How Northeast Petrochemical Logistics Will Change the Industry Landscape

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PLG Consulting

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Experience // Expertise // Excellence

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NEP

NORTHEAST U.S.

PETROCHEMICAL CONSTRUCTION

June 18-19 · Westin Convention Centre, Pittsburgh, USA

Experience // Partial List

PLG TEAM

- Real-world, industry veterans
- Over 50 logistics, supply chain, market, and engineering experts
- Delivering value to over 200 clients since 2001

CORE EXPERTISE

- Bulk commodity logistics
- Surface transportation and logistics
- Energy and chemical market intelligence
- Investment strategy and corporate development
- Logistics infrastructure design

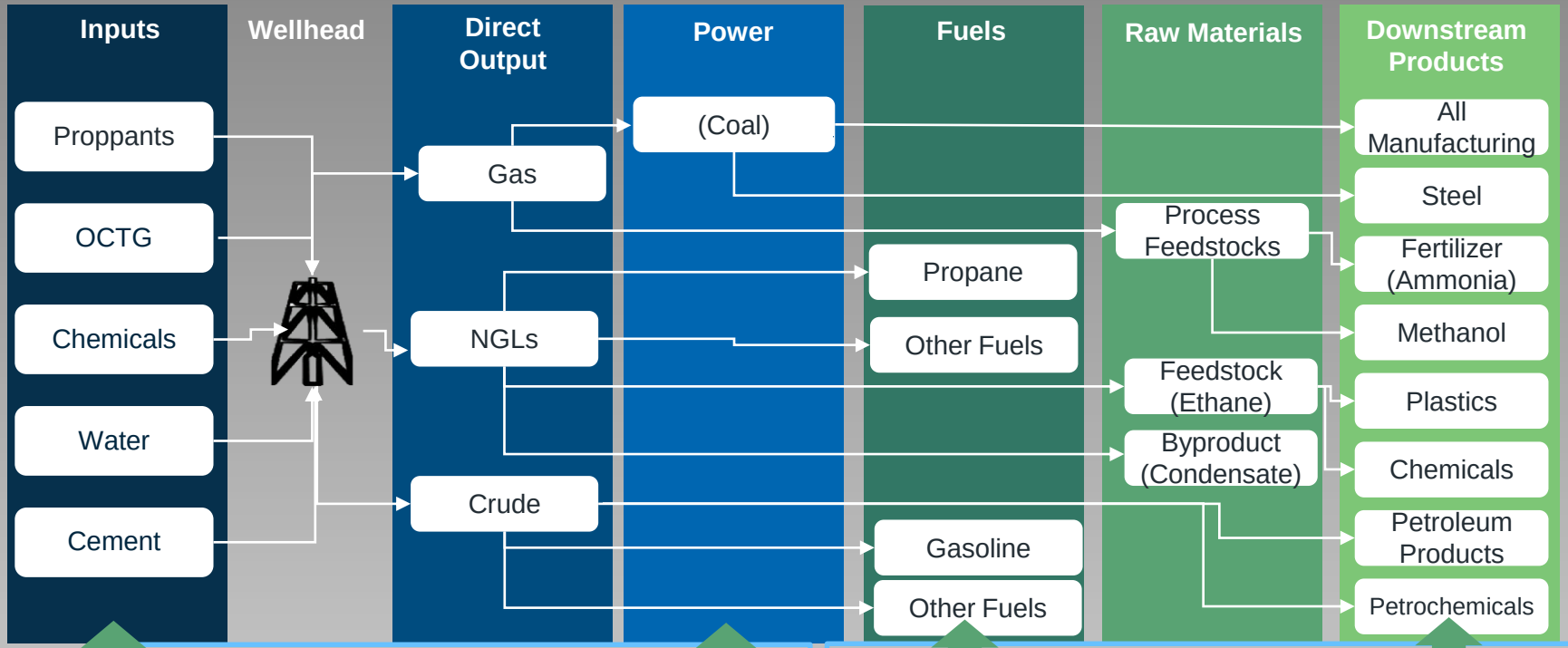
SERVICES INCLUDE

- Supply chain design and operational improvement
- Market analysis & strategy
- Investment thesis, target identification, due diligence, post-transactional support
- Diagnostic assessments and supply chain optimization
- Independent logistics technology assessment and implementation
- Site selection

Our Clients // Partial List

Shale Revolution Impacts:

Global Markets, U.S. Economy and Logistics



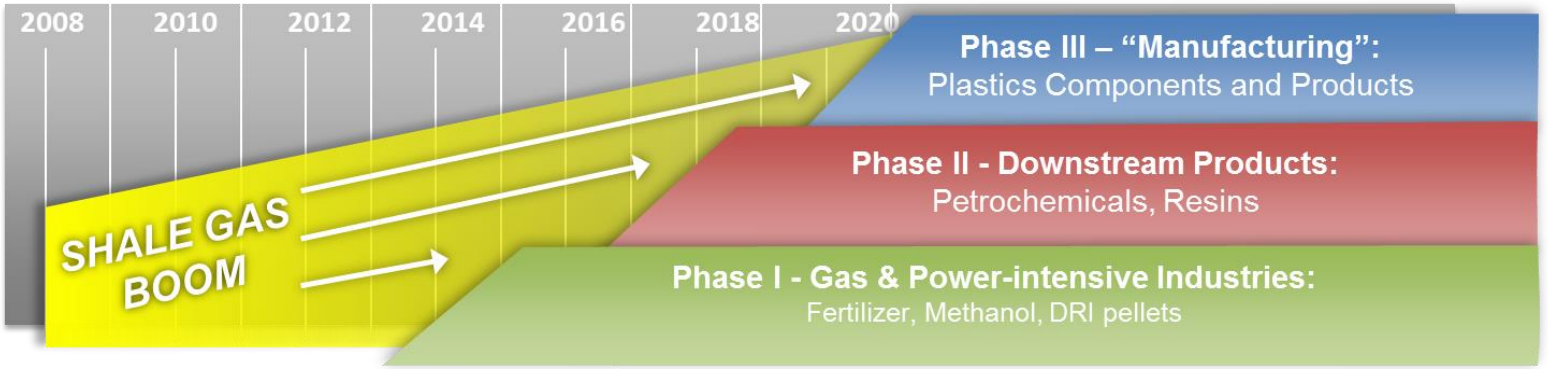
MACRO IMPACTS TO-DATE INCLUDE

Dramatic reduction in crude imports, lower electricity costs, lower gasoline prices, increased refined products

THE WAVE CONTINUES

U.S. petrochemical expansion based on abundant, low cost energy and feedstocks is impacting other manufacturing industries

Phased Impact of Shale Gas to North American Industrial Expansions

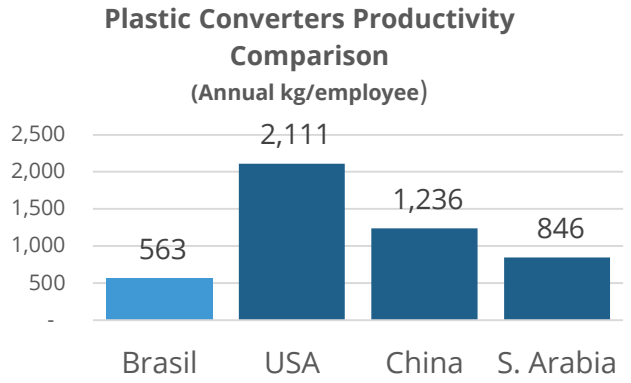


Source: PLG Consulting

Phase I – Dry gas feedstock industries

Phase II – Wet gas feedstock with large investments and longer lead time

Phase III – Downstream manufacturing industries thrive as a result of low power prices, advantaged material costs and more competitive labor costs.

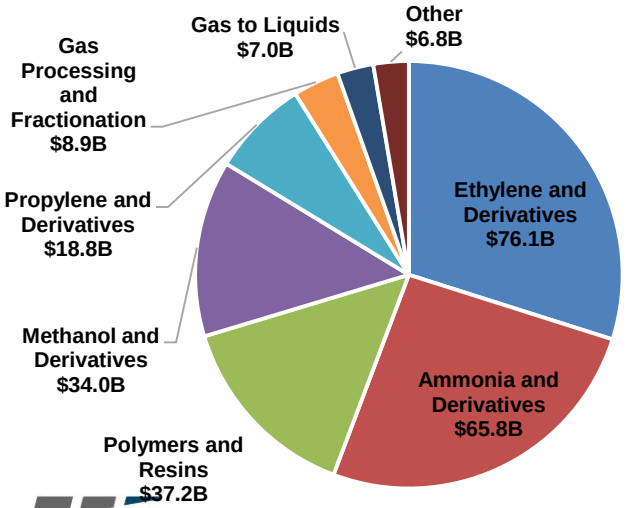


Shale-Driven Industrial Investment Forecast

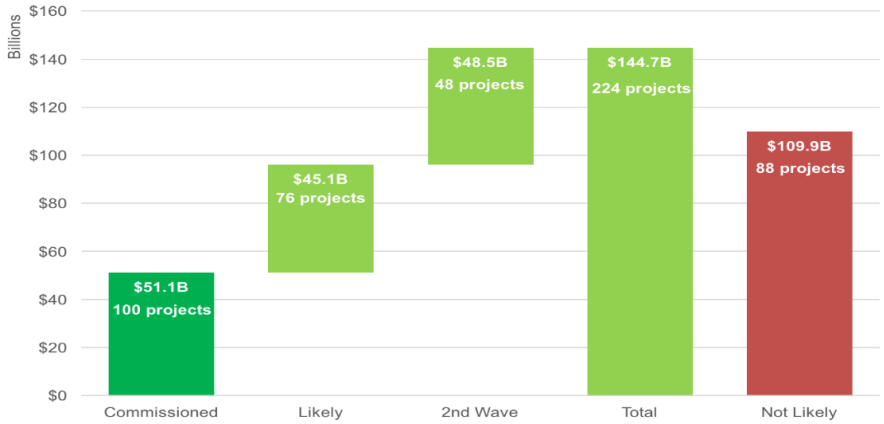
- The North American petrochemical industry will invest ~$145B in industrial facilities as a result of shale gas by 2025
- Processed gas, ethylene, methanol, and resins account for >80% of product volume output

Product Category Breakdown

All Announced Industrial Projects in SHIELD



SHIELD Investment Forecast Through 2025



Total Announced - $255B

Commissioned since 2011 - $51.1B of investment

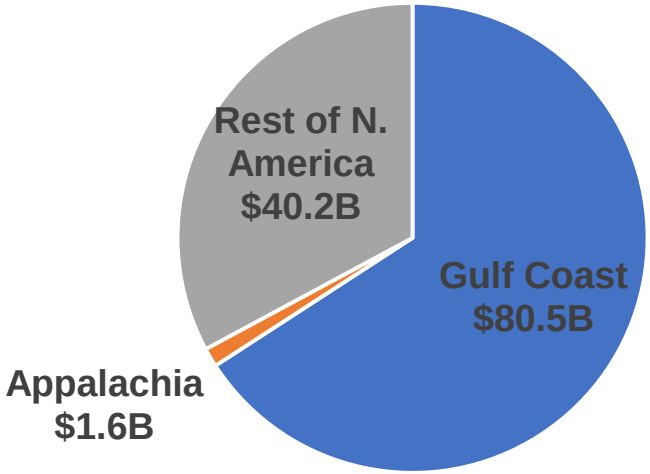
Likely start up by the end of 2019 - $45.1B of investment

2nd Wave – Likely start-up between 2020 and 2025 - $48.5B of investment

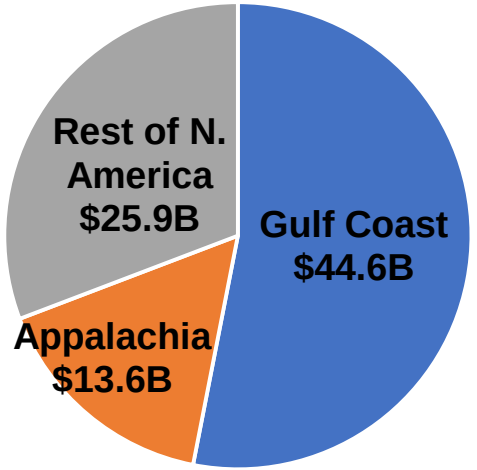
Not Likely - $109.9B of announced investment

Northeast Petchem Will Grow Significantly During 2nd Wave of Shale-Driven Growth

Announced Petchem Projects Investment by Region (2015-2019)

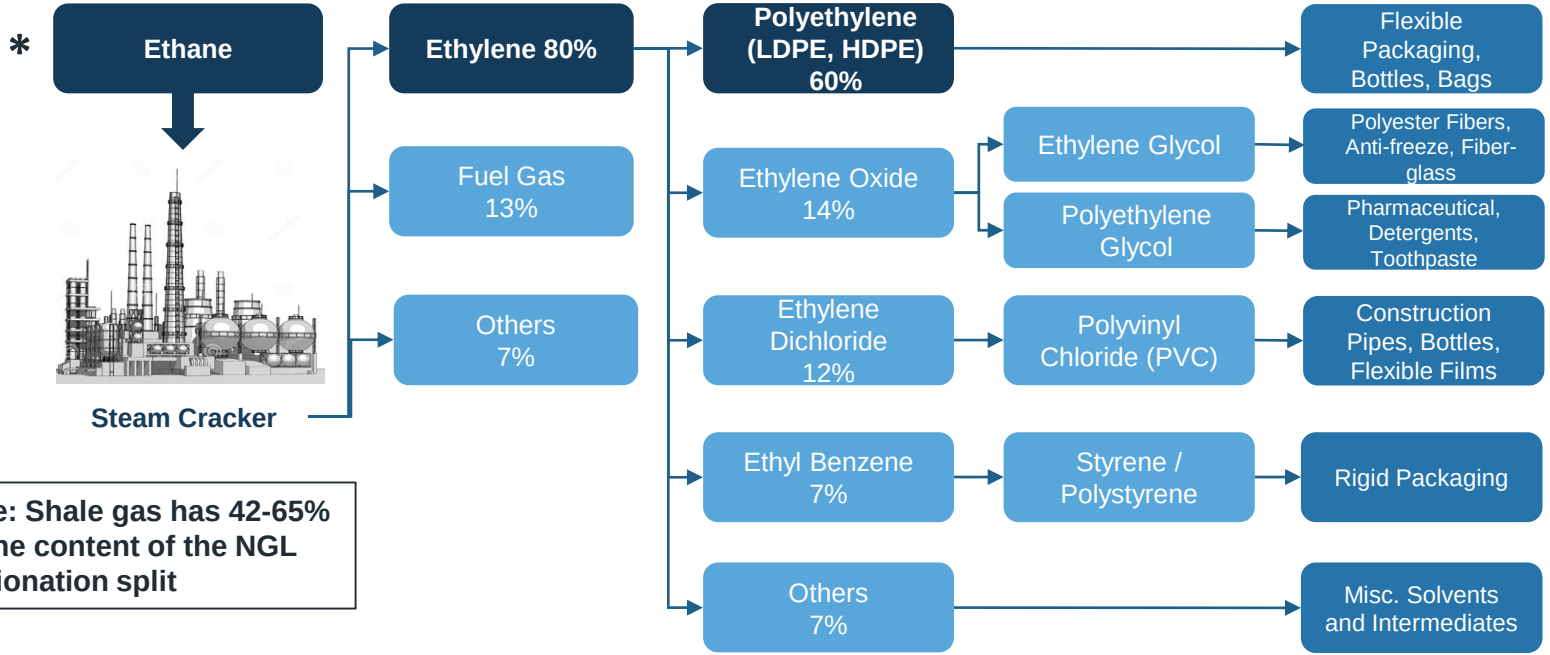


Announced Petchem Projects Investment by Region (2020-2025)



Northeast will grow from 1% to 16% of petchem investment from 1st to 2nd wave

Ethane Cracking Downstream Products



***Note: Shale gas has 42-65% ethane content of the NGL fractionation split**

Transportation Continuum — **Pipeline** ▸ **Integrated Facilities / Pipeline ▸ Rail** ▸ **Rail / Truck**

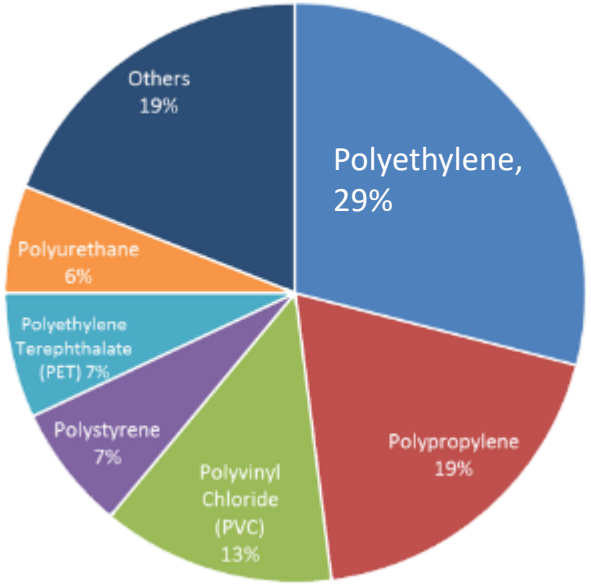
Source: PLG Consulting

Polyethylene Types and Applications

Polyethylene (PE) is the largest plastic resin globally and used in a variety of applications

- Demand for plastics is tied closely to overall economic growth
- The largest single market for polyethylene is packaging
- Polyethylene can be processed into soft, flexible products such as plastic bags or hard, strong products such as pipe
- Numerous grades and specs

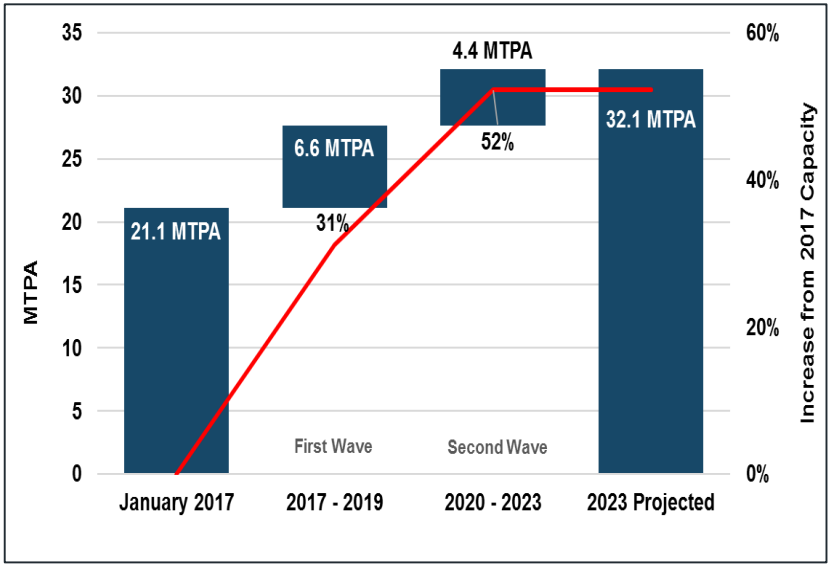
Global Plastics Demand by Type



Source: American Journal of Polymer Science, January 2016, Hisham A. Maddah

North American PE Expansion Plans

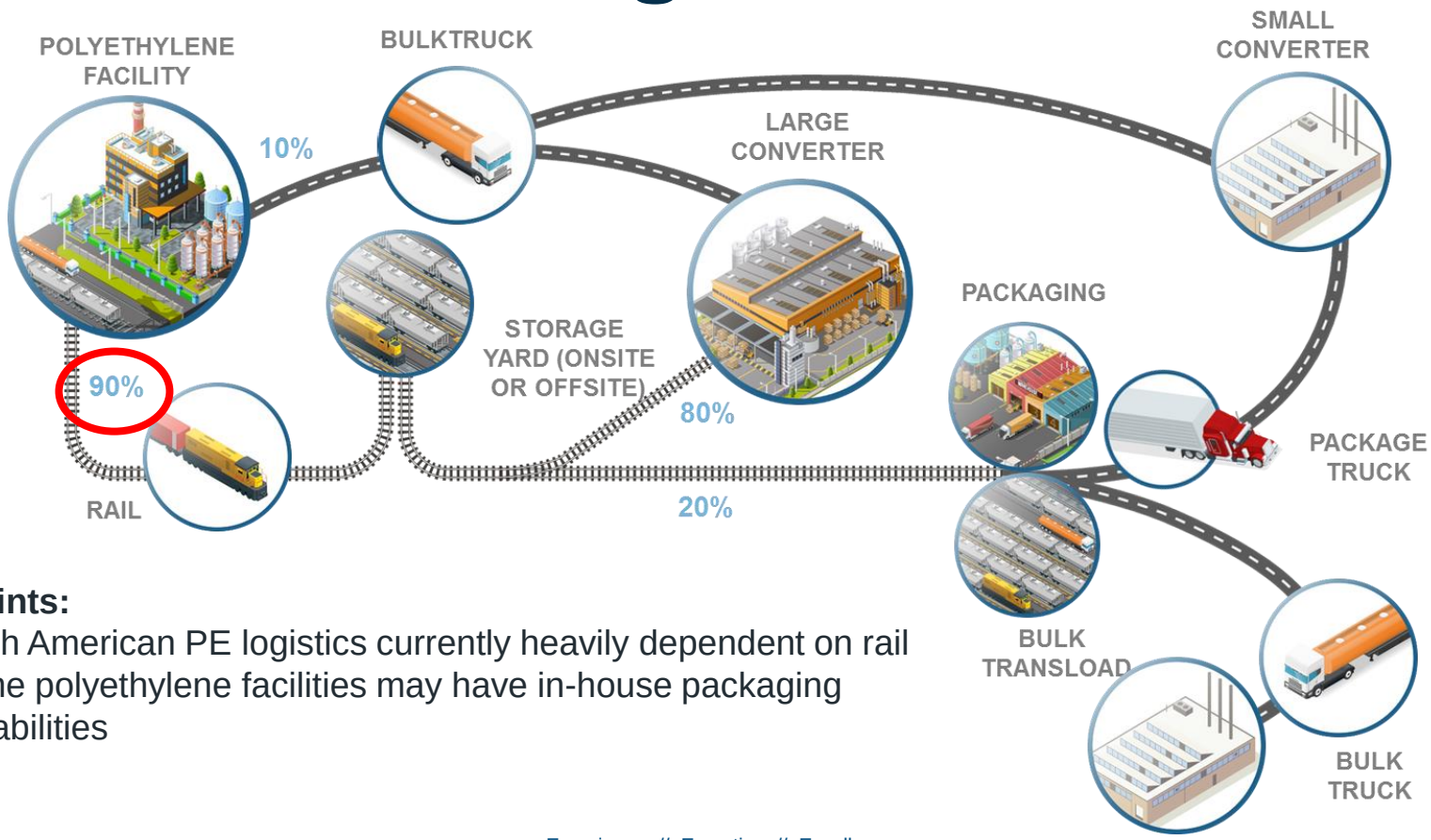
Production capacity growth is unprecedented



Source: Townsend Solutions, PLG SHIELD

- Exports will be relief valve for oversupply being created with first wave capacity
- Shell Monaca is in 2nd wave
- PTT and other Northeast facilities will likely be in “Third Wave” after 2023
- Extent of “Third Wave” PE capacity growth for North America will be determined by cracker-build decisions, demand growth, and global export competitiveness

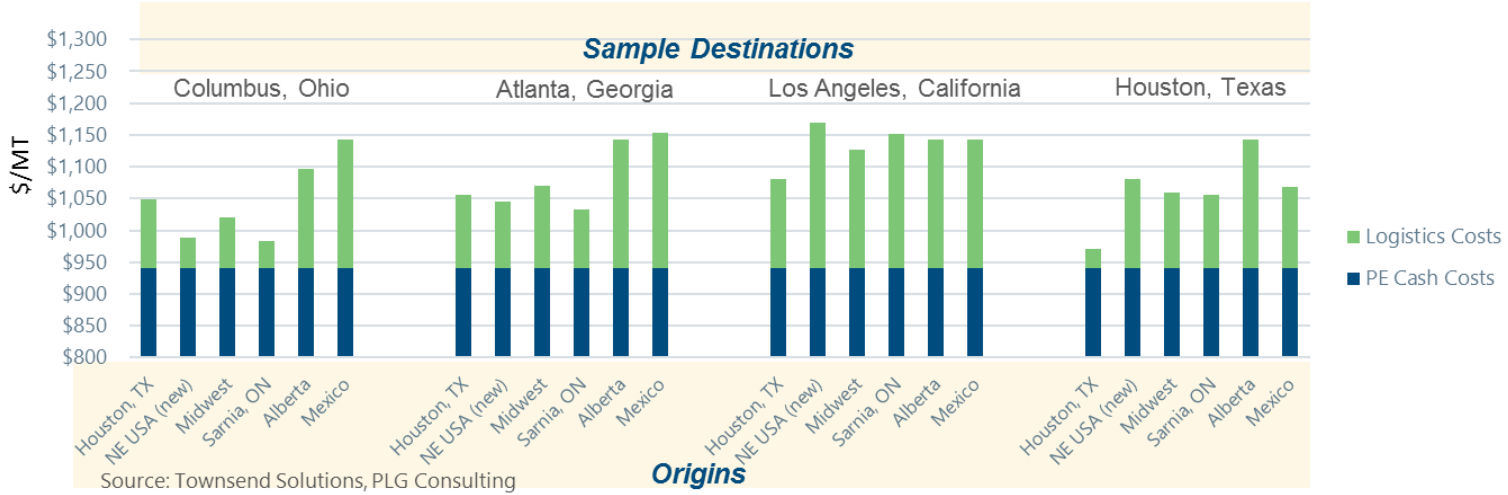
PE Domestic Logistics Flow



Key Points:

- North American PE logistics currently heavily dependent on rail
- Some polyethylene facilities may have in-house packaging capabilities

Northeast PE Facilities



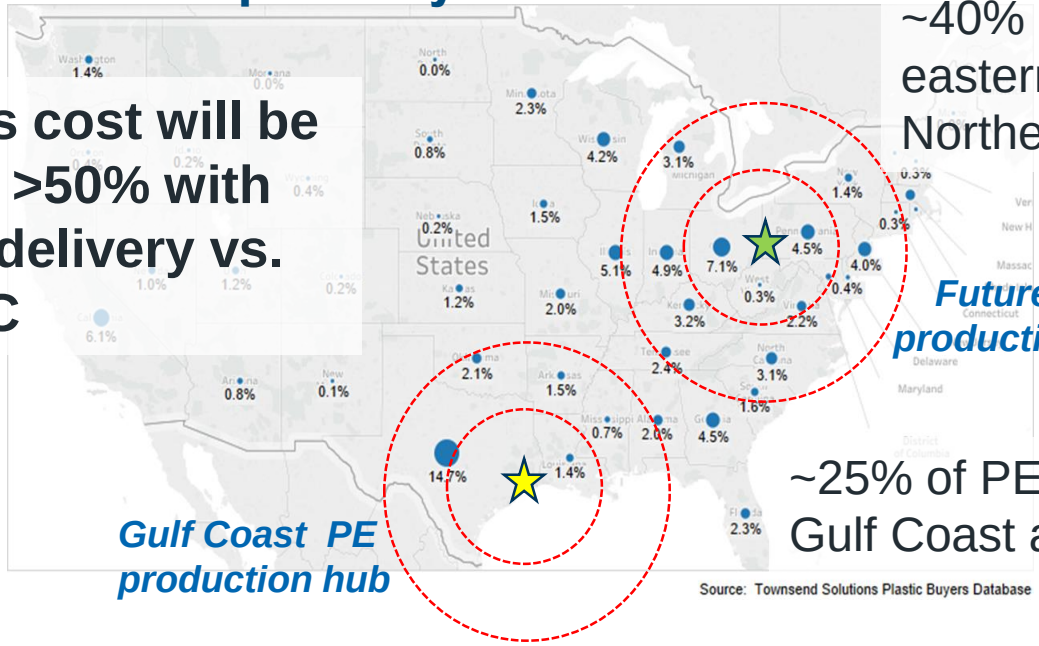
Total delivered cost in North America is highly influenced by location and logistics costs

- Northeast facilities will be competitive to Northeast and eastern Midwest markets, especially for locations within trucking distance
- Southeast market will be a battleground between Northeast and Gulf Coast facilities
- This analysis assumes that PE cost is the same
  - However, Northeast facilities will likely have significant feedstock cost advantage and add to competitive advantage

Logistics Impact on PE Delivered Cost

Northeast PE plant will offer a 5-10% total delivered cost advantage for Northeast & Midwest markets

PE Consumption % by State



NE logistics cost will be reduced by >50% with local truck delivery vs. rail from GC

~40% of PE is consumed in eastern Midwest and Northeast

Future PE production hub

~25% of PE is consumed in Gulf Coast and Southeast

Gulf Coast PE production hub

I Look Forward To Your Questions!

Thank You!

For follow up questions and information, please contact:

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