

TopLine Analytics APPALACHIAN STORAGE HUB

Shale Revolution changed the global chemicals industry

Covid-19 and other impacts?

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Appalachian Storage Hub 2020

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Global Chemical Shift

- “The feedstock cost for new crackers in [Saudi Arabia] will be around \$6/MBtu as there’s not enough ethane availability ... this cost will be much higher than the US gas price, which is currently at \$3.50-4.00/MBtu”
– Jamal Malaikah, president and COO, National Petrochemical Industrial Co (NATPET), Apr 2013
- “The shale gas revolution initiated in the US... is now reshaping not only the energy industry, but global economy and geopolitics as well.” This could cause “a great deal of discomfort” to Asia’s petrochemical sector.
– Yoshimitsu Kobayashi, chairman of the Japanese Petrochemical Industry Association at APIC, May 2013
- “The shale gas revolution in the US has turned the global petrochemical industry inside out...Basic petrochemicals can now be made in the United States for about half the cost as in Europe”
– Tom Crotty, Ineos group director, ChemWeek Interview October 2013
- “The supply of low-priced products that are based on coal and shale gas will become a threat to the existing petrochemical industry and will bring a significant change in its structure.”
– Han-Hong Ban, chairman of the Korea Petrochemical Industry at APIC, May 2013

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Shale Gas drives the Chemical Industry

Typical Shale Gas

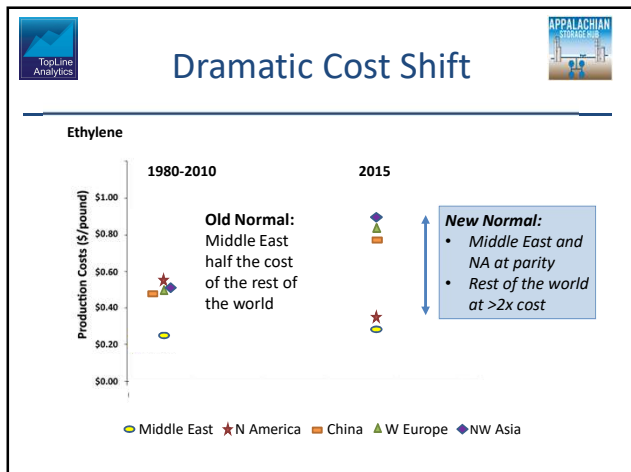
Component	Percentage	Use
Methane	~75%	Fuel
Ethane	~15%	Chemical Feedstock
Propane	~10%	Chemical Feedstock

Source: Typical Shale Gas: Western Marcellus Shale Gas: Chesapeake Investor Presentation 2011

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Chemical Industry U.S. Announced Investments

- 70% investment foreign**
- 50% + capacity increase**
- 50% of capital spending by manufacturing**



Front Line in COVID-19 Defense is Chemicals: 75%

- Soap, hand sanitizer & disinfectants
- Medical staff protective: suits, masks, face shields, gloves
- Ventilator: masks, hoses, straps and most of the ventilator
- Test kits, vaccine, and drugs
- Syringes, IV bags and IV hoses

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- ### Outlook for more Crackers?
- Covid-19
 - Developing world middle class
 - Plastic are amazing
 - On-Shoring Decade
 - CPG and Wall Street
 - Petrochemical Giants
 - Appalachian Basin is unique

COVID-19 Plastic Packaging

Critical in the medical setting:

- Protect sanitized equipment
- Contain contaminated material

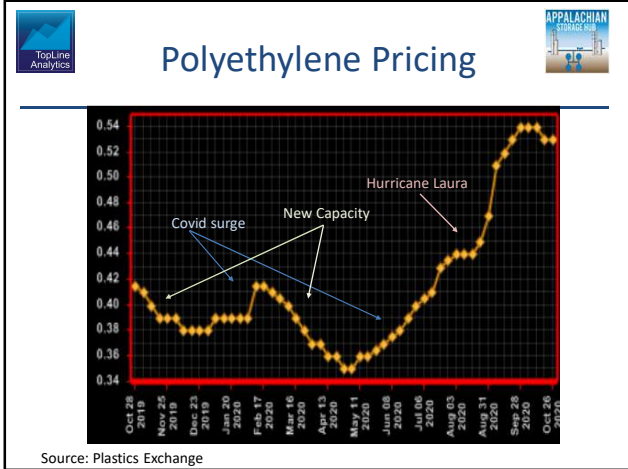
Shift in consumer behavior:

- At home: restaurants / commercial

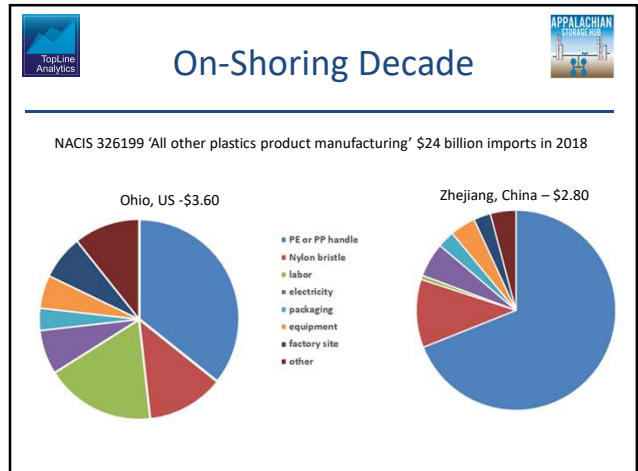
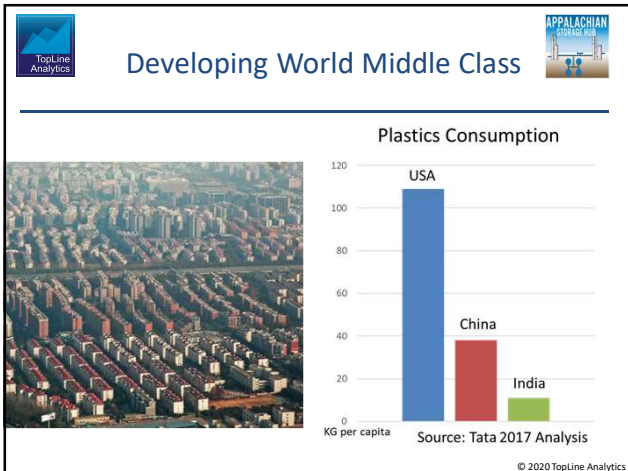
Required to protect workers:

- Supermarkets ban reusable bags
- Garbage pickup plastic bag only
- Plastic barriers at retail locations

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- ### Plastics are Amazing: PE
- Lowest cost man made material by 20%
 - Highest volume man made material by 25%
 - Applications: cutting boards, toothbrush, milk bottles, plastic bags
 - Ultra high molecular weight polyethylene
 - 5 million amu
 - 15% more abrasion resistant than carbon steel
 - Lower coefficient of friction than Teflon
 - 8 times the strength weight ratio of high strength steel
 - Bullet proof vests







CPG and Wall Street

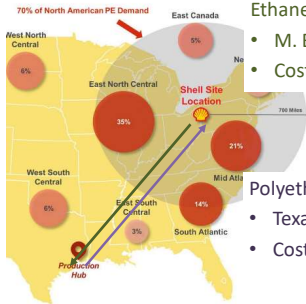


- Consumer Packaged Goods: items you buy in supermarkets and drug stores
- Many products heavily dependent on offshore
- Covid-19 in China months of no production
- No production equals no sales, no CPG profit
- Wall Street wanted to know China exposure
 - “how many products”
 - “how many suppliers”



Appalachian Basin Plastics






Ethane advantage \$12/Bbl

- M. Belvieu price \$26/Bbl
- Cost transport via ATEX \$14/Bbl


Polyethylene LLDPE advantage \$0.07/lb

- Texas spot \$0.65/lb
- Cost rail transport \$0.07/lb

Source: Shell Graphic



Petrochemical Giants



- Stock valuation depend on dividends
- Dividends depend on new projects
- Three legged stool
 - Exploration and Production
 - Refining and Marketing
 - Chemicals