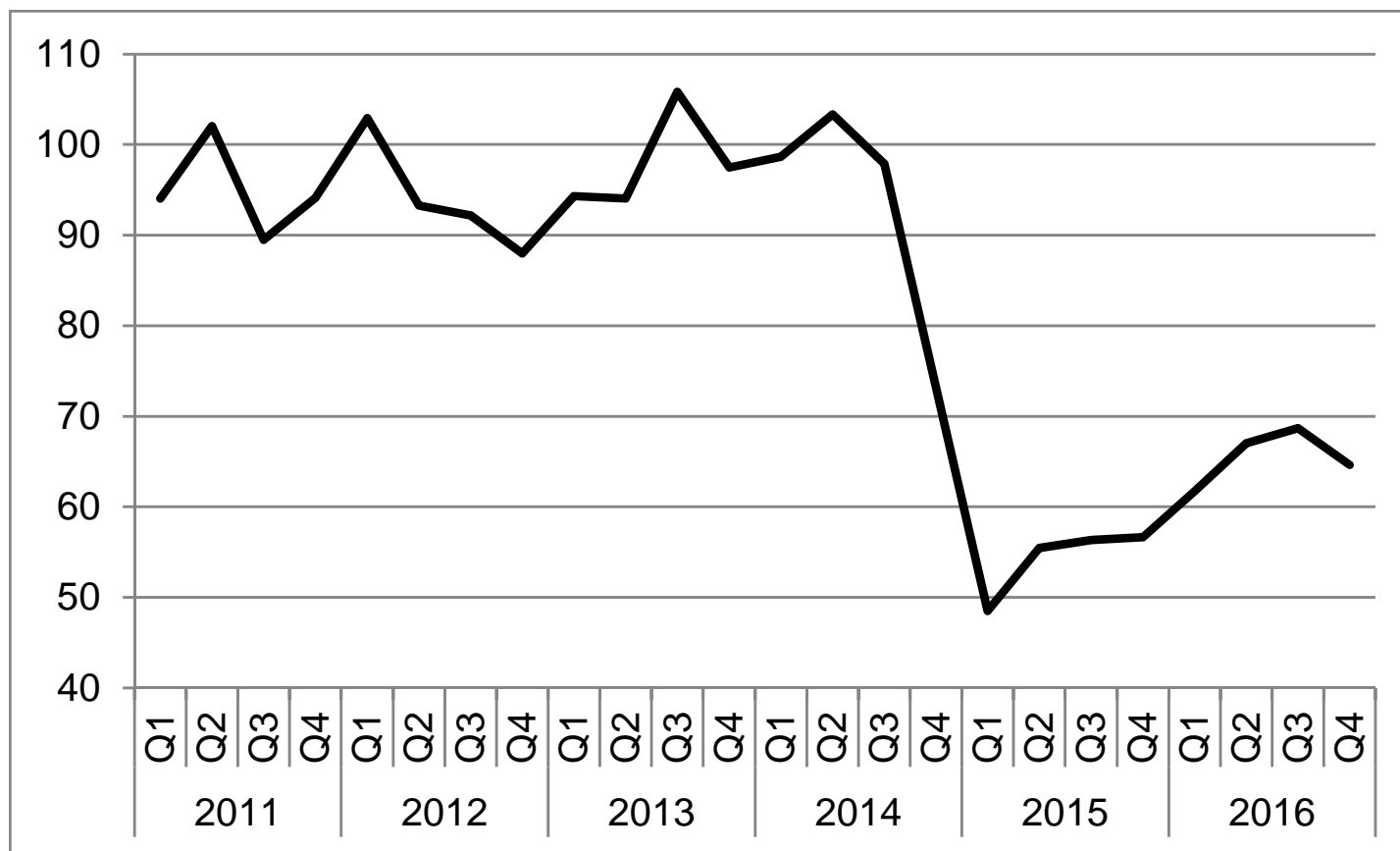
- Dr. Phil Leighton, Jacobs Consulting

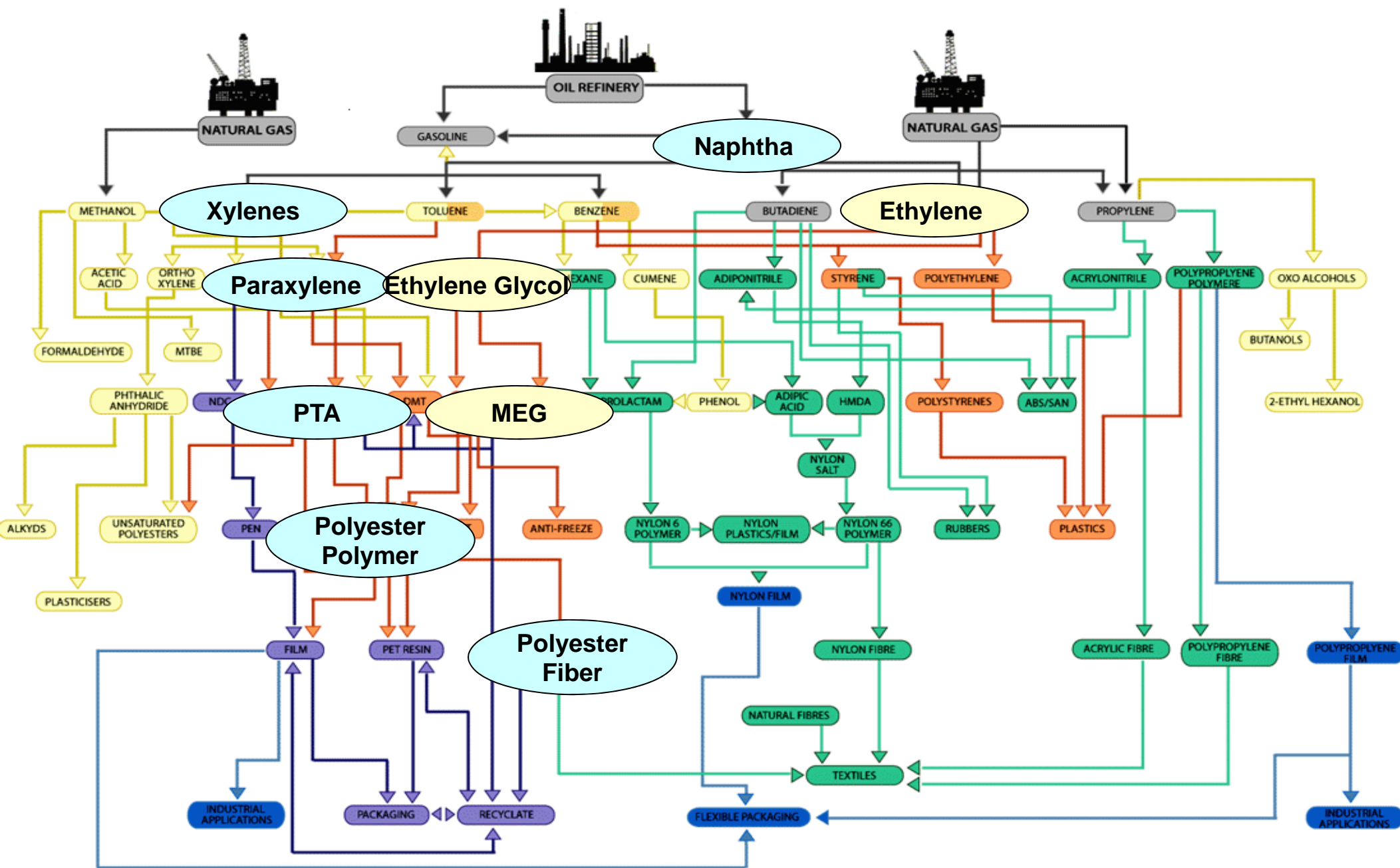
The price of oil is fundamentally unstable.

EIA is forecasting US oil production will be down 57,000 barrels a day by May on a total of 9 million + /day. This will help stabilize prices and lead to a gradual increase which will bring idled wells back into production as higher prices are reached. Tight oil wells can be easily stopped and started.

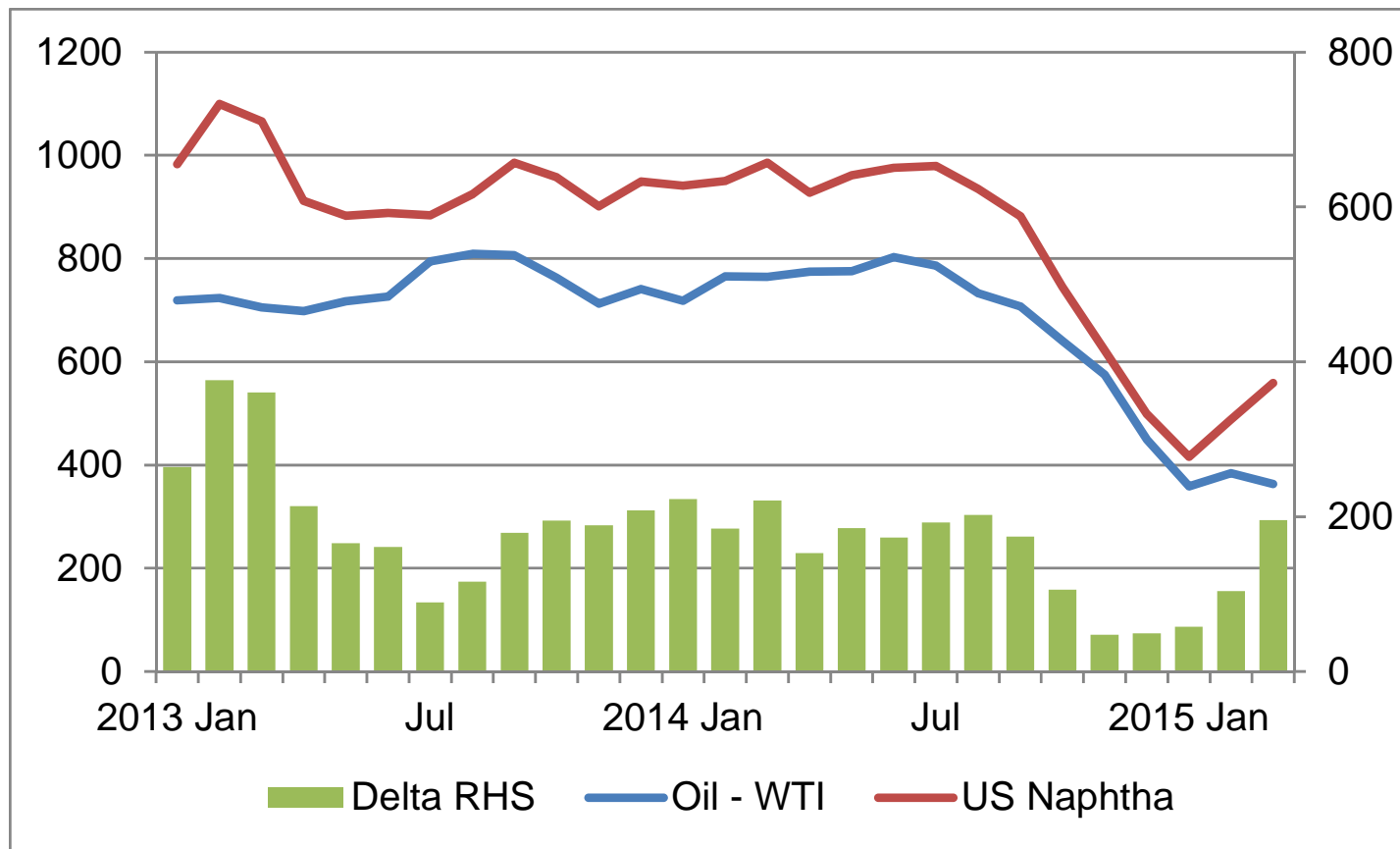
Global oil production = 93.6 million barrels/day (12 million tons/day)

EIA Short Term Oil Forecast – WTI \$/barrel

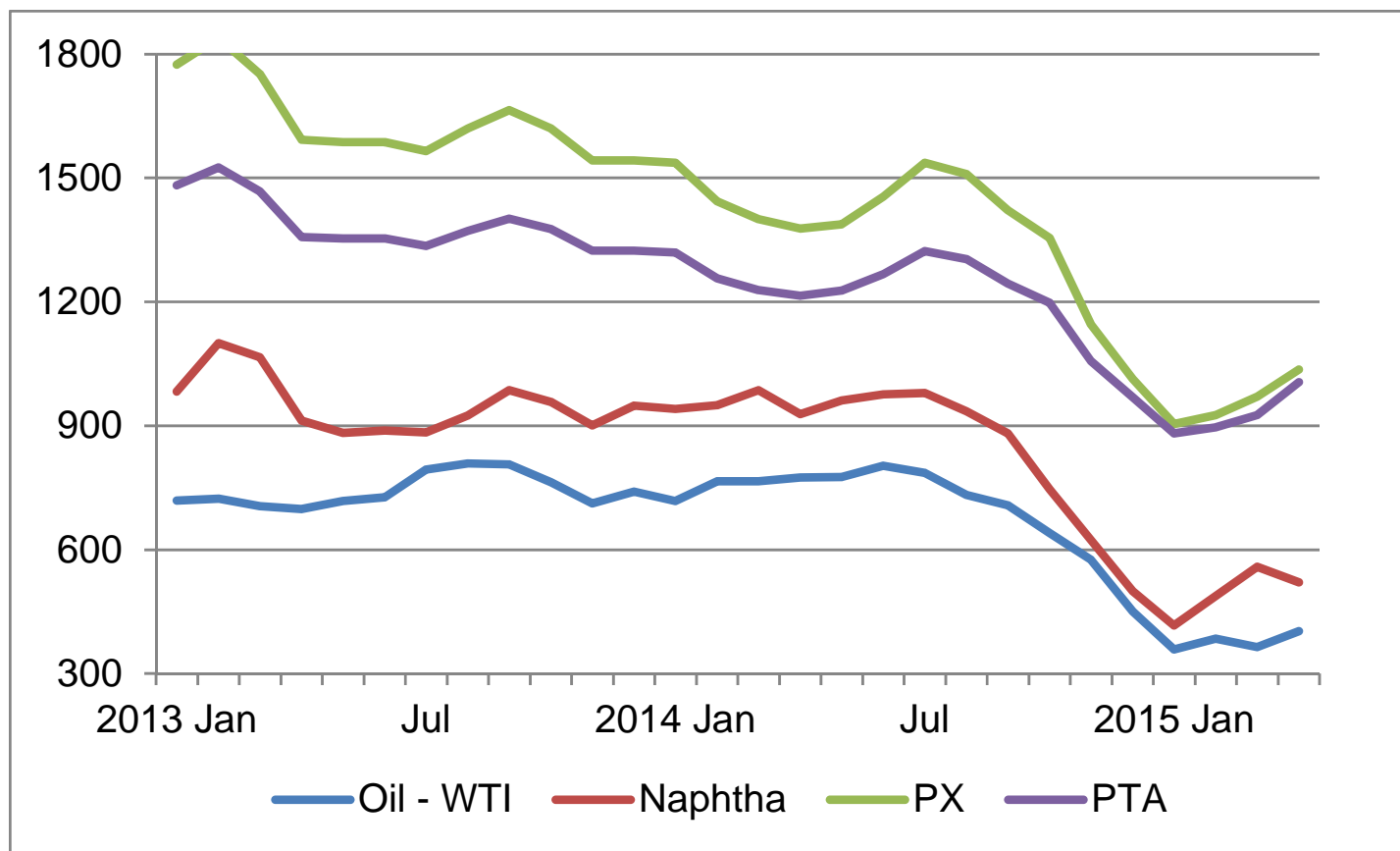




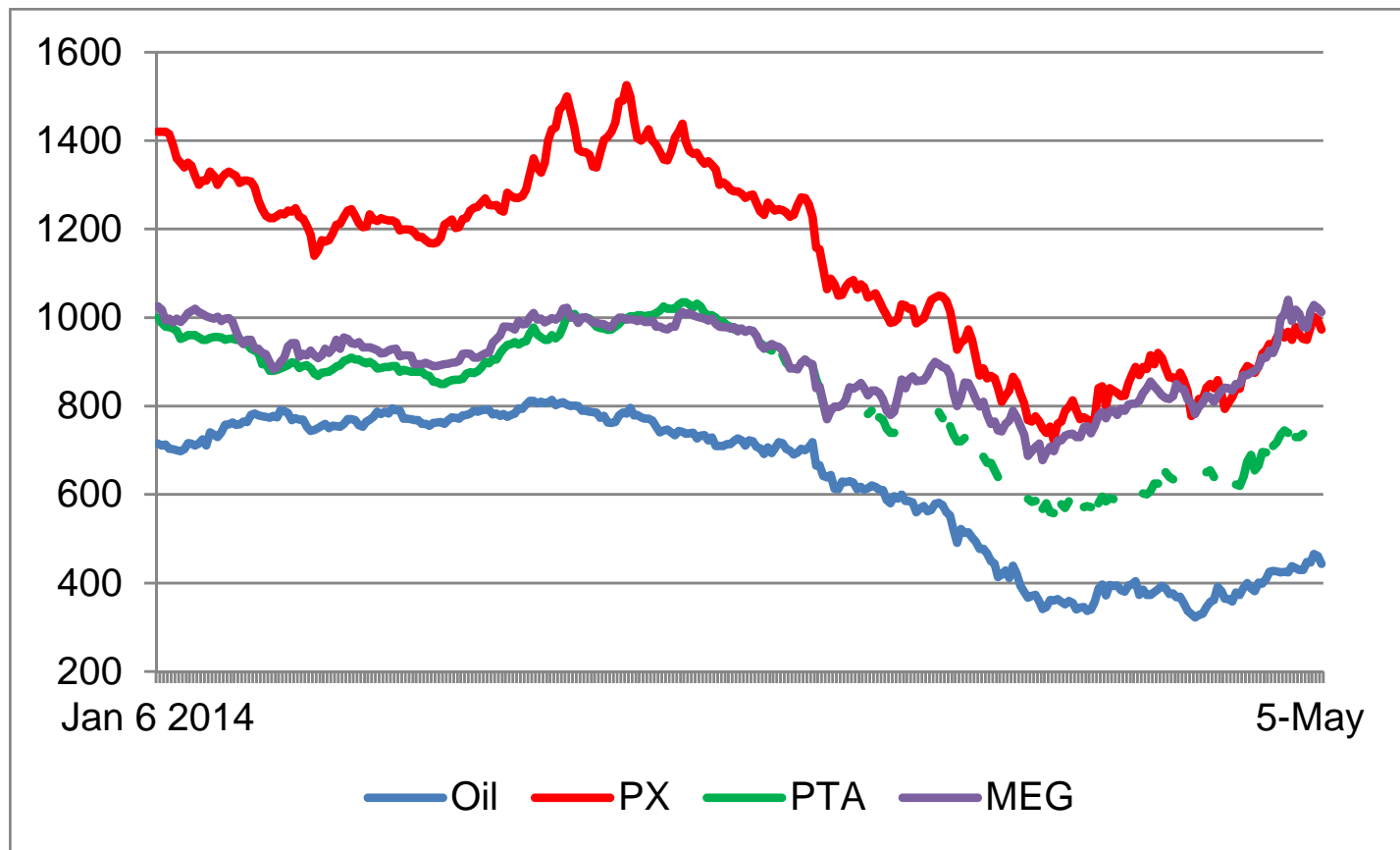
Naphtha is the starting point for many Petrochemicals



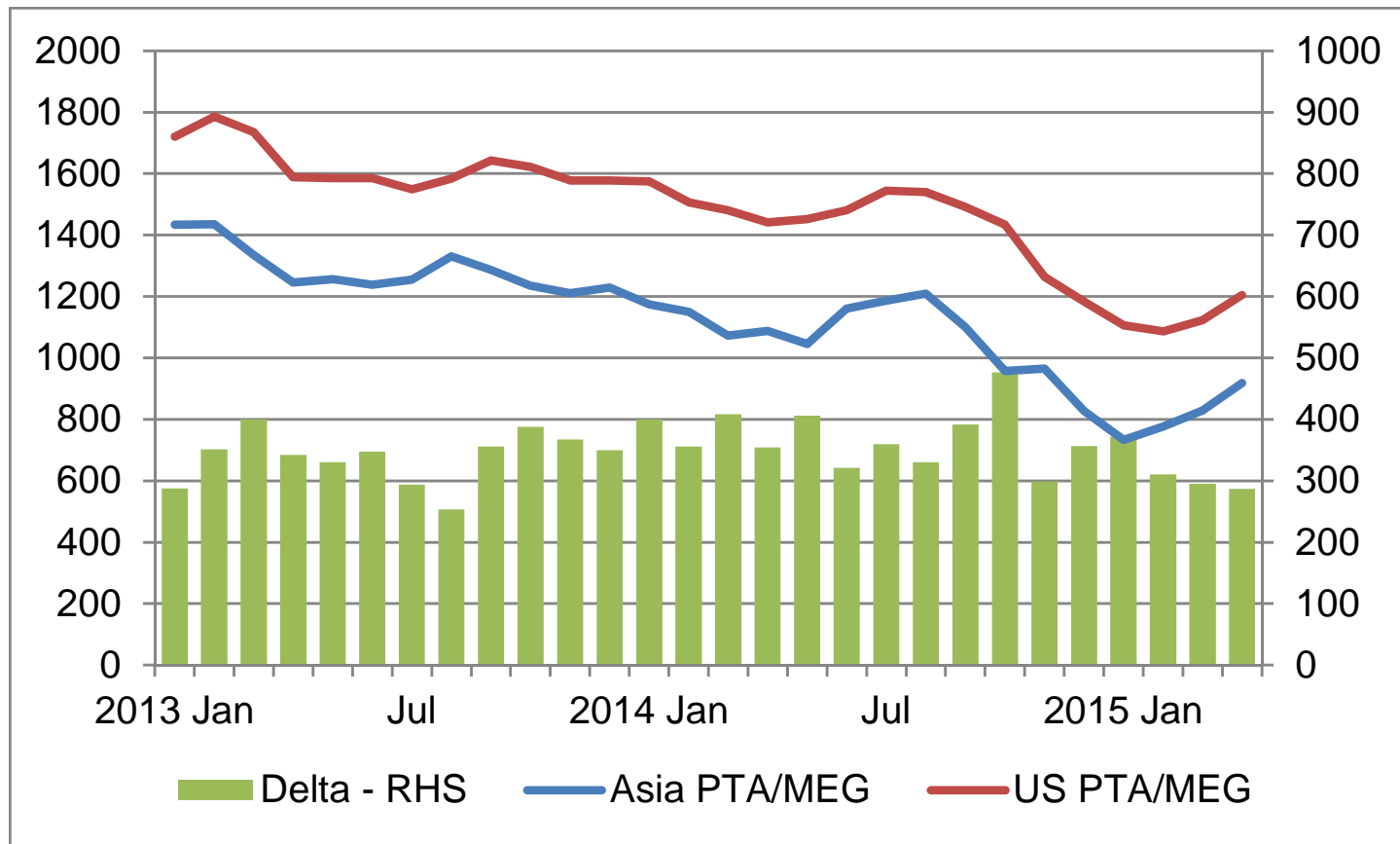
Main Polyester Raw Material Route (\$/ton)



Daily China Spot Prices for Polyester Raw Materials \$/ton

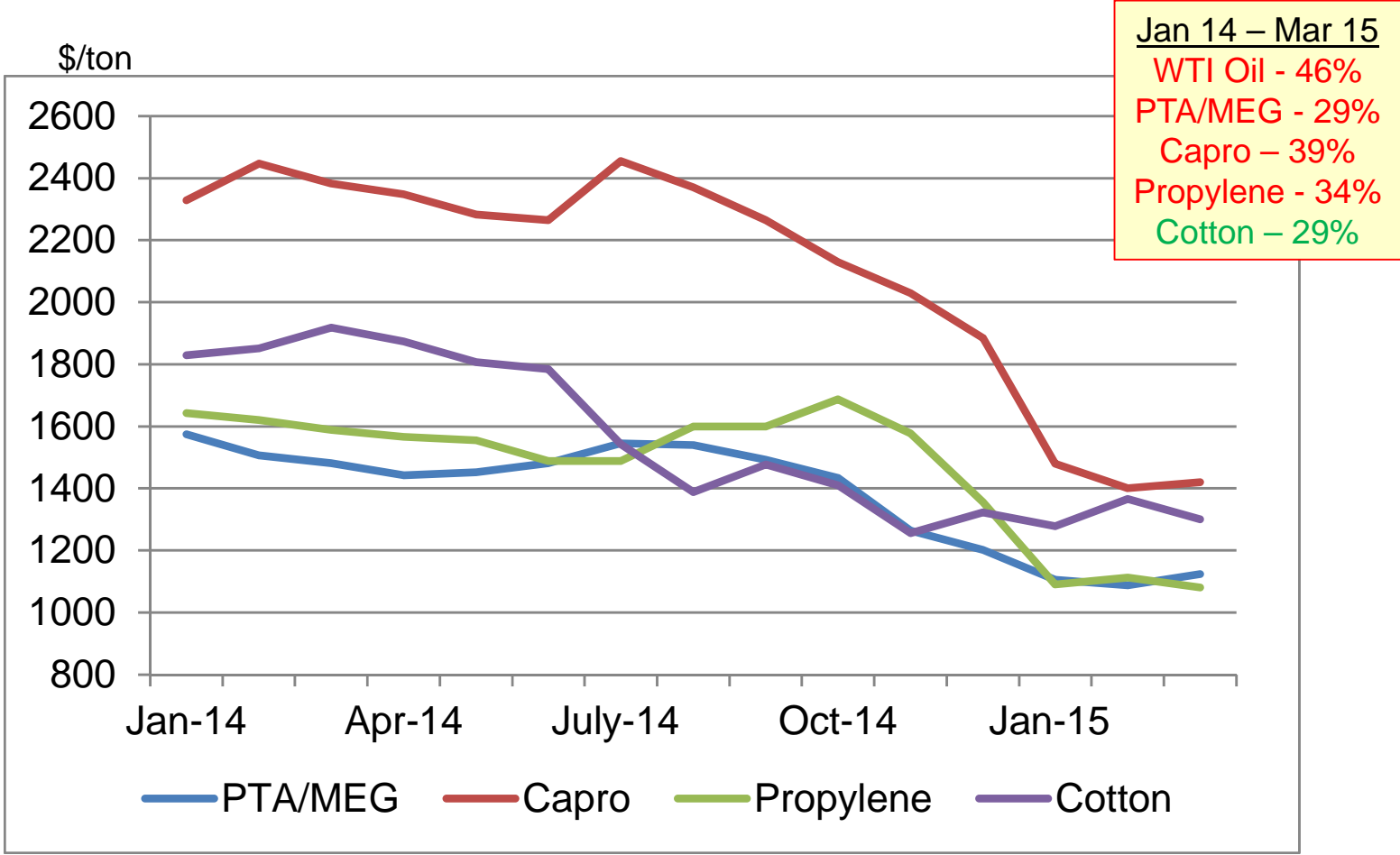


Polyester Raw Materials Prices, Asia vs USA \$/ton



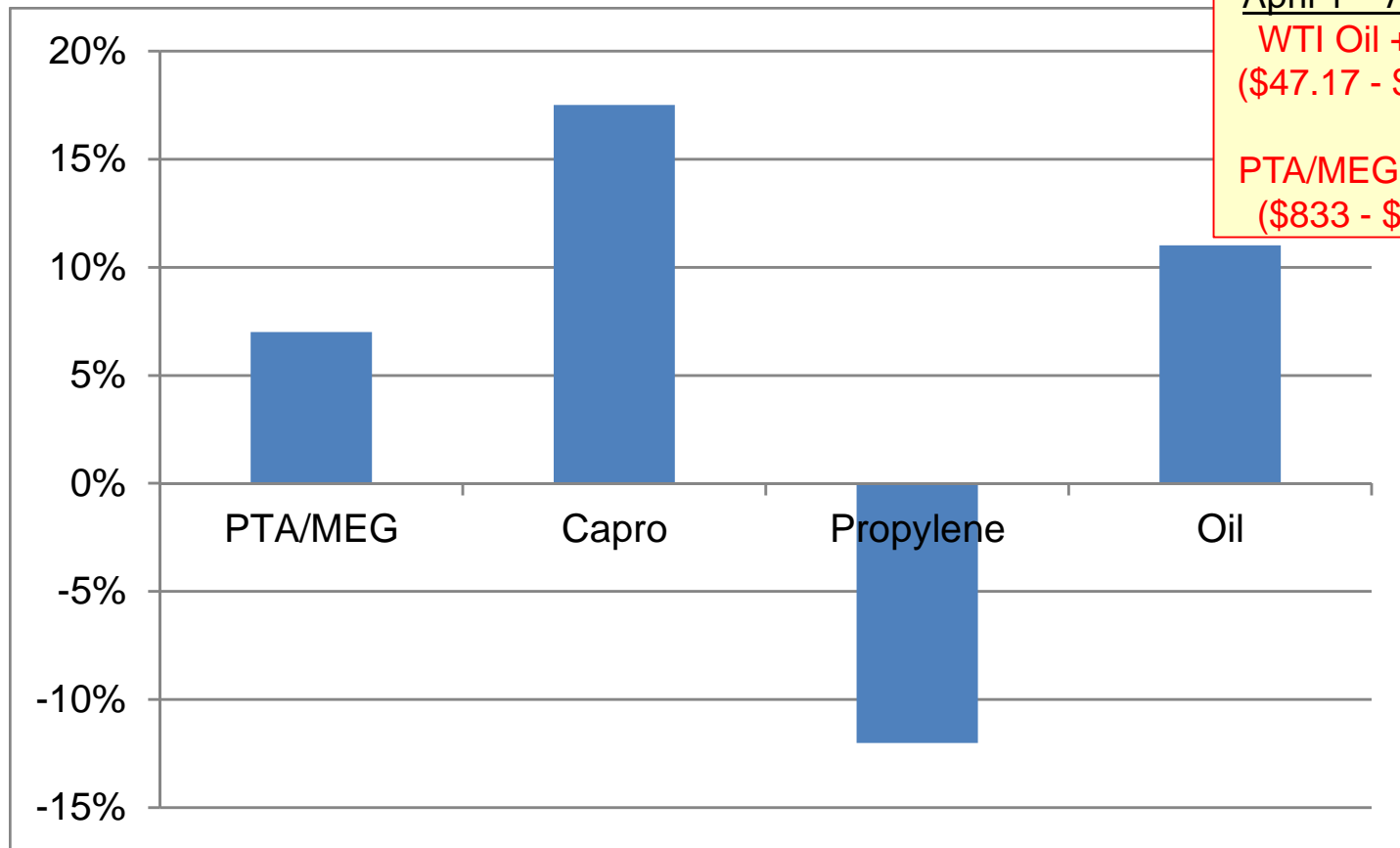
The average price disadvantage in US against Asia = \$352/ton or 16c/lb

USA Raw Material Price Change for Major Synthetic Fibers + Cotton



But, Things Start to Change in April

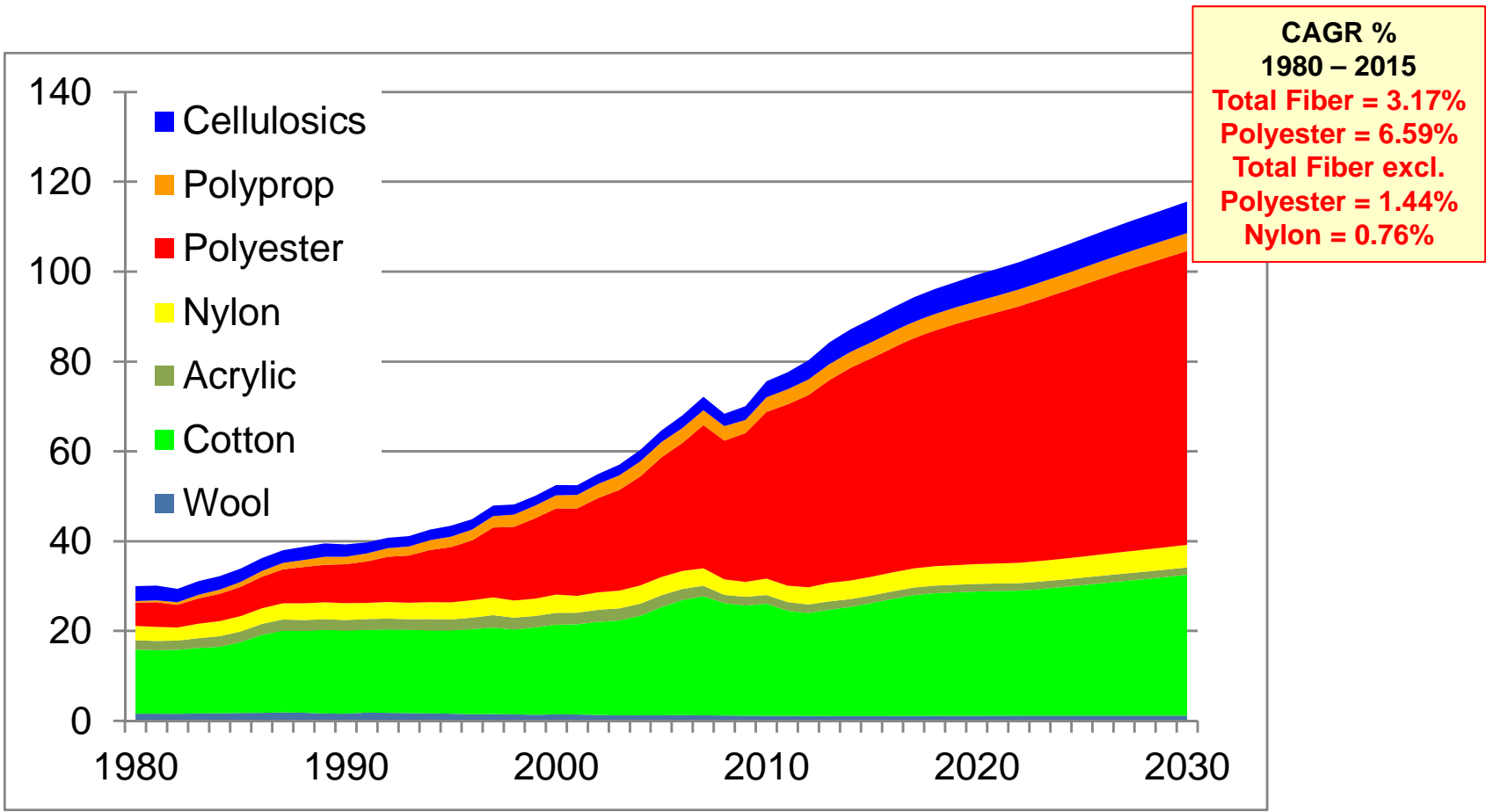
March 2015 – April 2015 % Change (US prices)



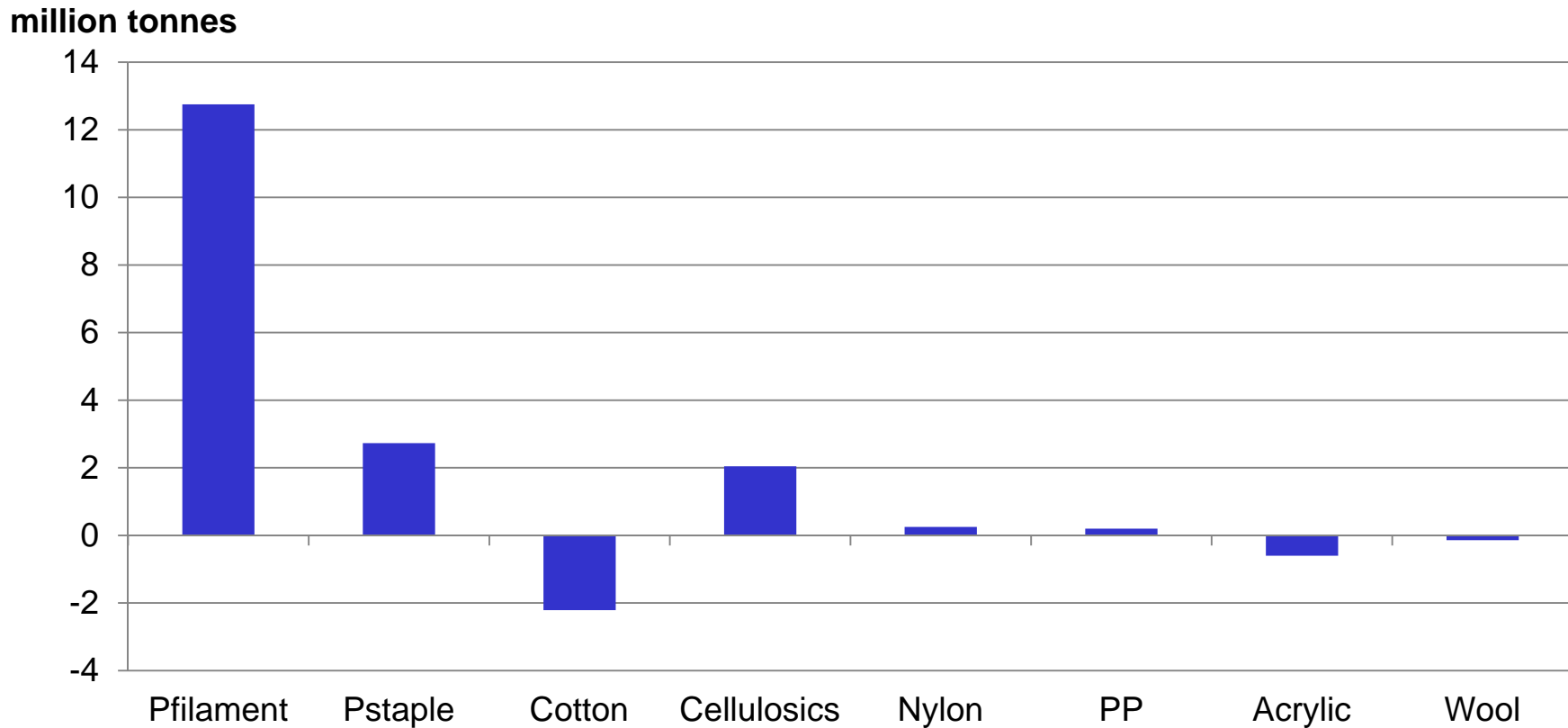
Daily Asian Price
April 1 - April 30
WTI Oil + 25%
(\$47.17 - \$59.03)
PTA/MEG + 23%
(\$833 - \$1026)

Price increases announced in Polyester fibers & resin/polymer

Total Fiber Demand (million tons)

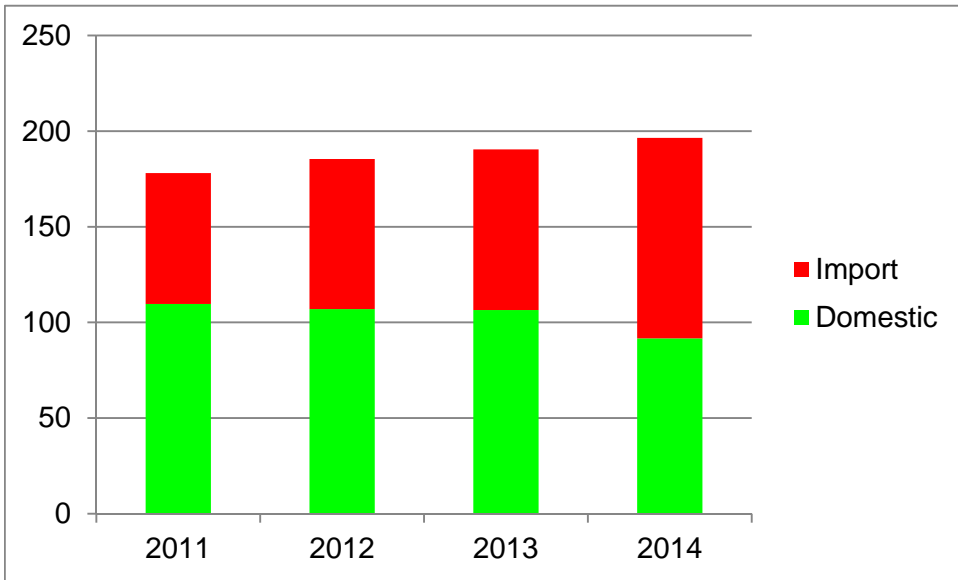


Change in Global Mill Consumption – 2007 : 2014, Winners & Losers



Source: PCI Fibres Demand Model

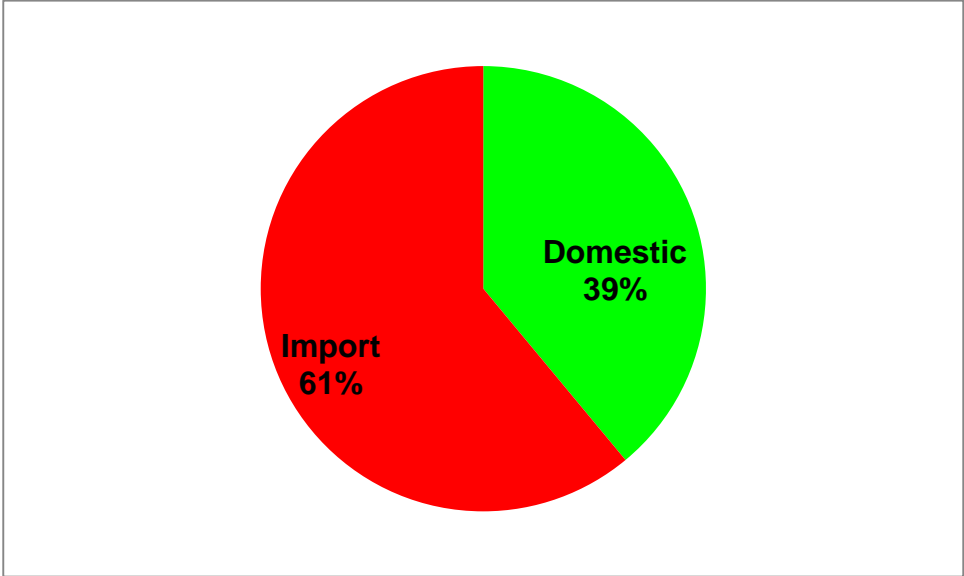
Polyester Industrial US Domestic Consumption (000 tons)



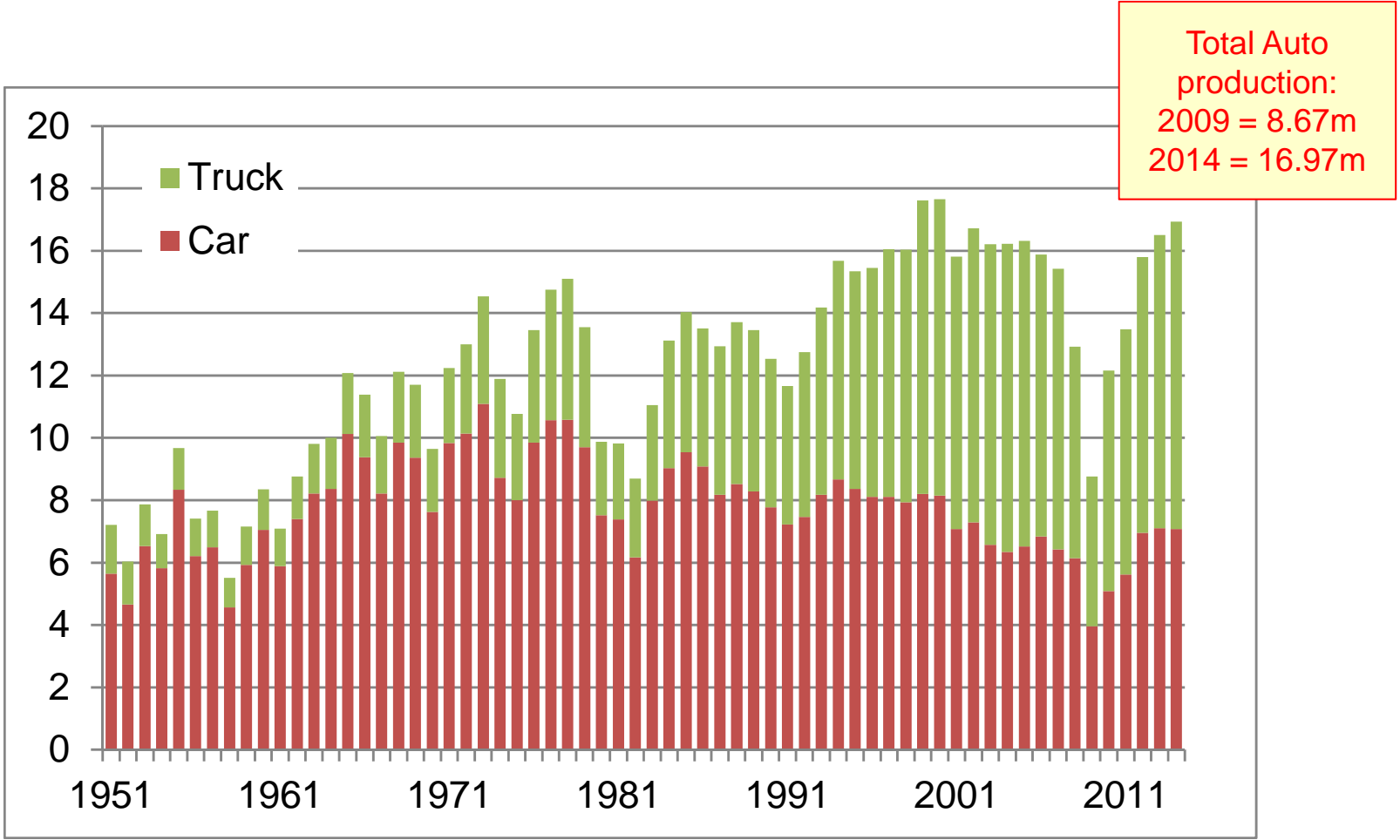
Closure of Moncure in Q4 2014 starts to show in increased imports for full year

To Feb 2015

Impact of closure becomes clearer. Imports in 2013 were 44% of total, now 61%. To 2/15 imports increased by 5.1ktons over 2/14, Chinese imports increased by 4.5k tons.



North American Total Auto Build (millions)

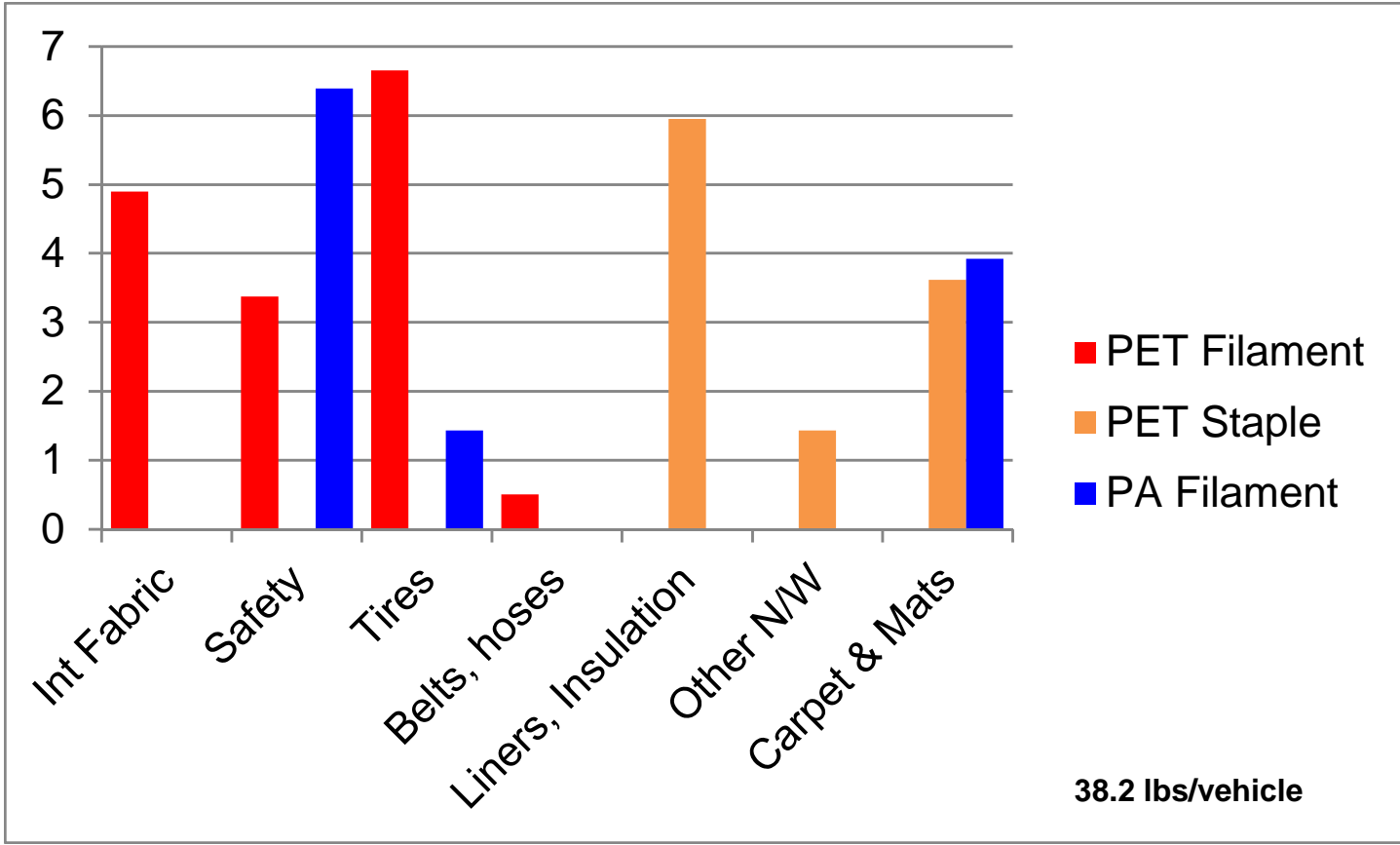


North American Auto Industry Booming

- In 2 years Mexico has announced or started up \$11 billion of new automotive investment.
- Mexico will be the 7th largest vehicle producer in the world in 2015.
- Mexico is the 4th largest exporter of vehicles (Japan, Germany, S.Korea, Mexico)
- In last 20 months Audi, Kia, Daimler/Nissan and BMW have all announced new assembly plants each of more than \$1 billion.
- 12/14 GM investing \$3.6 billion at existing plants to double capacity in Mexico
- 03/15 VW announces \$1 billion expansion at Puebla plant - Tiguan
- Mexico has excellent free trade agreements – EU, NAFTA, S.America, 40 countries + TPP Asia Pacific expected. Easy access to Atlantic and Pacific ports. Competitive labor costs, but expensive energy.
- BMW investing a further \$1 billion in Spartanburg making it the largest BMW plant in the world. 75% of production for export. Total Investment \$7.5 billion
- US auto exports broke record for 4th consecutive year in 2014. 2010 = 1.3 million light vehicles, 2014 = 2.1 million (\$159 billion)
- Volvo announce \$500m plant in S.C. 4/2015

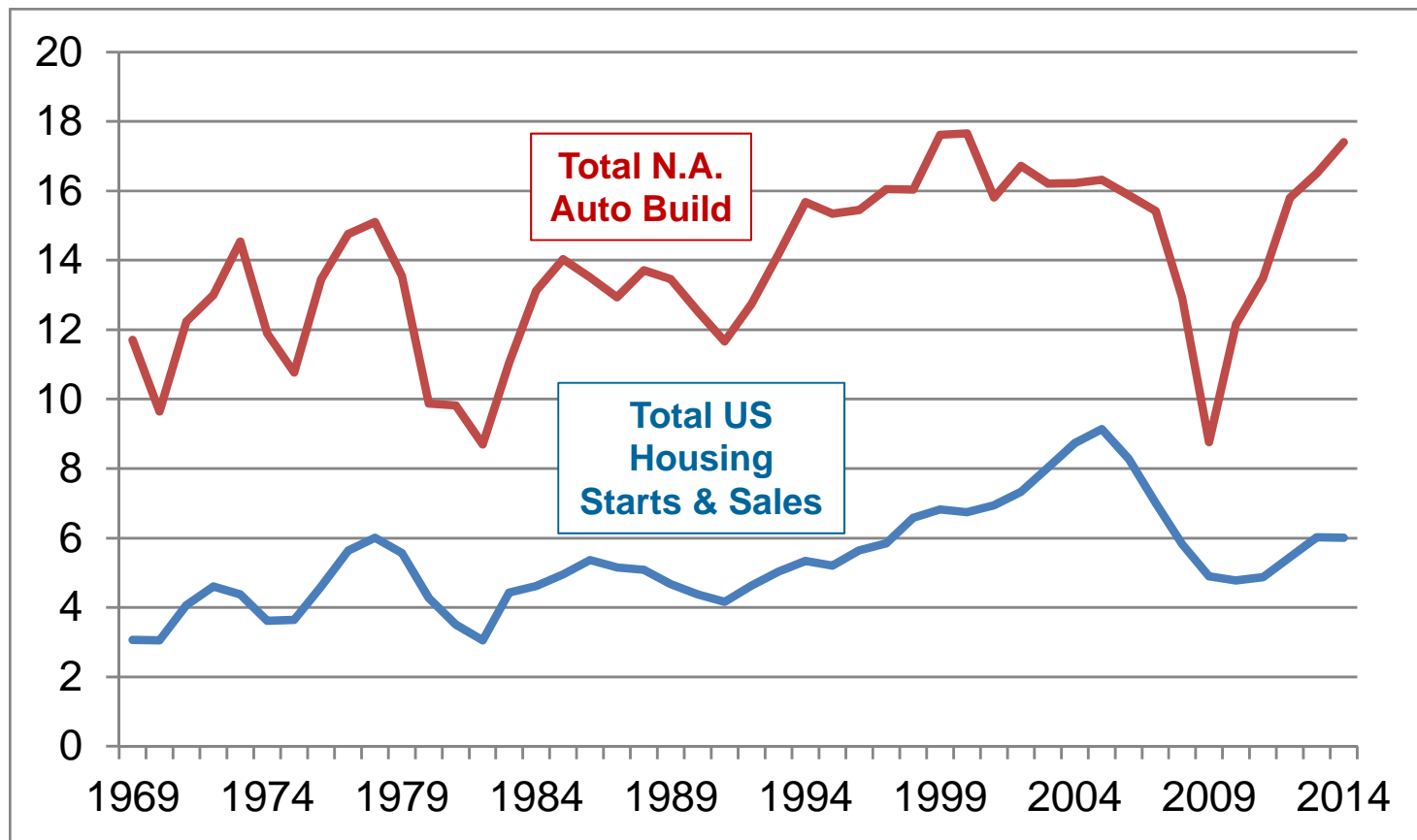
Why is Auto Build important to Polyester & Nylon

Synthetic Fibers into N. American Auto Build (lbs/vehicle)



**Total Polyester Fiber used in LCV Auto Build 2014 = 450 mm lbs
with an estimated 150 mm lbs from rPET
Total Nylon Fiber used in NA LCV Auto Build 2014 = 200 mm lbs**

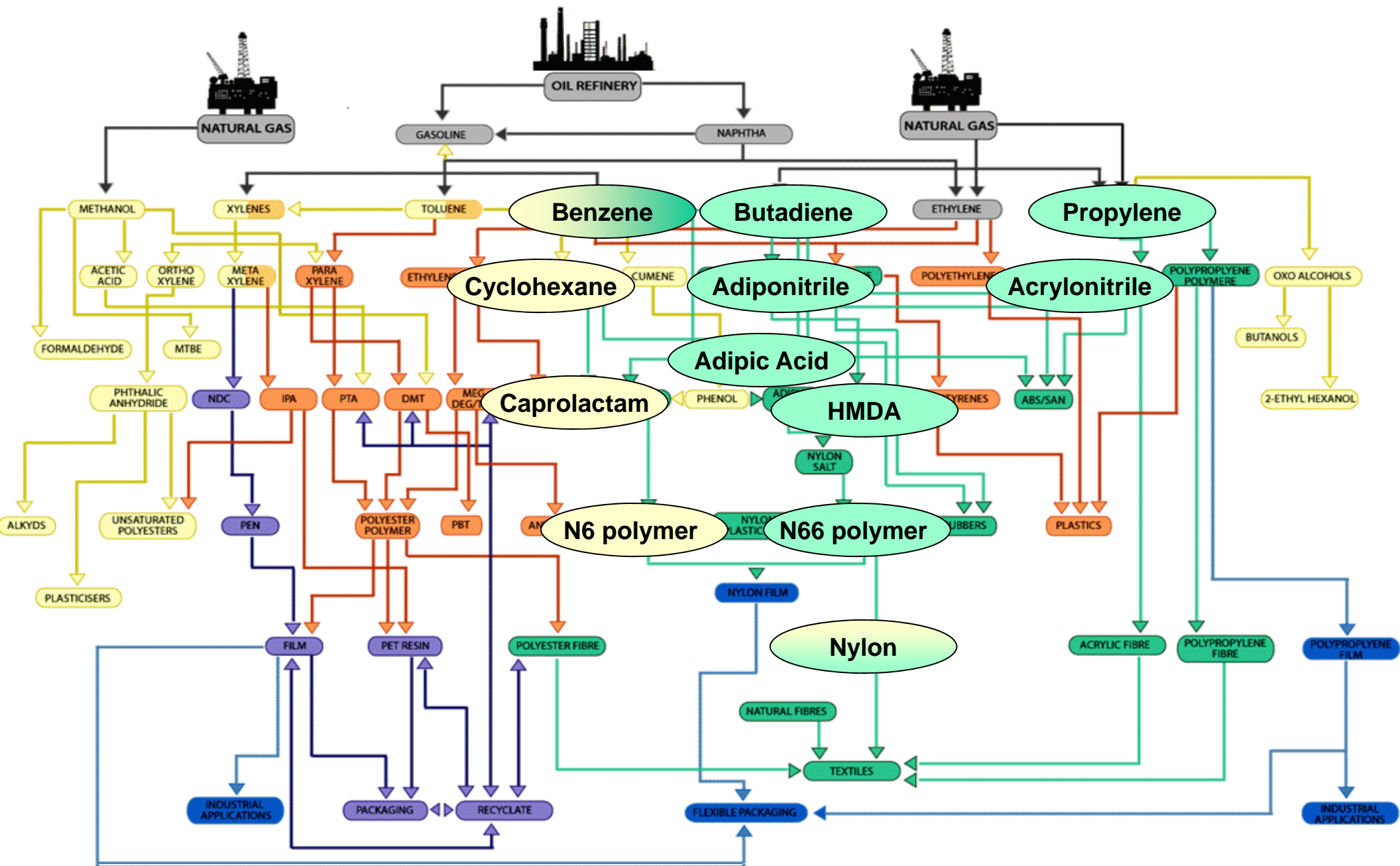
Auto & Housing Recovery from Recession (million units)



Nylon – Current Issues

Nylon 66 impacted by Invista Force Majeure Early April 2015

Plant issue at Victoria TX resulting in Force Majeure. No official news yet of the severity of the cut back in deliveries of the expected duration. Key products impacted by FM are Adiponitrile (ADN), Hexamethylene Diamine (HMD) and Nylon 66 Polymer.



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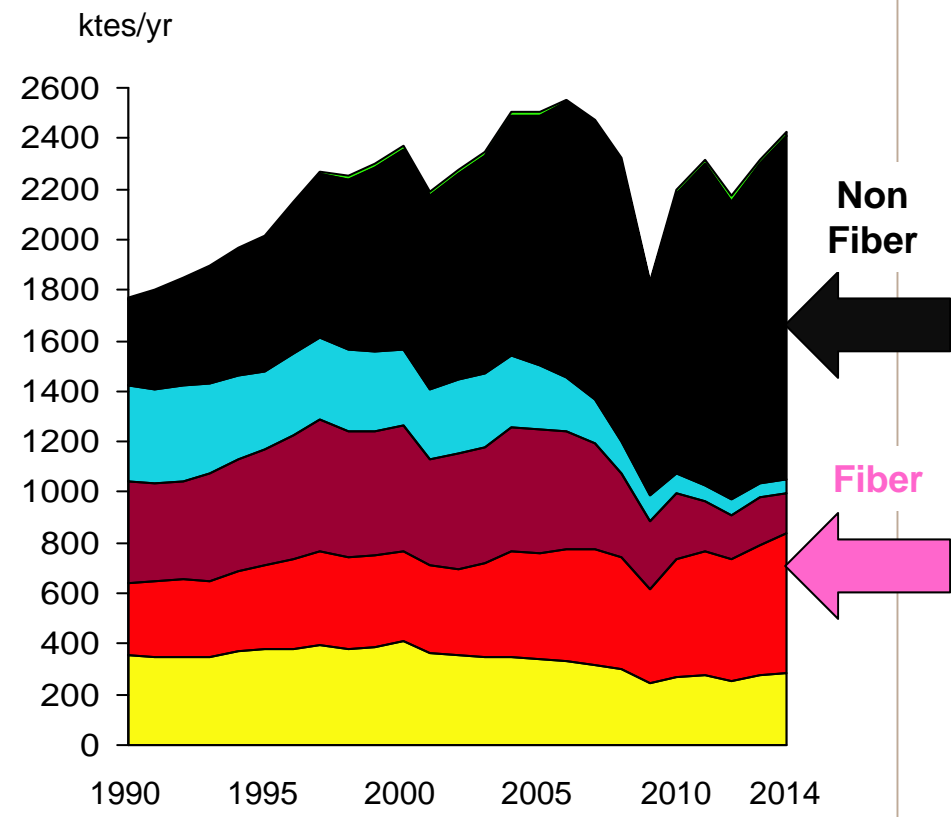
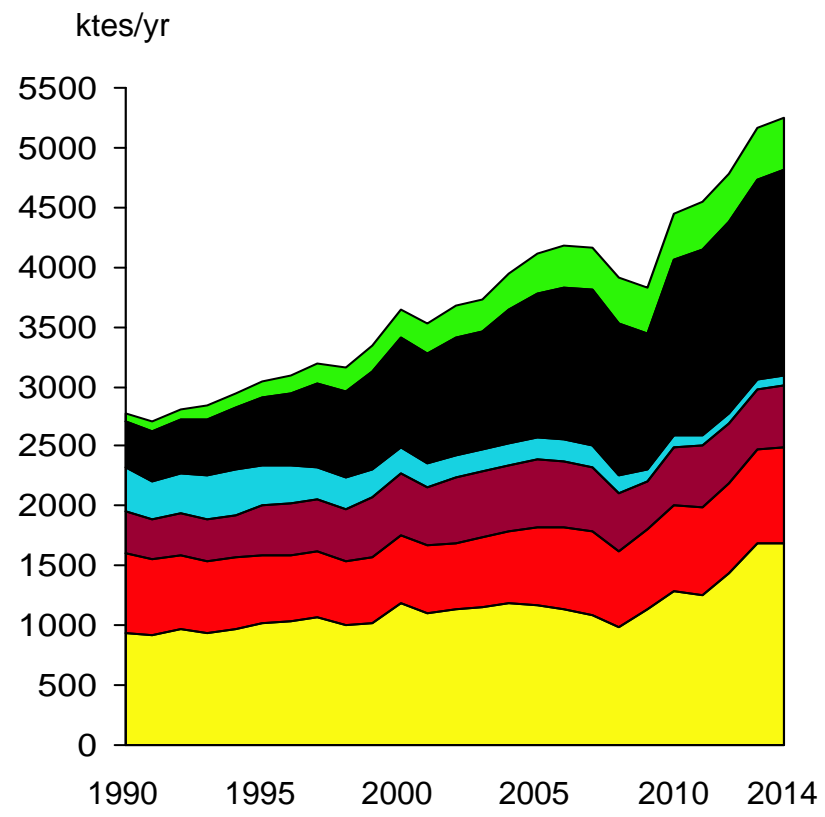
ADN is particularly critical as there are only 4 major plants in the world that supply the world's needs for Nylon 66:

- Invista Victoria TX – 403,000 tons
- Invista Orange TX – 360,000 tons
- Ascend Decatur AL – 455,000 tons
- Butachimie France – 520,000 tons (Rhodia/Invista J/V)

Global PA Demand by End-Use: PA6 vs PA66

Global PA6 Consumption – by Application

Global PA66 Consumption – by Application

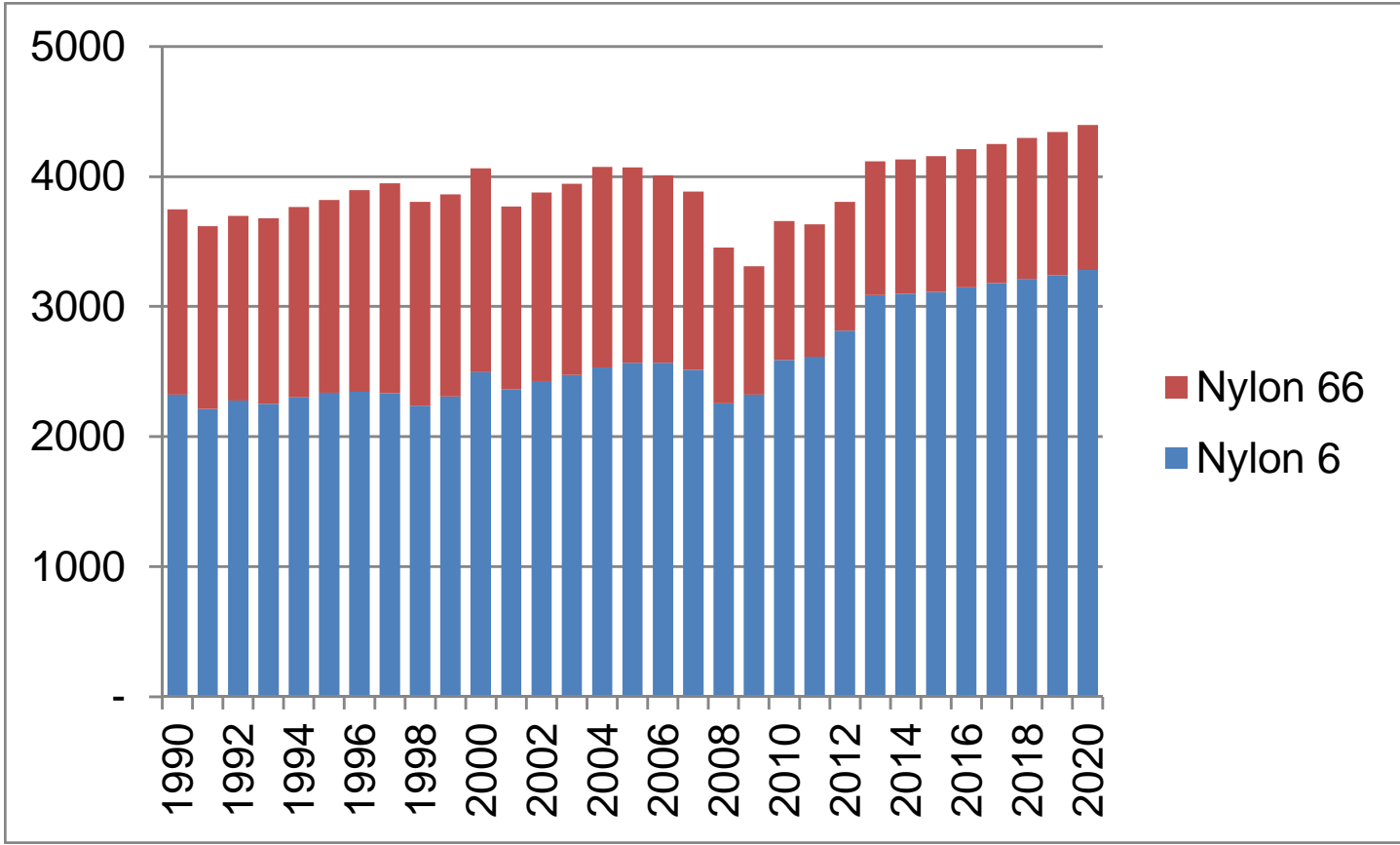


■ Film
 ■ Engineering Plastics
 ■ Staple Fibre
 ■ Carpet Filament
 ■ Industrial Filament
 ■ Textile Filament

Source: PCI Nylon

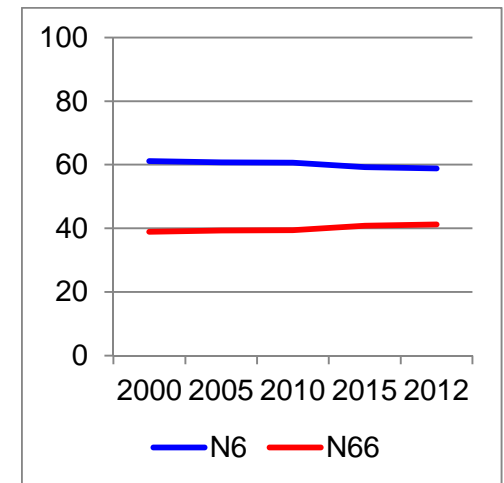
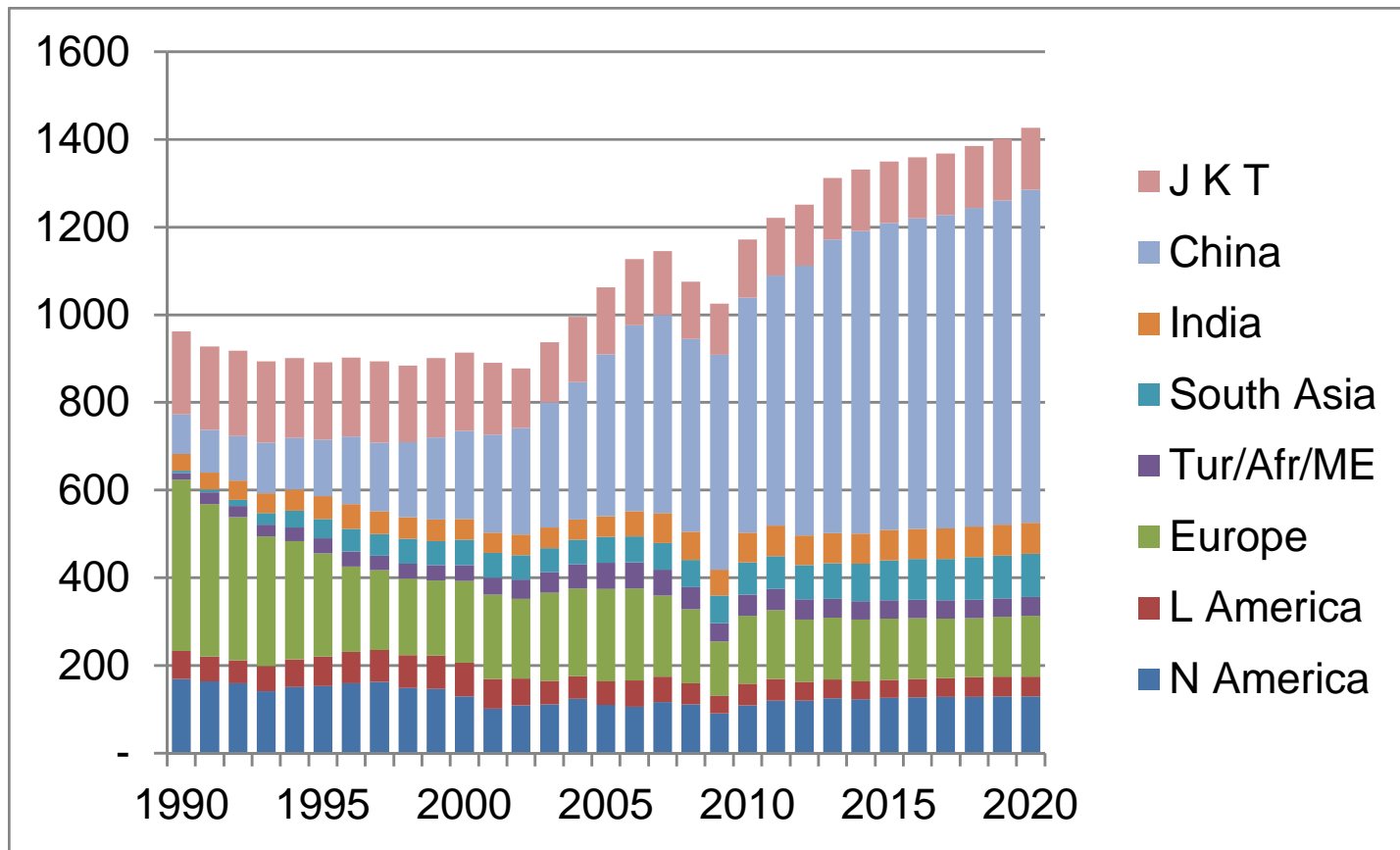


Total Nylon Fiber Production (000 tons)



2015 Polyester Production = 48.7 m tons; Nylon = 4.2 m tons

Nylon Industrial Filament Production by Region (000 tons)



Share by Polymer Type

N66 makes slight gains – air bags, cap ply

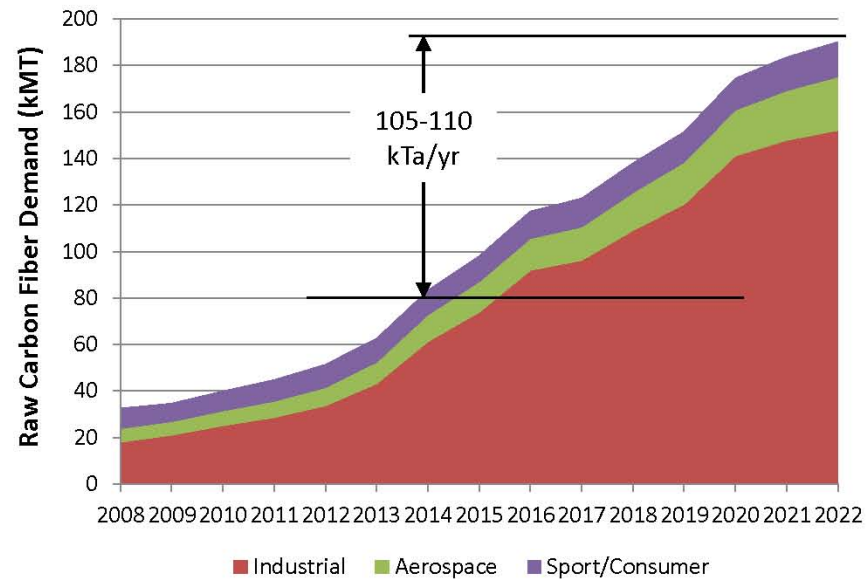
What do all these have in Common?



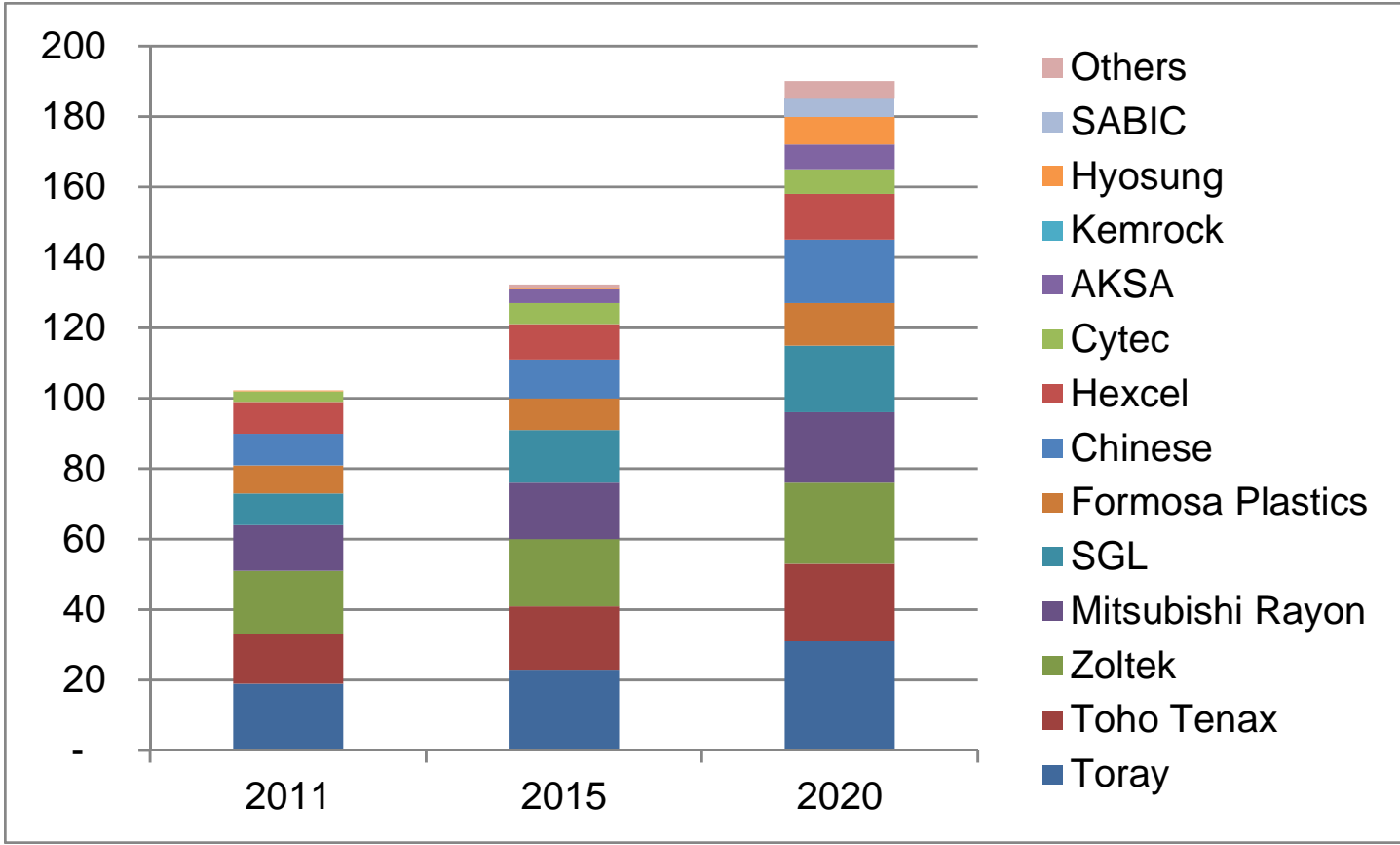
Consumer Demand for Carbon Fiber

- 1970 – CF demand is “lab scale”
- 1980 – CF demand est. 1 kTa/yr
- 1990 – CF demand est. 11 kTa
- 2000 – CF demand est. 15kTa
- 2010 – CF demand est. 40 kTa
- By 2014, demand is estimated at 83.3 kTa – 240% of 2010
- By 2022, anticipated demand will grow to 190 kTa – 230%
- **Energy-related applications (usage or production) are the biggest growth markets for carbon fibers.**

Current and Forecasted Raw Carbon Fiber Demand, 2008 - 2022



Global Capacity Estimates for Carbon Fiber (000 tons)



Note: 2020 capacity forecasts vary from 170,000 tons to 200,000 tons

Recent Carbon Fiber Activity

Toray acquire Zoltek in 2014 - \$584 million

Mitsubishi doubling CF capacity to 4,000 tons in Sacramento CA in 2016

SGL/BMW doubled CF capacity to 6,000 tons in WA in 2014; adding a further 3,000 tons started. \$300m invested

Cytec doubling CF capacity by adding 3,000 ton plant in SC – start up 2016

Toray start new precursor plant in France in 2014

Toray announce \$1 bn investment in SC. 65% spend by 2017 – precursor, fiber & prepreg

Hyosung invest \$230m for 2,000 tons in 2013, plan to invest further \$800m to 17,000 tons by 2020

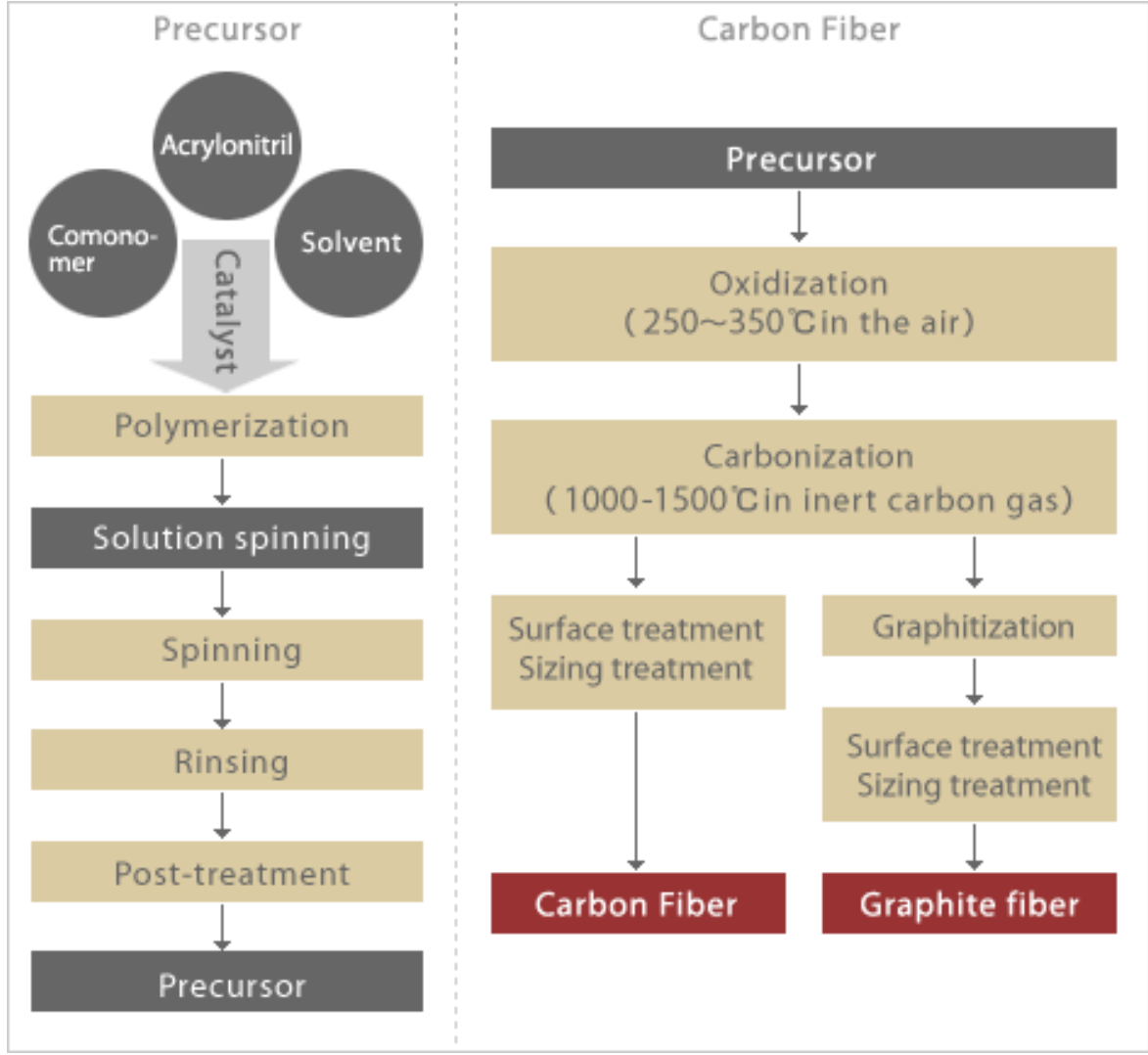
Toray sign 10 year deal with Boeing for 777X & 787 estimated at \$8.6 bn sales

Toray adding 5th prepreg line in Washington State

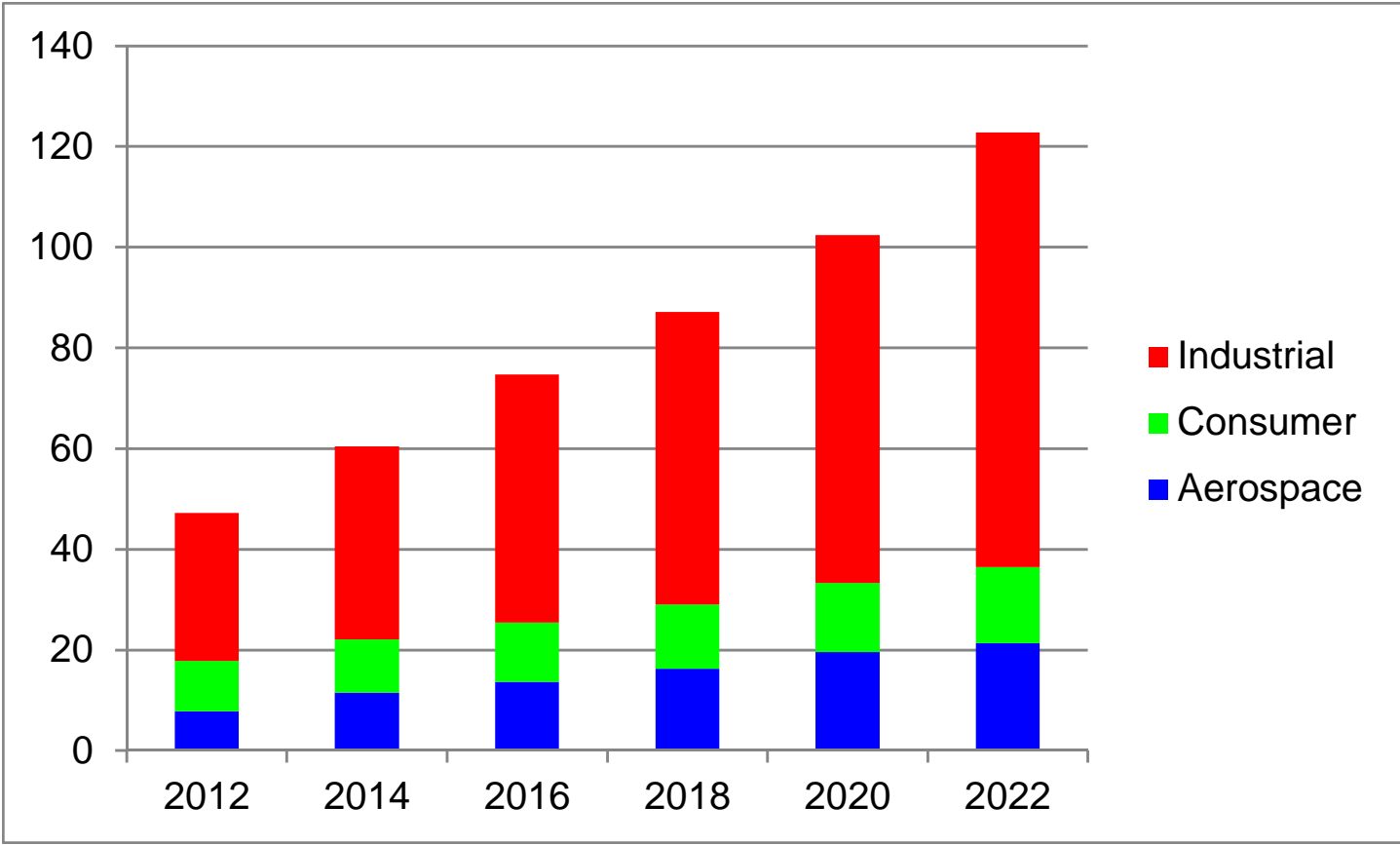
Hexcel building new plant in France – start up 2017. \$250 million investment

Toray doubling large tow carbon fiber capacity in Mexico to 5,000 tons – May 2015

Production Process for Carbon Fiber



Global End Use Growth in Carbon Fiber (000 tons)



- Industrial
 - Automotive
 - Energy (wind, gas & oil, storage, tidal)
 - General engineering
 - Medical
 - Tooling

- Consumer
 - Sports (golf, fishing, tennis, skis, bikes etc)
 - Marine
 - Others

- Aerospace
 - Aircraft (wings, bodies, engines)
 - Military
 - Space launch
 - Munitions
 - Others

Fiber Industry Status

Market is generally strong – Carpet has been weakest element.

Apparel business very good – mainly via CAFTA/NAFTA.

Automotive excellent – Domestic origin preferred.

Closure of Performance Fibers Moncure plant cuts US capacity for High Tenacity by 36%

Non Woven volumes continue to grow.

Polyester producers in filament & staple running full, Nylon not as strong.

Short term forecast sees polyester prices increasing due to raw materials and full utilization.

Mid term: as oil increases synthetic fibers will increase, we expect oil to plateau to mid year and then increase into Q4.

Nylon 66 Invista Force Majeure coming to a conclusion without too much disruption in the market.

**THANKS
&
Questions??**

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