FROM ENERGY TO E-COMMERCE:

Supply Chain Evolutions For The Next Decade

James Shefelbine

Executive Vice President

PLG CONSULTING

www.plgconsulting.com

Prepared for:

Midwest Association of Rail Shippers

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MARS Midwest Association of Rail Shippers

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- Supply chain design

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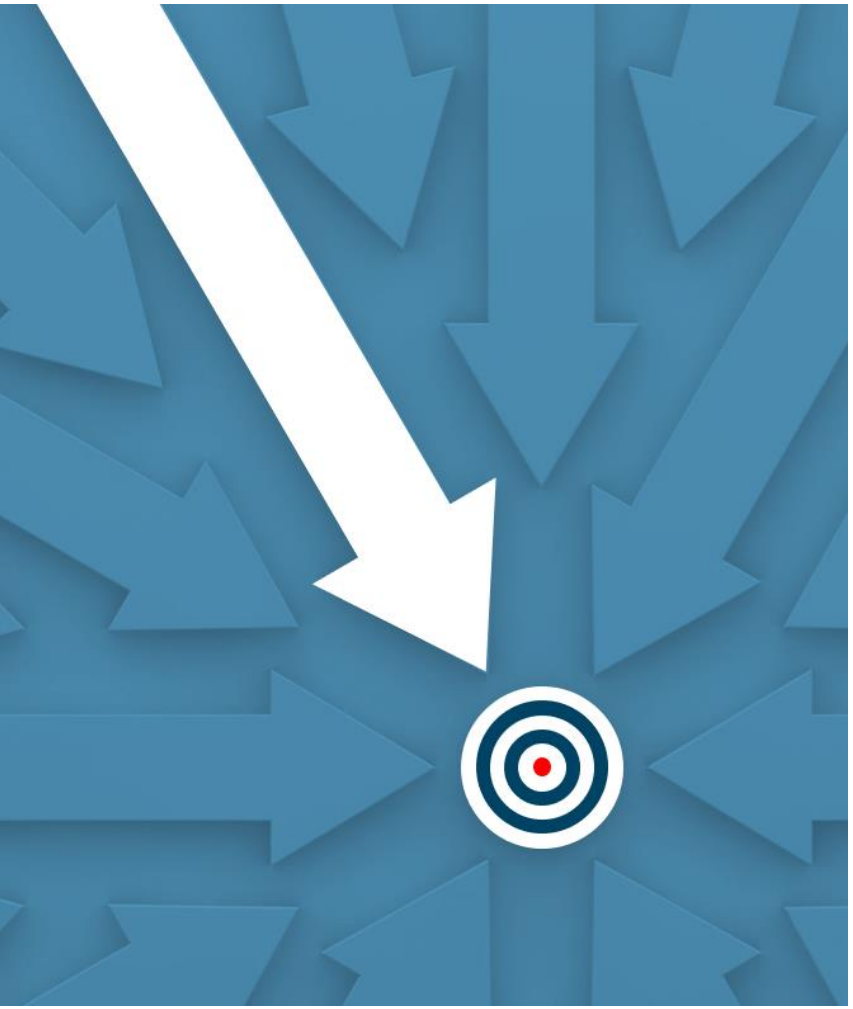
Defining Success is a Great Place to Start



RESHAPING THE CHAIN

GOALS FOR TODAY

1. **UNDERSTAND** key role that shale development played during the past decade in driving rail supply chain evolution.

2. **IDENTIFY** the driving force or forces for the next decade.

3. **CONTEMPLATE** what other rail supply chains will evolve or must be invented – similar to what we saw in the 2010s.

4. **CONSIDER** what actions shippers, carriers/services providers, and investors must take to manage these evolutions and take advantage of the opportunities they present.

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Decade of DISRUPTION 2010s

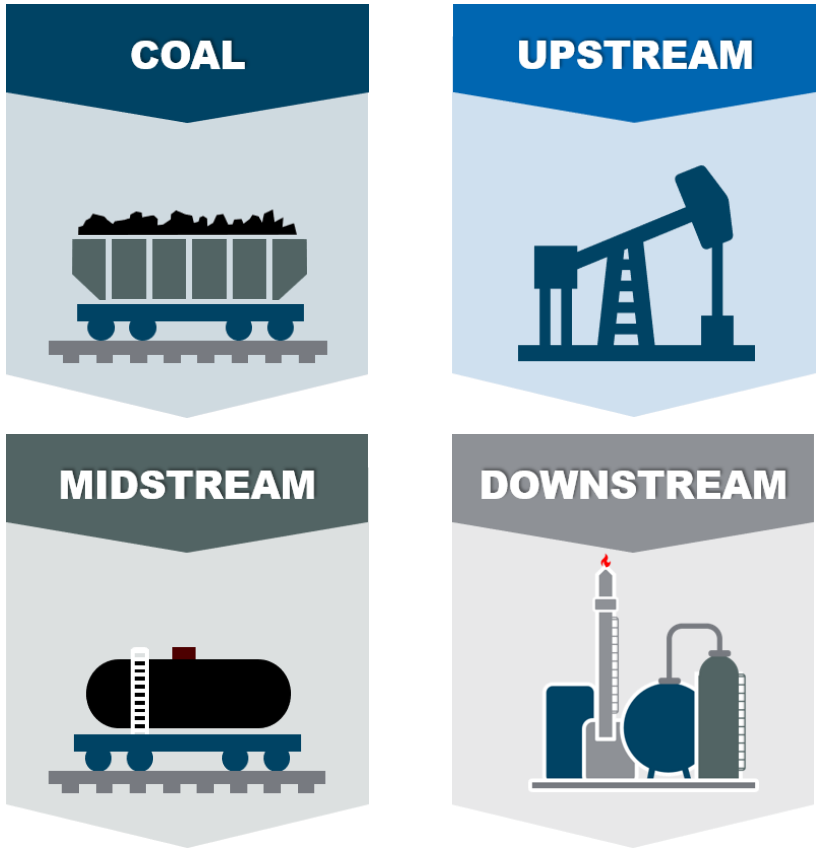
A LOOK BACK

Shale Development: The Defining Story of the 2010s

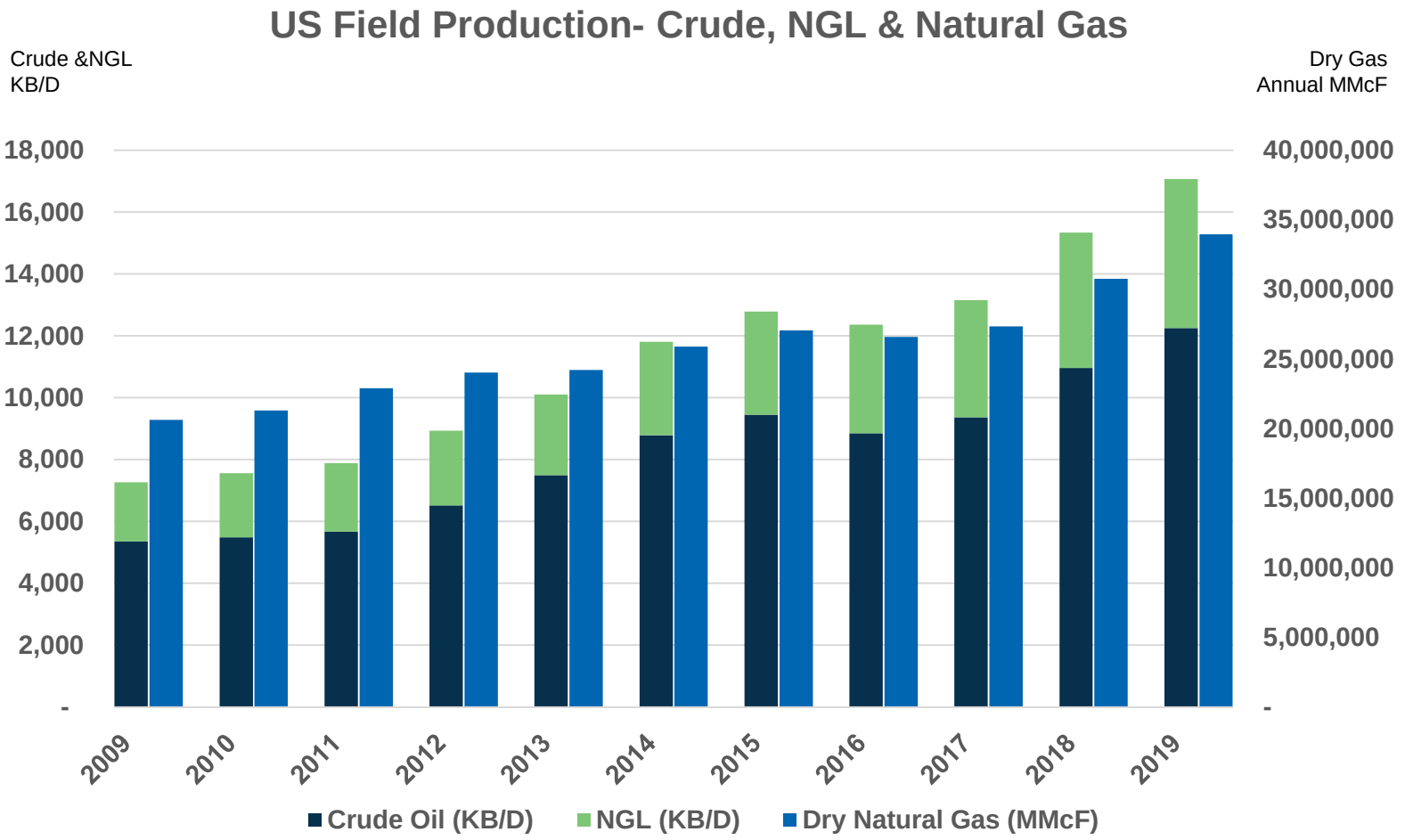
RESHAPING THE CHAIN

Shale Development Was the Industrial Economy's "Driving Force"

Causing These Supply Chains to Evolve…
or be Invented



Shale Revolution: Increasing Domestic Production, Achieving Energy Independence, and Creating an Export Powerhouse



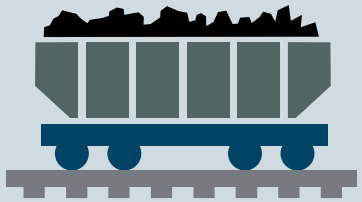
Source: EIA

Understanding the "Shale Revolution" Impacts to Four Primary Rail Supply Chains – Recap and Near-Term Forecast

RESHAPING THE CHAIN

SUPPLY CHAINS THAT CONTINUE TO SHRINK, EXPAND, OR EVOLVE

COAL

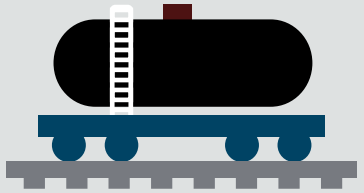


Thermal

UPSTREAM

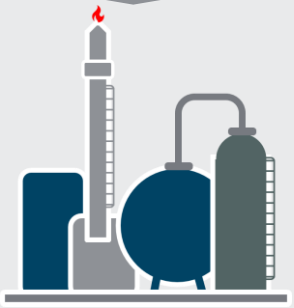
Frac Sand
OCTG

MIDSTREAM



Crude by Rail

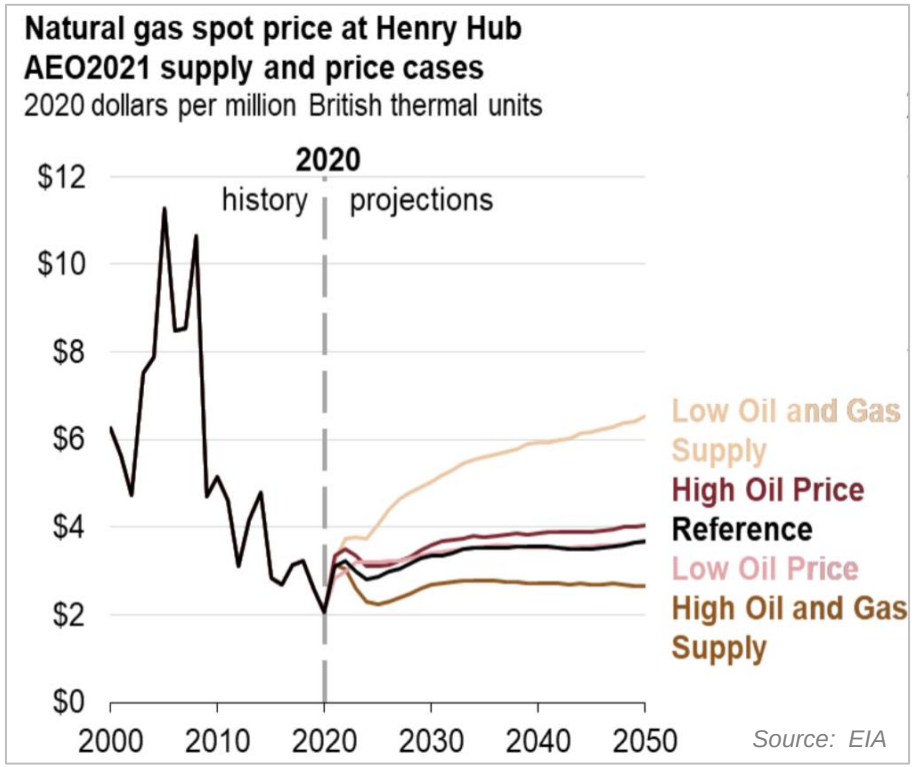
DOWNSTREAM

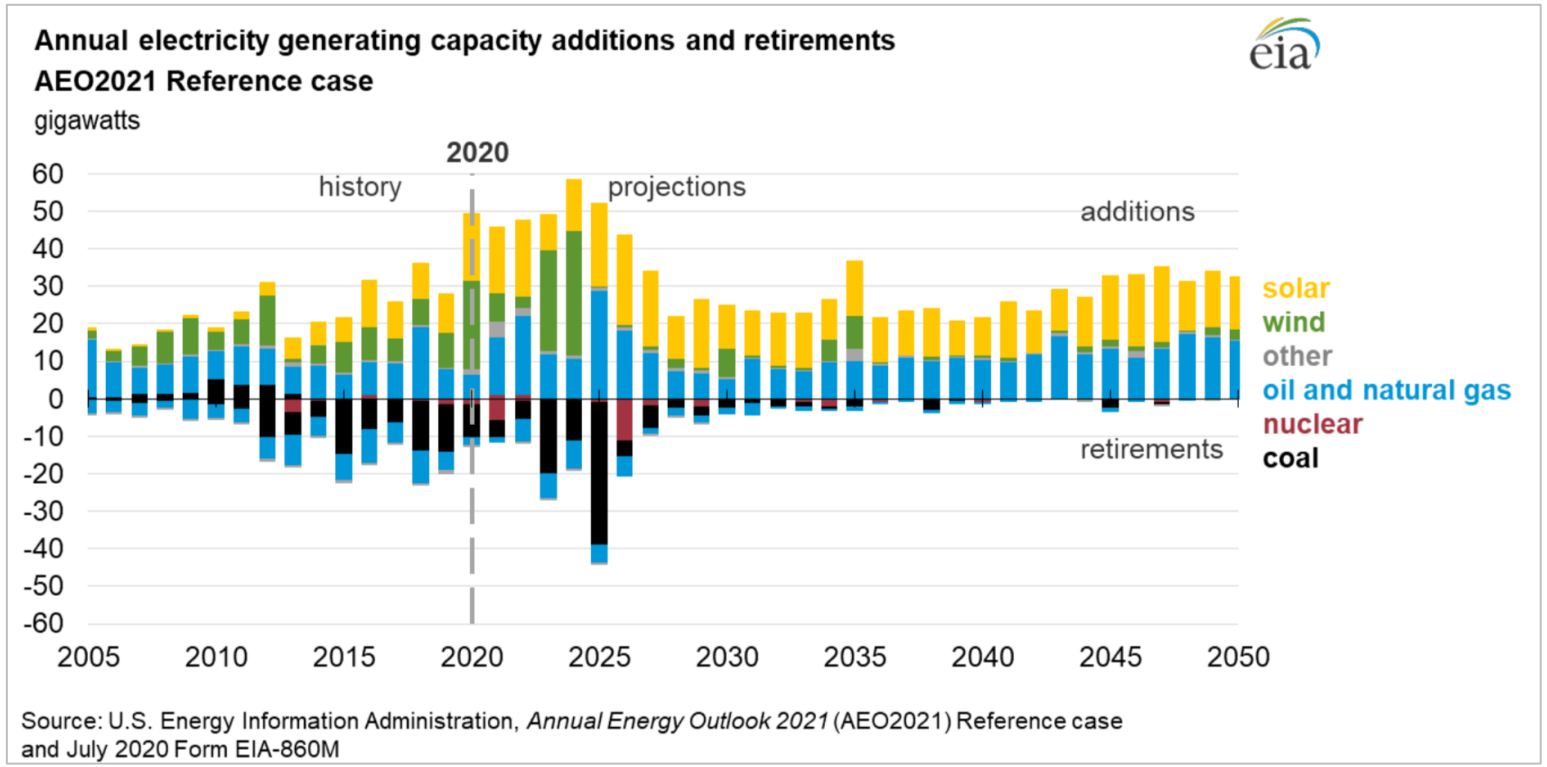


Refined products
LPGs
Plastics / Other chemicals
Fertilizers

Market Forces Continue to Diminish Thermal Coal Demand and Associated Rail Volumes

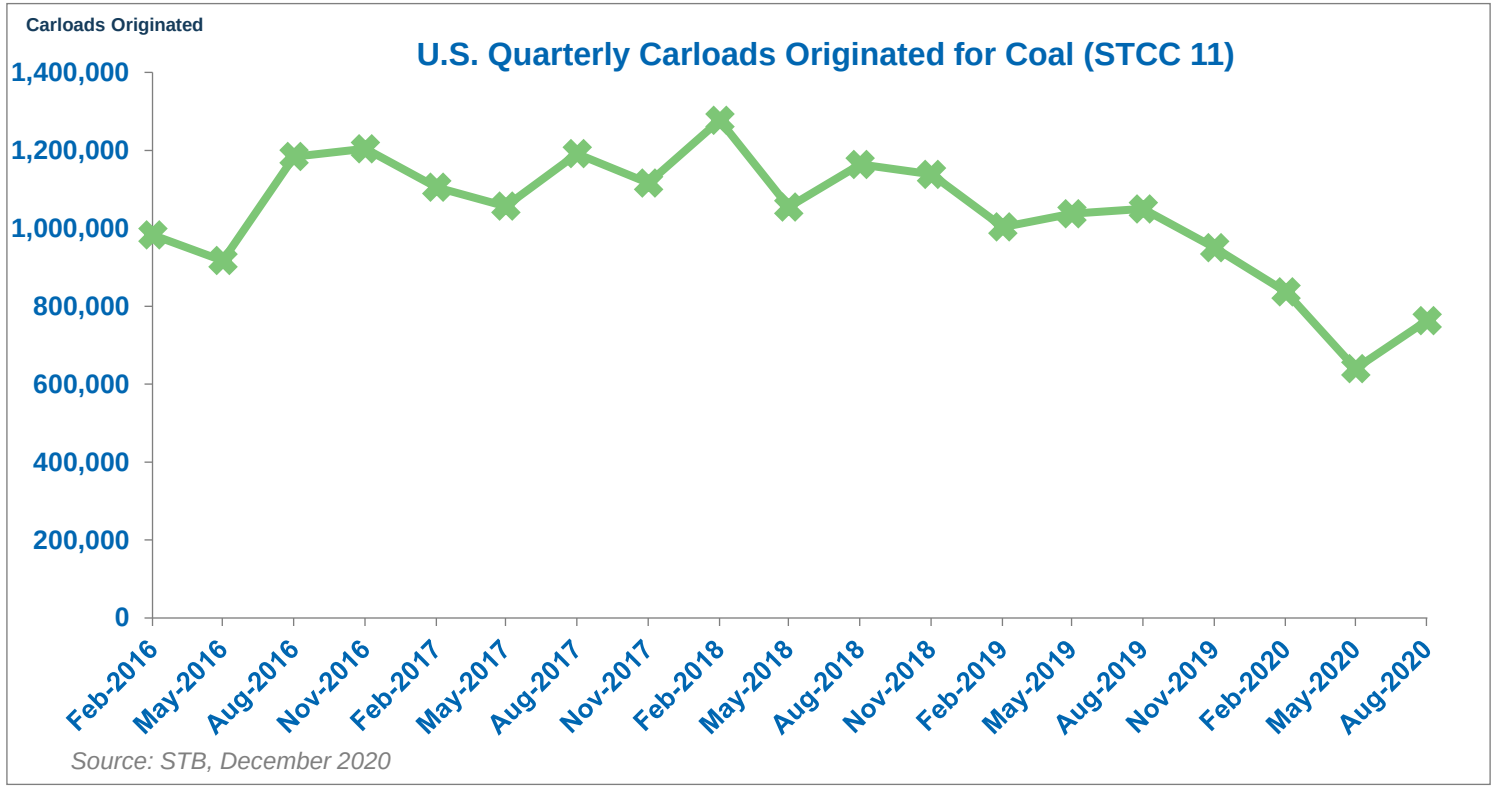
- Sustained low natural gas prices
- Combined cycle natural gas generation
- Increasingly competitive solar
- Significant round of coal-fired generation retirements to occur around 2025

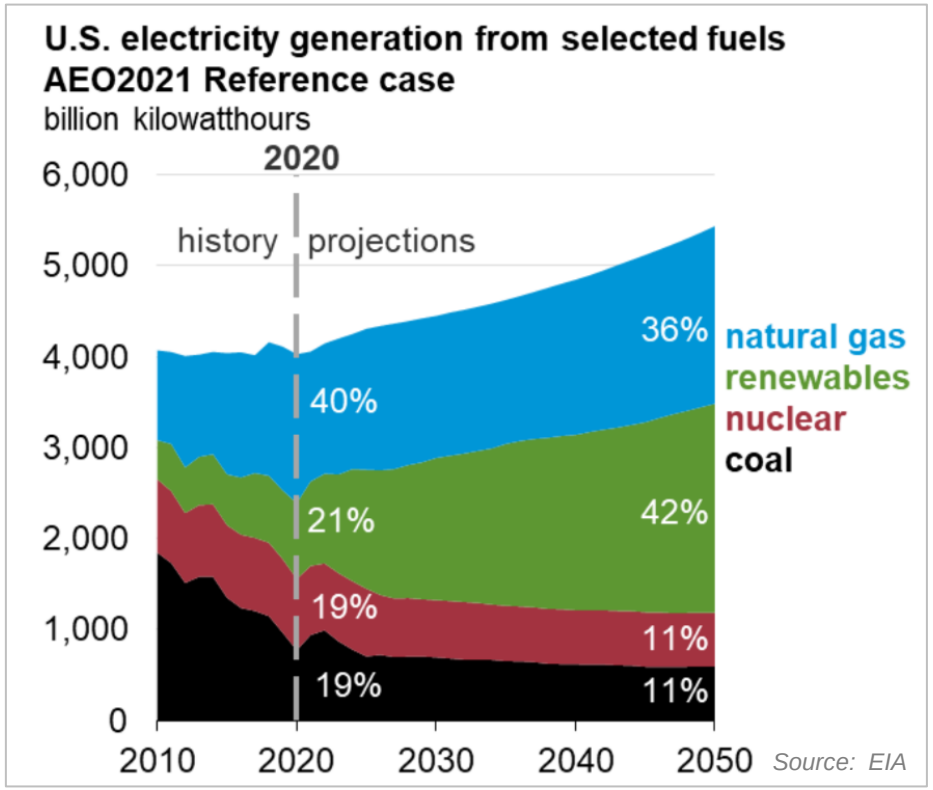




Thermal Coal Rail Supply Chain – Past and Future

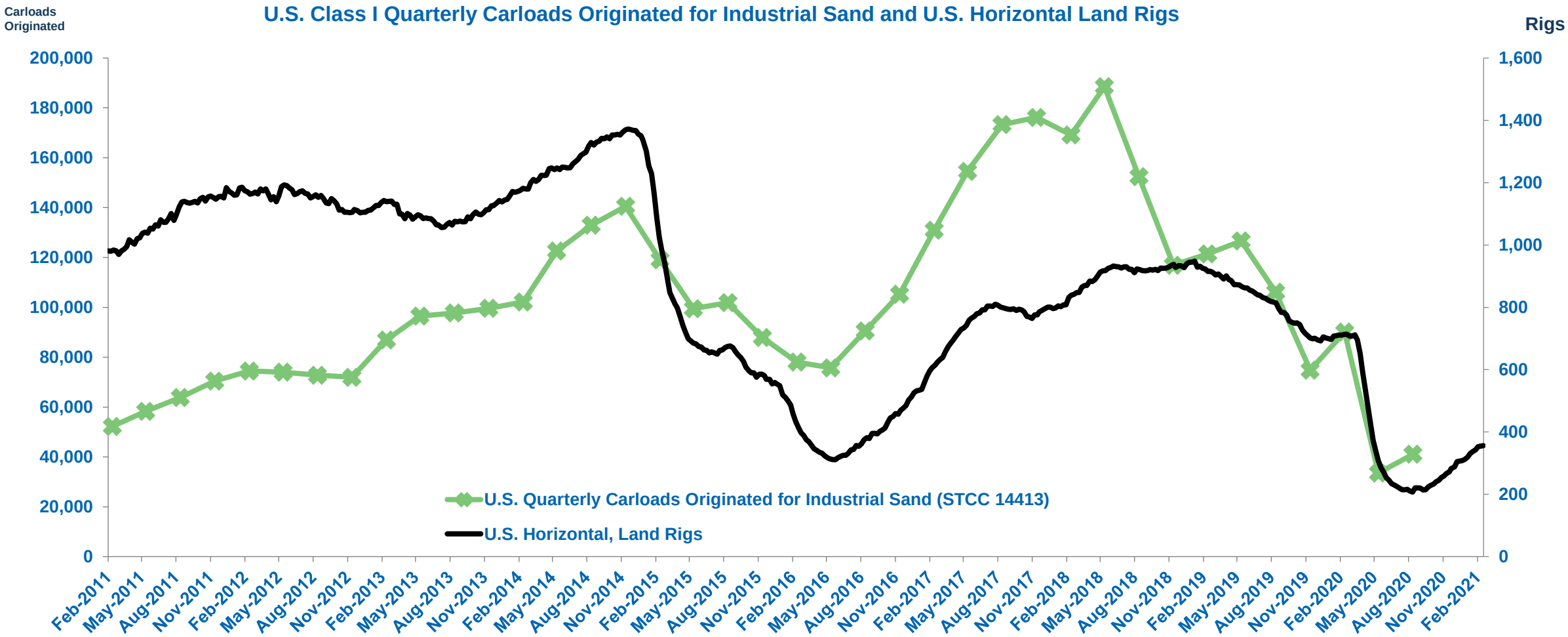
COAL





Continued Decline in Frac Sand Rail Shipments

UPSTREAM



Source: STB (STCC 14413 – Industrial Sand: includes frac sand and other industrial sands), Baker Hughes, February 2021

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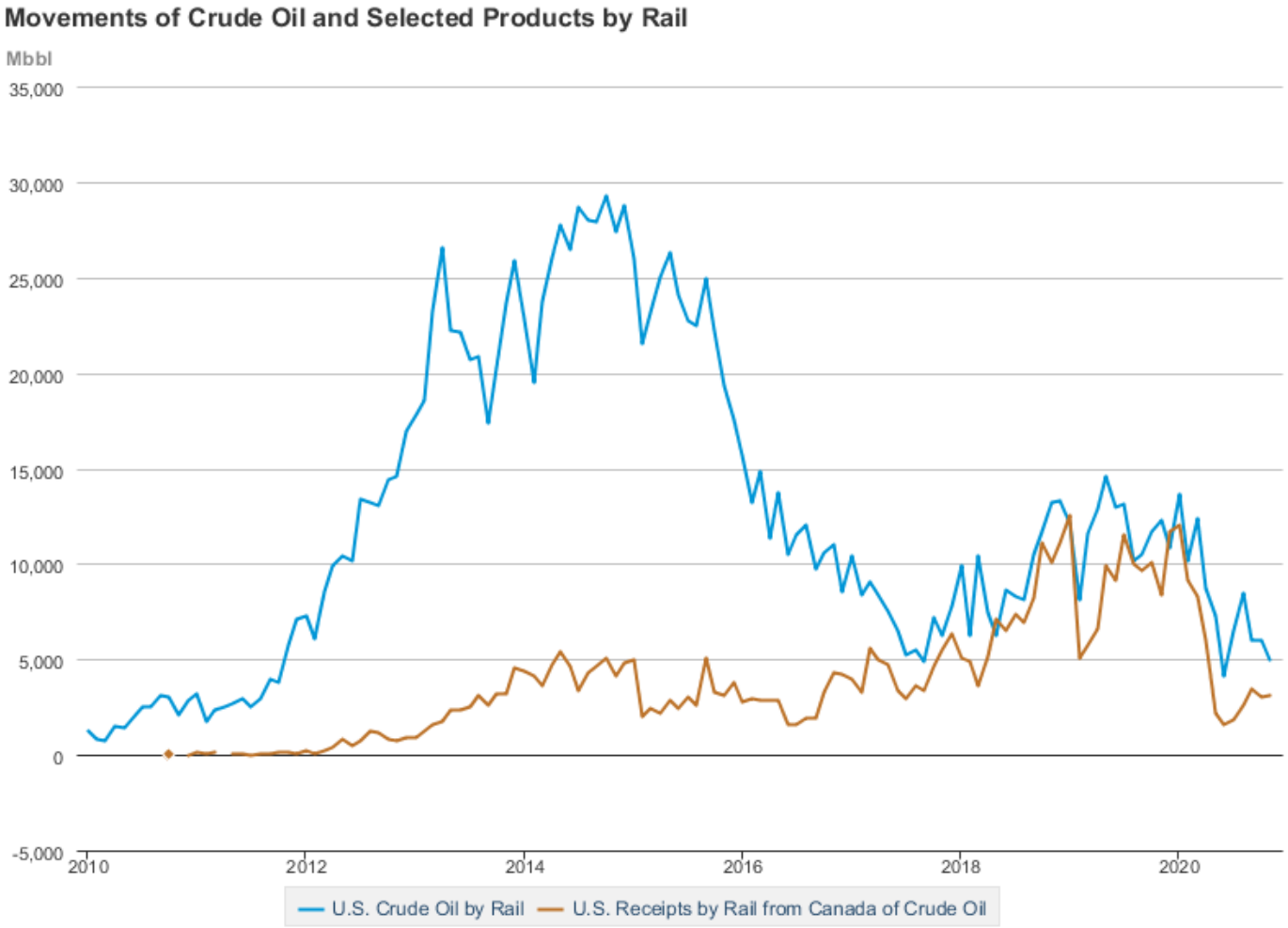
US & Canadian Crude By Rail Growth

Crude by Rail Volumes - Total U.S./Canada

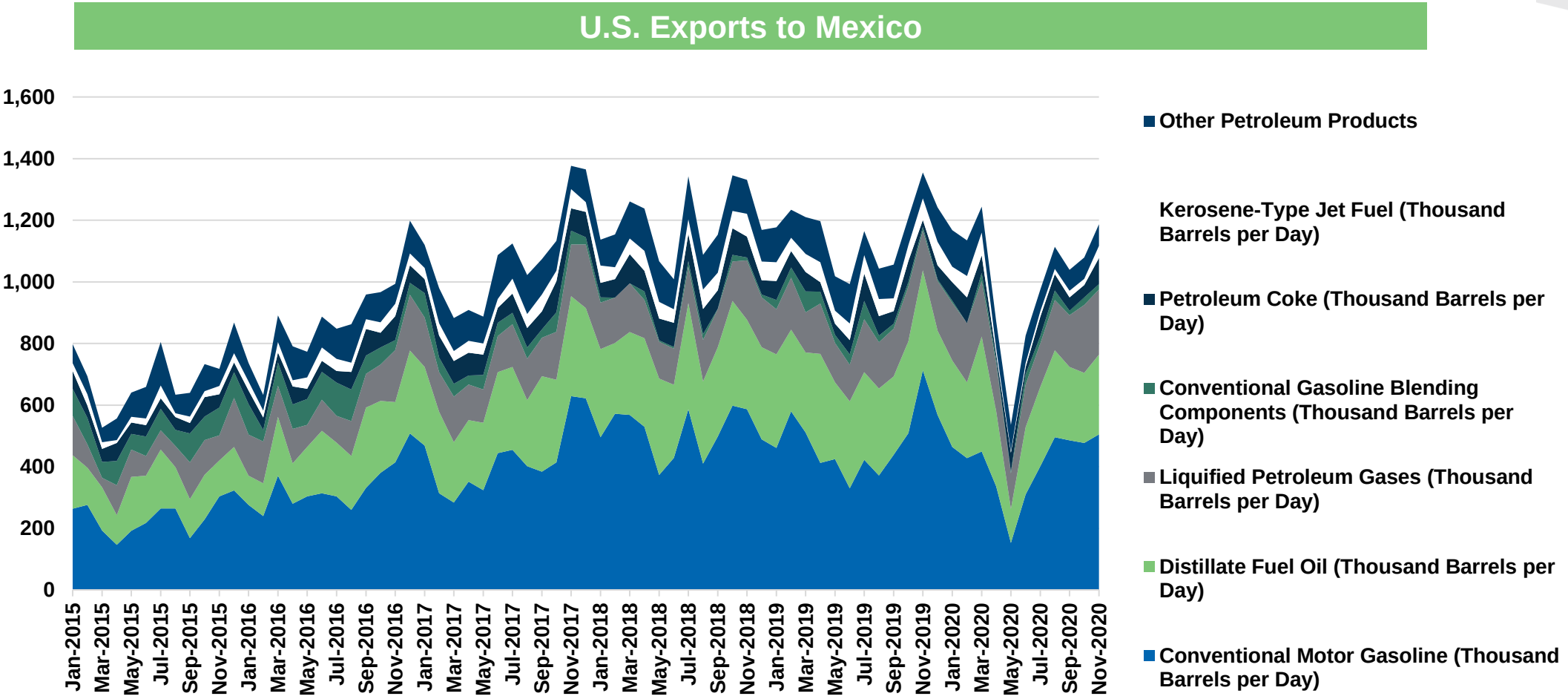


Source: U.S. Energy Information Administration

- Bakken and Western Canada production drives most CBR volume
- Primary destinations are Pacific Northwest (Bakken) and US Gulf Coast (Canadian)
- Pipeline constraints from Canada led to 2018-2019 run-up in CBR, but Covid-19 significantly reduced volumes

US Refined Products Exports Meeting the Growing Demand for Energy in Mexico

DOWNSTREAM

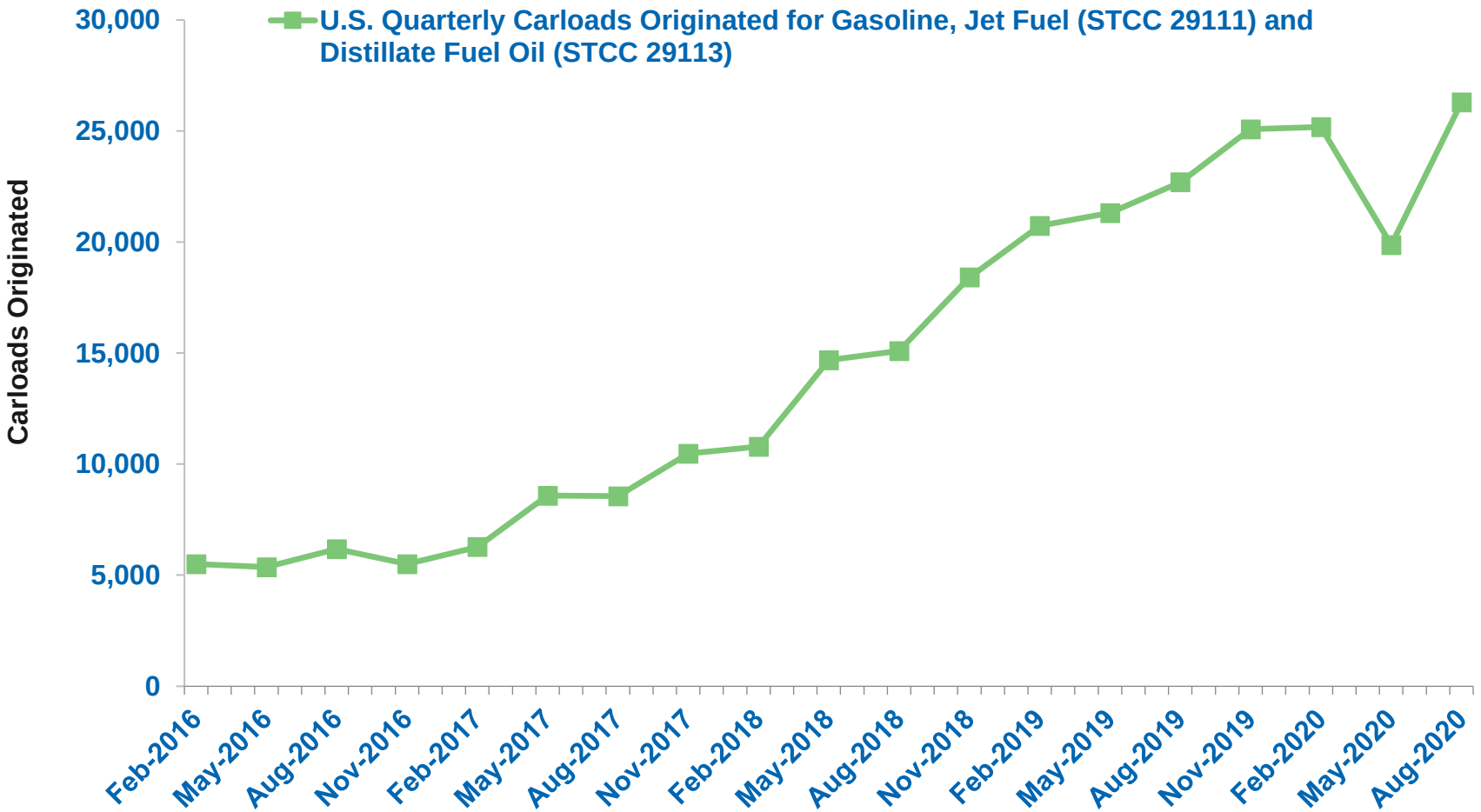


Source: EIA, January 2021

Mexico Represents Significant Opportunity for Diesel, LPG, and Gasoline Rail Shipments

DOWNSTREAM

U.S. Class I Carloads Originated for Selected Petroleum Products

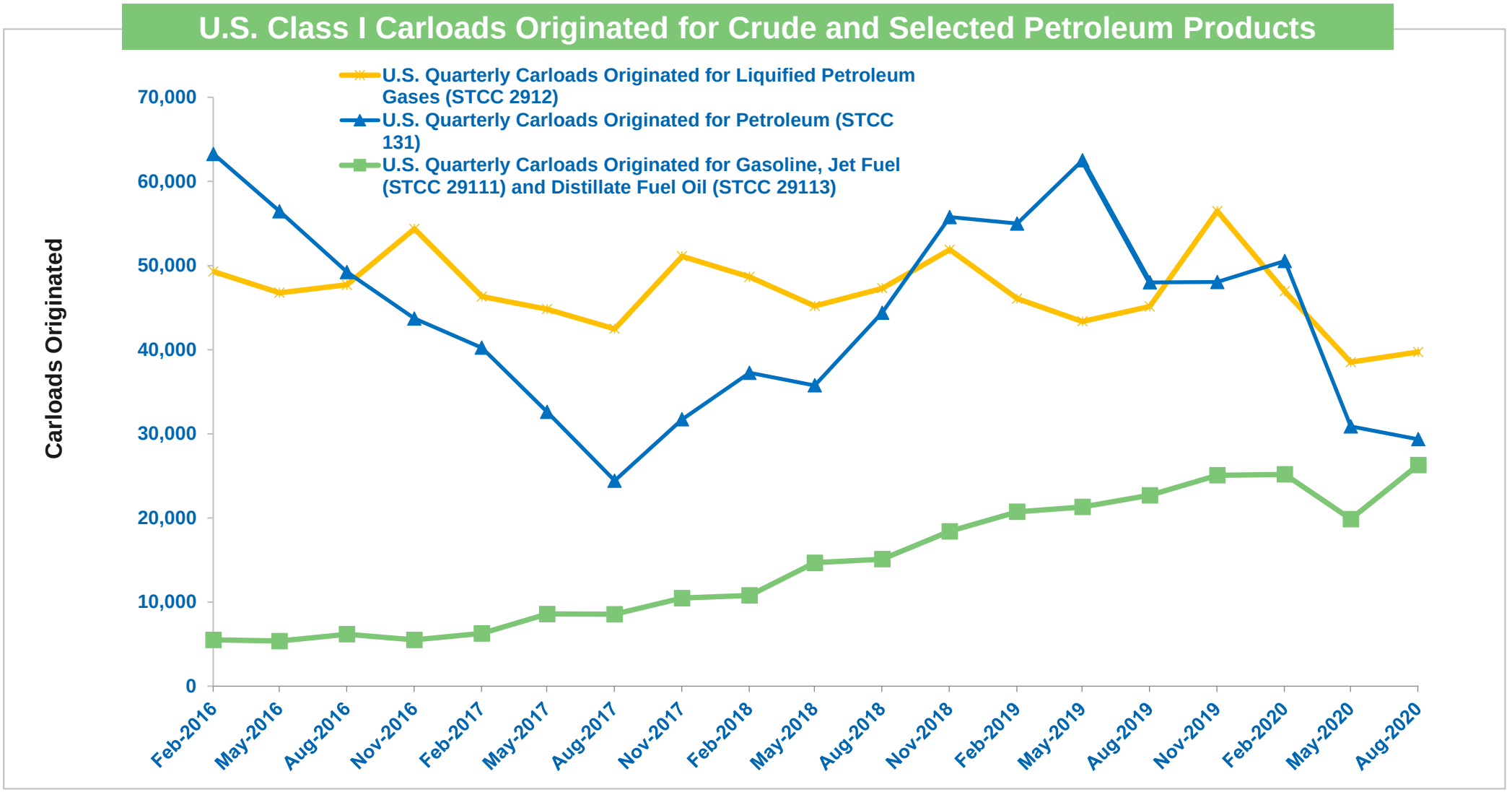


- Structural challenges for Mexico's internal refining capacity will support continued opportunity for US exports
- Rail market share is approximately 30—40% of US exports to Mexico

Source: Surface Transportation Board, December 2020

Refined Products Becoming an Increasingly Important Part of Energy-by-Rail Activity

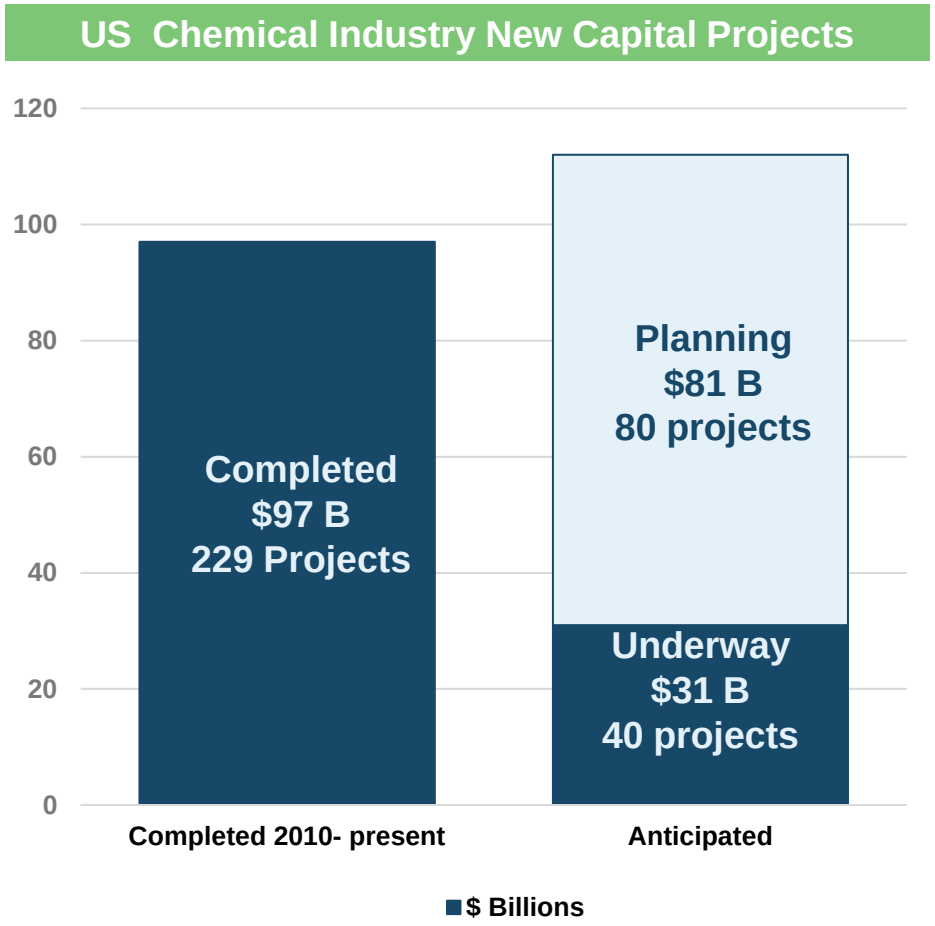
DOWNSTREAM



Source: Surface Transportation Board, December 2020

Chemical Sector Driving US Industrial Renaissance

DOWNSTREAM



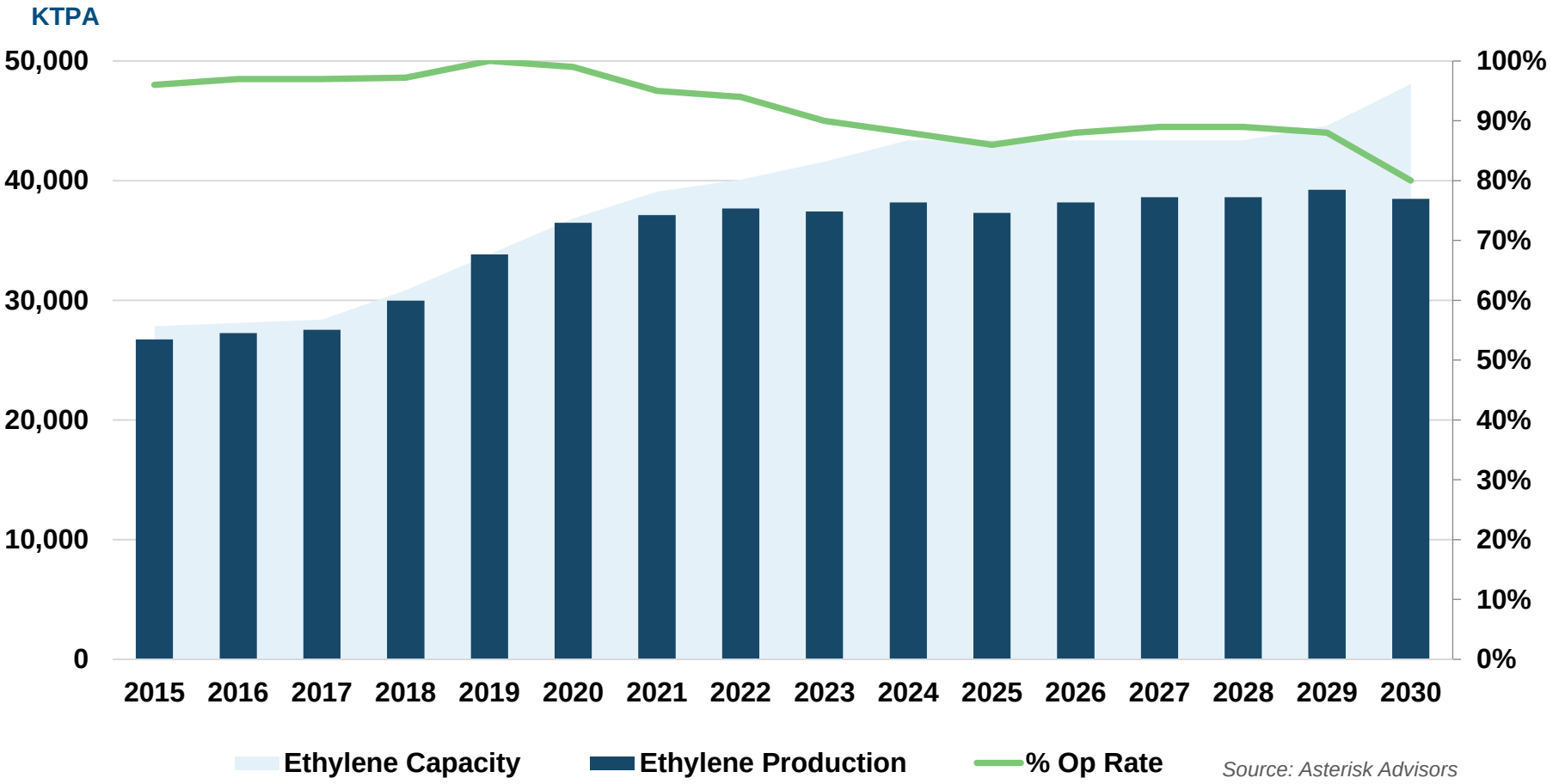
$136 BILLION of US produced chemicals were exported in 2019, accounting for approximately 10% total U.S. export value

14% of the world's chemicals were made in the US, the world's second largest producer

41% of construction spending in the manufacturing sector was generated by the chemical industry in 2019

Source: American Chemistry Council

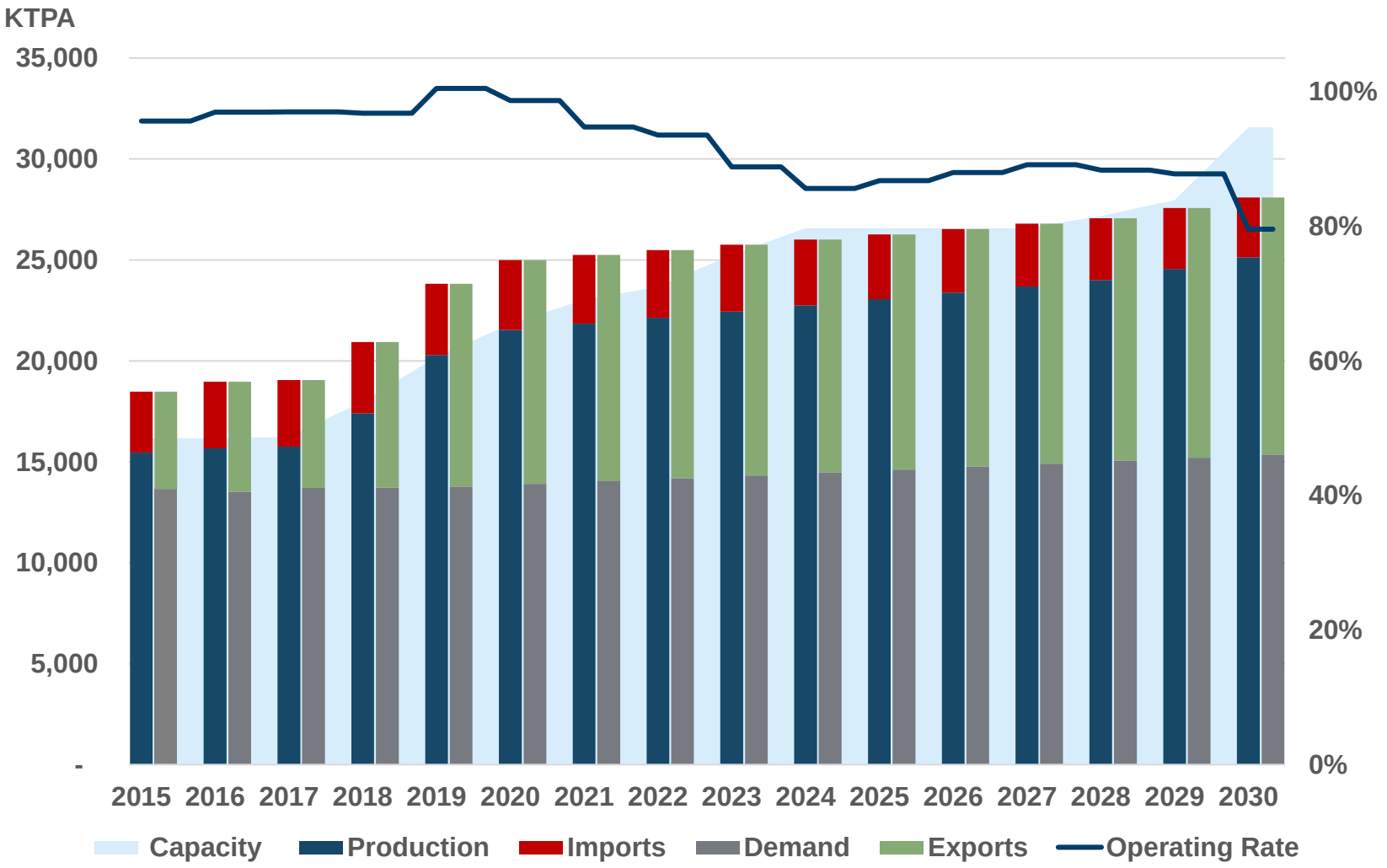
US Ethylene Capacity & Production



Source: Asterisk Advisors

- Potential new capacity is on hold or has been postponed, keeping operating rates at reasonable levels

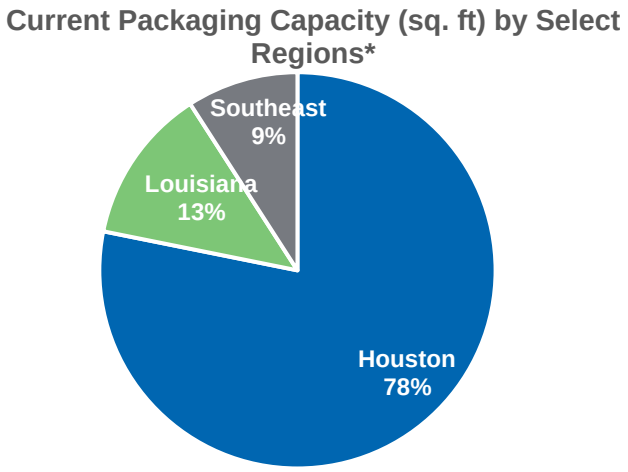
U.S Polyethylene Market

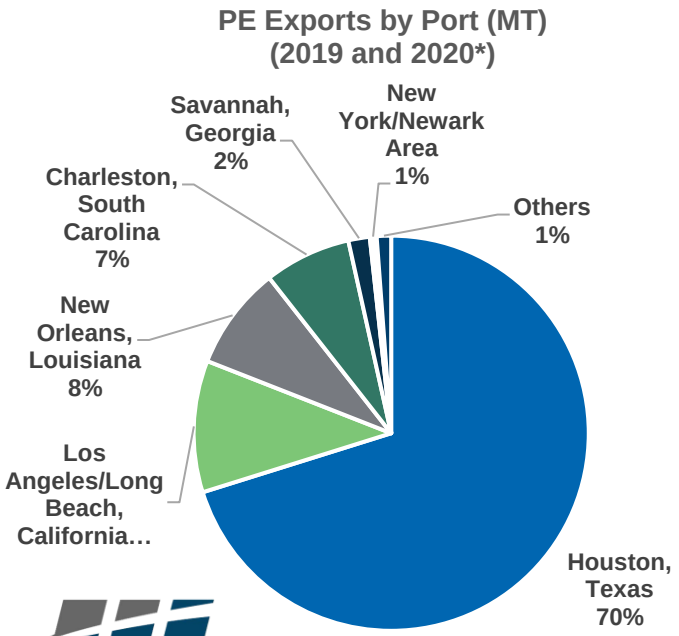


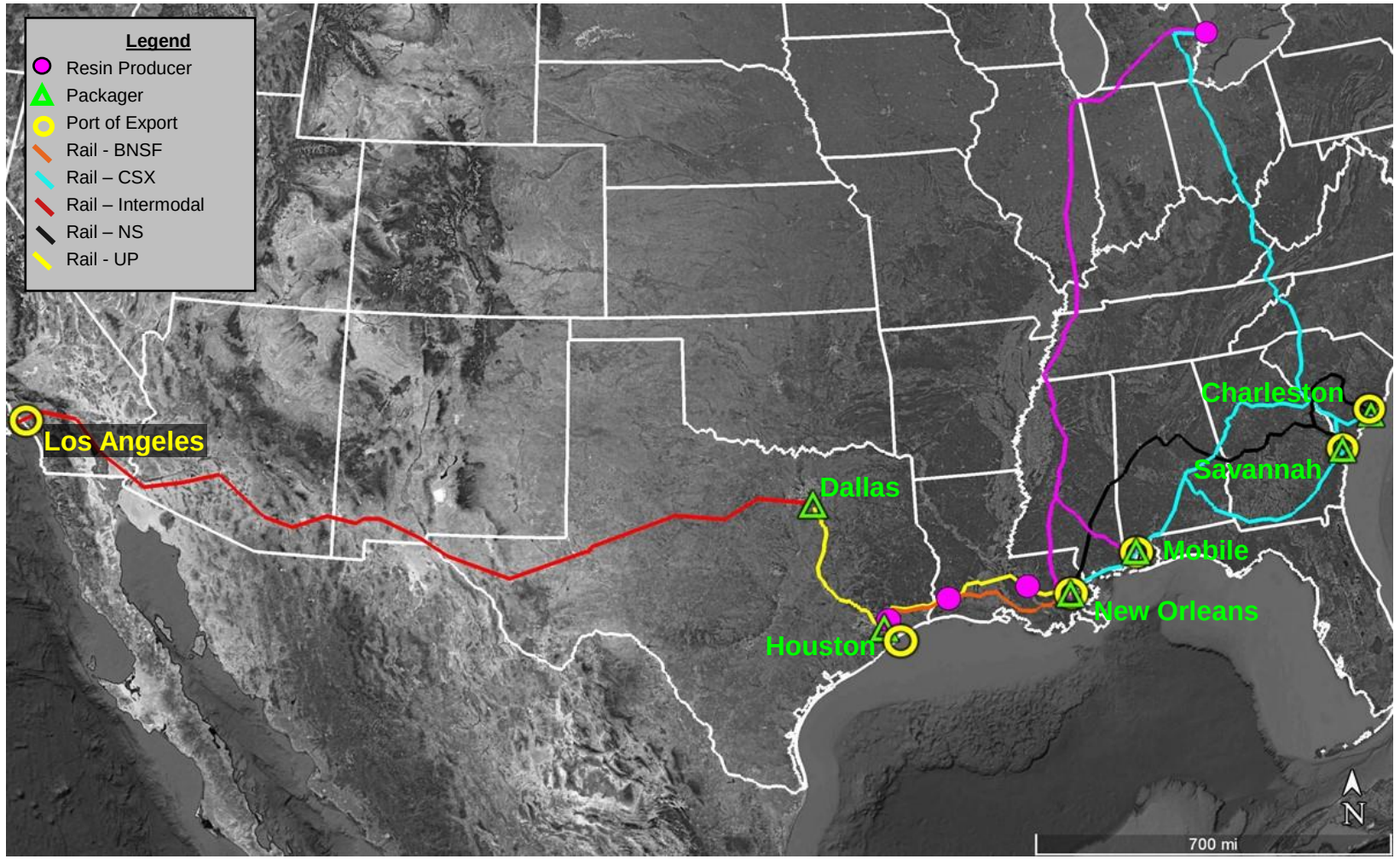
- Similar to ethylene, potential new PE capacity has been put on hold or postponed
- Exports are now a key staple of the US PE business, representing nearly half of production
- Therefore, export infrastructure and logistics are critical factors

Source: Asterisk Advisors

Packaging Capacity by Region, Port Market Shares, and Representative Export Routes for Polyethylene







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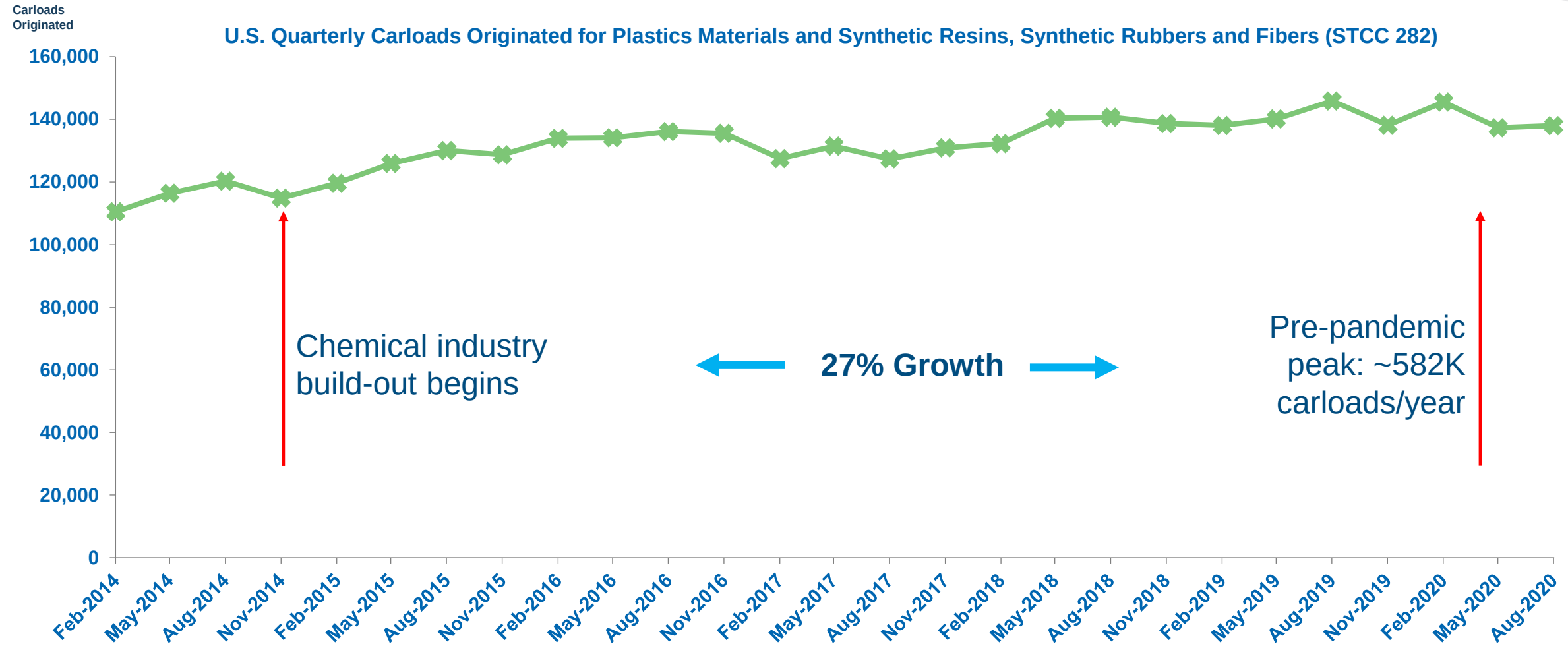
** 2020 through November; source: Asterisk Advisors and PLG analysis*

Plastic Resin Related Railcar Originations

DOWNSTREAM



Source: STB, December 2020

Decade of OPPORTUNITY 2020s

A LOOK FORWARD

A Decade of Opportunity Lies Before Us

THE 2020'S: THREE PRIMARY QUESTIONS

1 **EVOLUTION:** How will **EXISTING** supply chains evolve and adapt?

2 **EMERGENCE:** What **NEW** supply chains will emerge?

3 **DISRUPTION:** What **MARKET FORCES** will create or reshape supply chains?

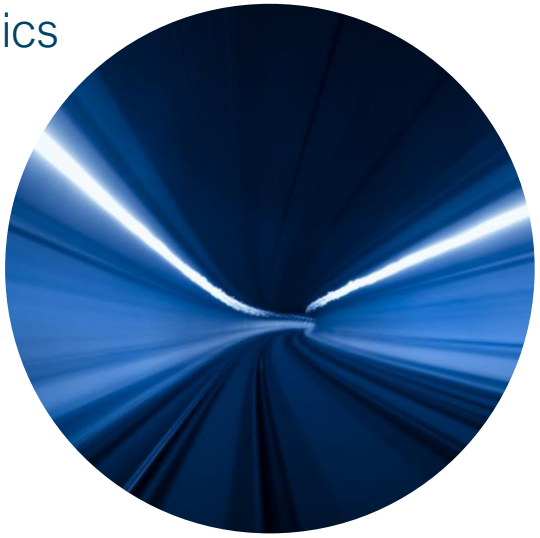
Reshaping Supply Chains of the Next Decade

RESHAPING THE CHAIN

Two
KEY DRIVERS
of 2020's Rail Supply Chain Dynamics

Response to
CLIMATE CHANGE
Particularly ESG Investment

+



Continued Growth of
E-COMMERCE
Accelerated by COVID-19

Marketplace Dynamics will Continue to Impact Rail Supply Chains

RESHAPING THE CHAIN

NEW & EVOLVING RAIL SUPPLY CHAINS

RENEWABLE DIESEL

Refined Products
Ag Products

CIRCULAR ECONOMY

Waste Plastics
Basic Chemicals & Energy Products

ELECTRONIC COMMERCE

Warehousing & Distribution
Intermodal

Renewable Diesel Attributes and Policies Favorable for Growth

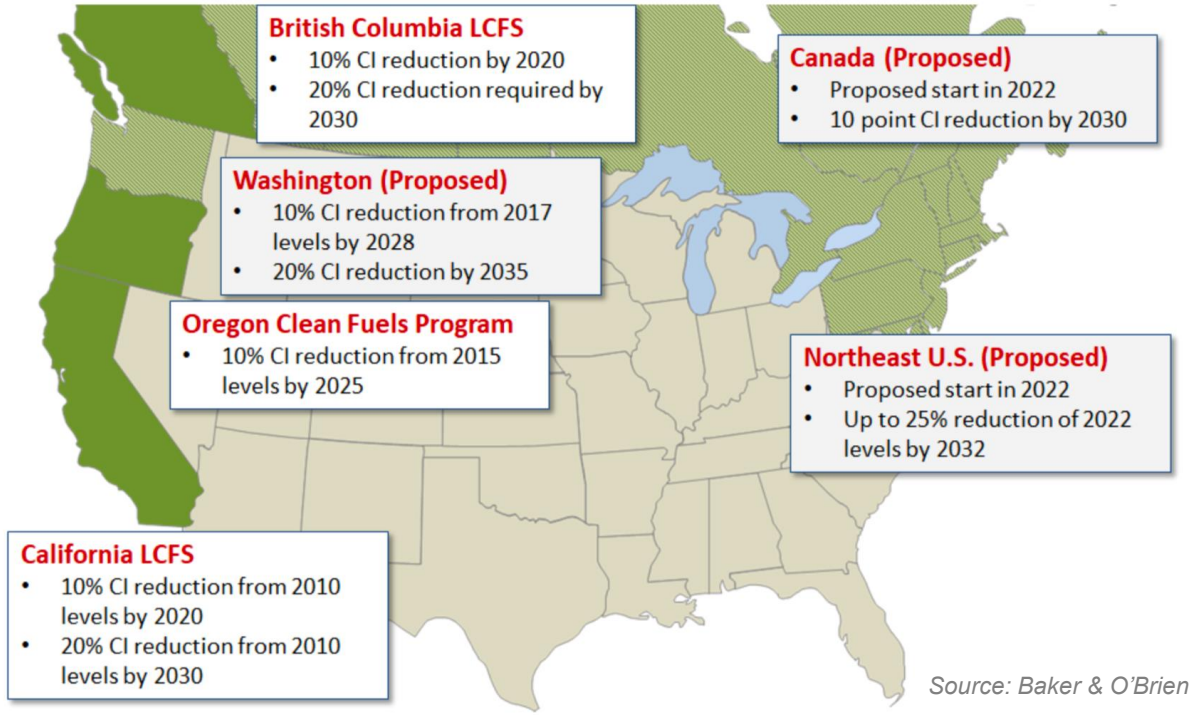
R E N E W A B L E D I E S E L

KEY **ATTRIBUTES**

- Renewable diesel is a “drop in” replacement for conventional diesel, unlike ethanol and biodiesel
- Low Carbon Fuel Standards (LCFS) driving demand in west coast states
- Other states plus Canada are expected to adopt similar programs, expanding demand for renewable diesel
- Nearly 20% of on-road diesel consumed in California is now renewable diesel

LCFS **POLICIES**

United States & Canada



Source: Baker & O’Brien

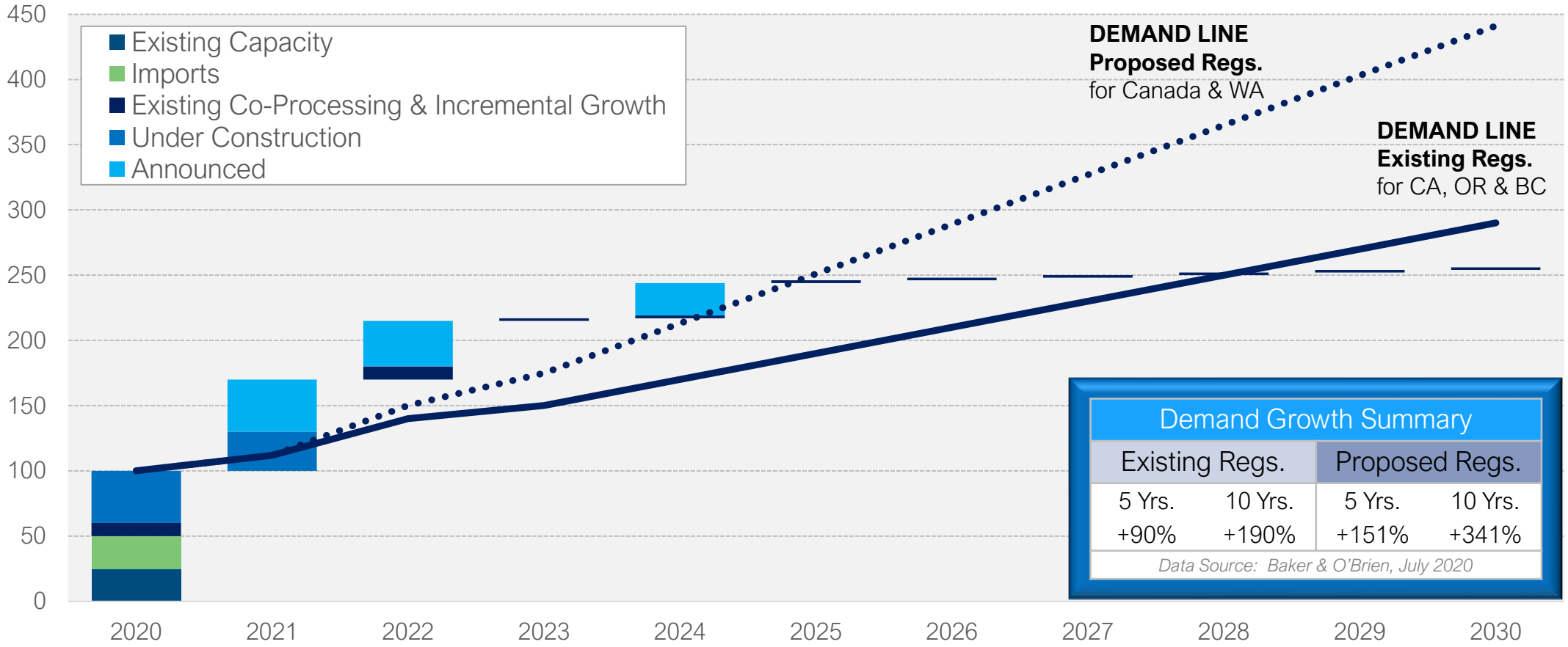
Renewable Diesel Supply & Demand Growth will Benefit Rail in the Coming Decade

RENEWABLE DIESEL

North American Renewable Diesel Supply & Demand

2020 – 2030

K/BPD



Demand Growth Summary			
Existing Regs.		Proposed Regs.	
5 Yrs.	10 Yrs.	5 Yrs.	10 Yrs.
+90%	+190%	+151%	+341%

Data Source: Baker & O'Brien, July 2020

Baseline Capacity

Incremental Annual Capacity Additions

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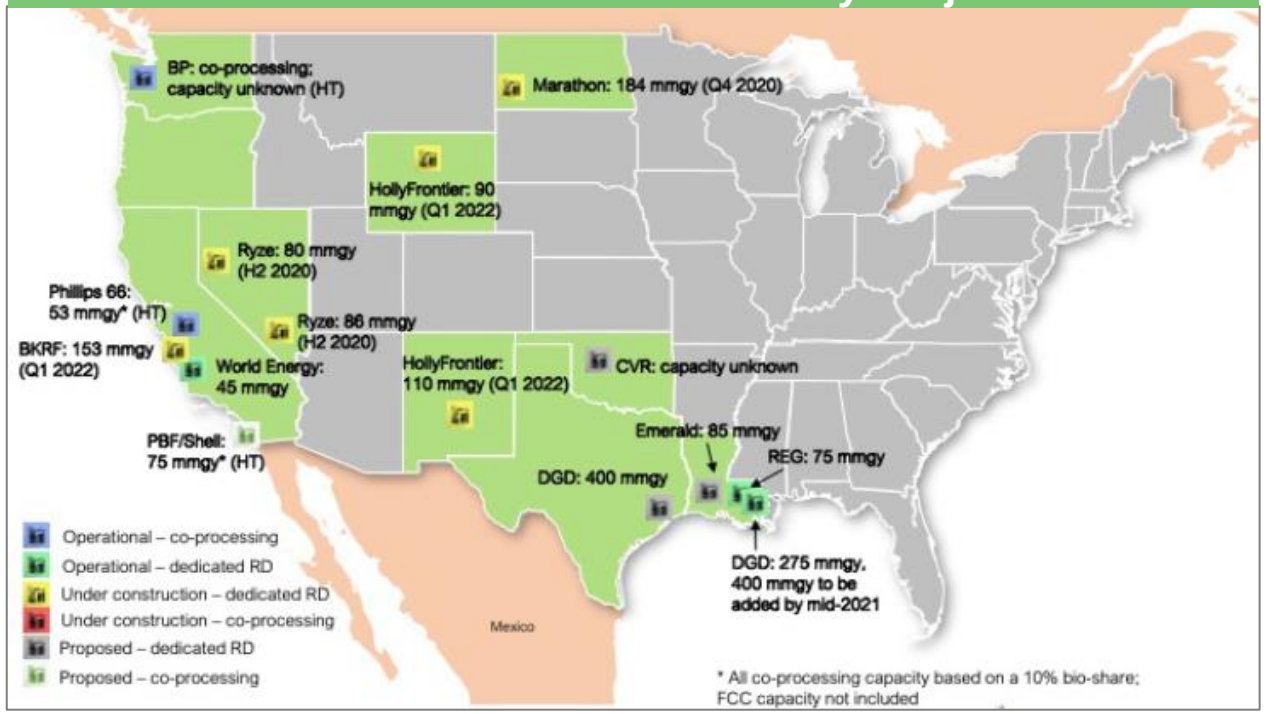
Renewable Diesel Requires New, Rail-Centric Supply Chain

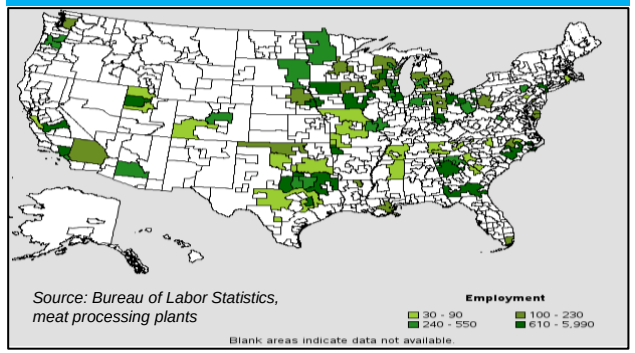
U.S. Renewable Diesel Refinery Projects



- Feedstocks include distillers corn oil, soybean oil, animal fats, used cooking oil
- With a primarily west coast finished product market and Midwest-based feedstocks, nearly all plant projects require significant rail volumes for feedstocks, finished product, or both

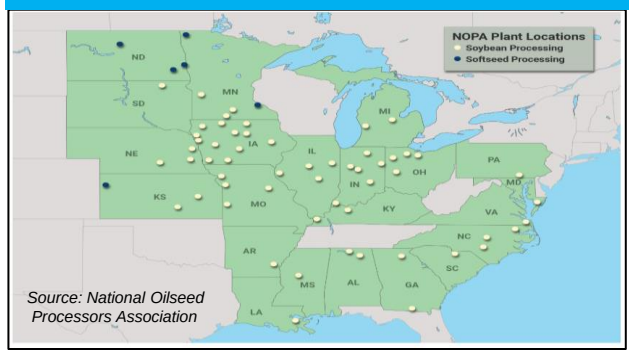
Source: Stratus Advisors; PLG Consulting

Rendering Plants



Source: Bureau of Labor Statistics, meat processing plants

Soybean Processing



Source: National Oilseed Processors Association

Ethanol Plants

Source: Renewable Fuels Association

Supply Chain/Logistics is a Critical Strategy

- **Network sourcing and supply chain**
  Feedstocks are located in several distinct locations and types across the United States

- **Multi-modal transloading, storage, and distribution strategy and implementation**

  Feedstock is rail-centric creating new tank car volumes from myriad sources and suppliers (some could move via barge)

  Supply chain is complex and dispersed

  Suppliers who already have tank cars and existing rail contracts are well suited to provide feedstock on a delivered basis

  Renewable diesel refiners will need to have the ability to manage and store multiple pools of railcars

- **Railcar fleet sizing, specifications and sourcing**
  Will be important consideration for both feedstocks and finished product as could involve multiple railcar suppliers (feedstock supplier, refinery operator)

- **Logistics assessments and optimization for new plant sites**
  Plant site transportation infrastructure (rail, marine, truck) design and engineering, and inventory and storage requirements are key.

  Plant site logistics infrastructure must be configured correctly for not just volumes but also operational efficiency and optimal commercial agreements with serving carriers

- The supply chain network is currently moving these products in small quantities
- As the supply chain evolves and refineries come online, the need for railcars will increase

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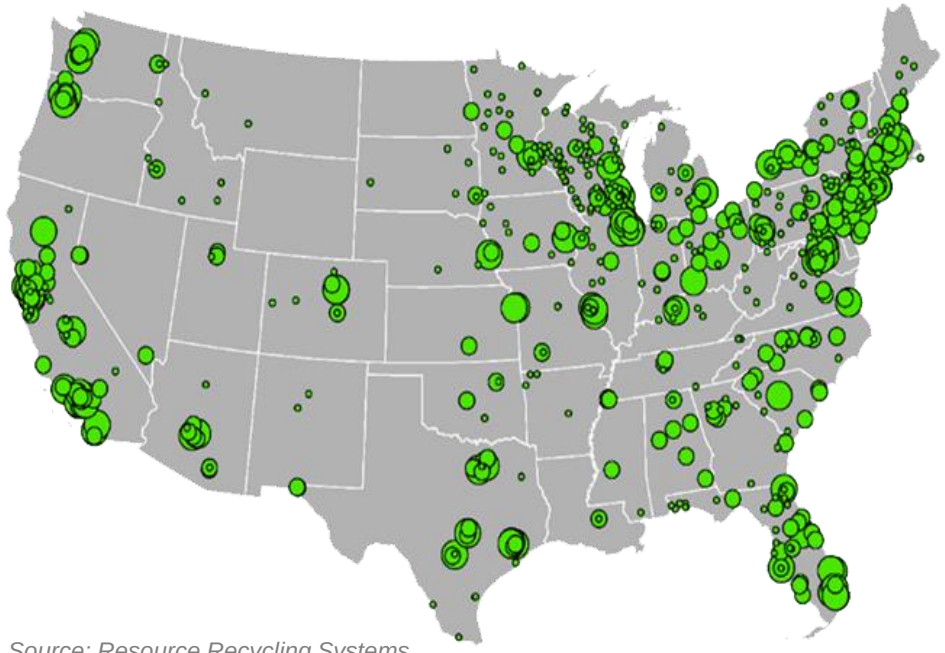
CIRCULAR ECONOMY

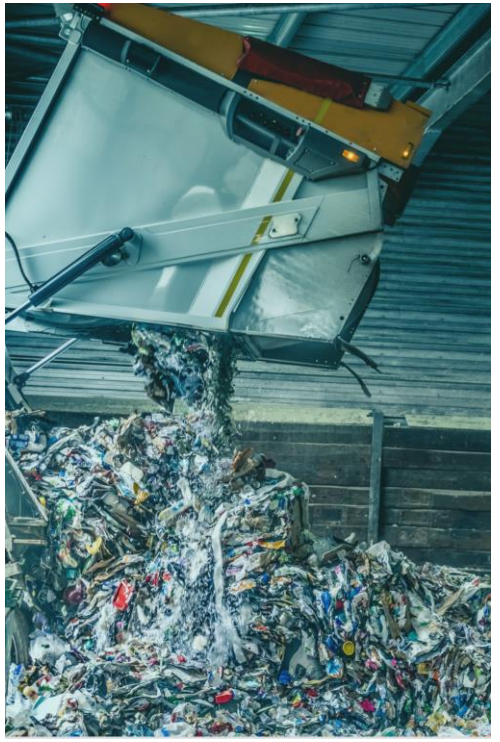
Significant Efforts are Underway to Convert Waste Plastics to Basic Materials and Energy Products

- More than 40 new technology providers and new ventures are operating pilot and commercial scale plants in North America today or will do so in the next two years
- Extremely active area of investor interest
- Projects will distribute process industry developments outside traditional regions such as the US Gulf Coast
- Biggest challenge: Less than 10% of plastics are recycled – the ultimate “first mile” problem

US Material Recycling Facility (MRF) Locations

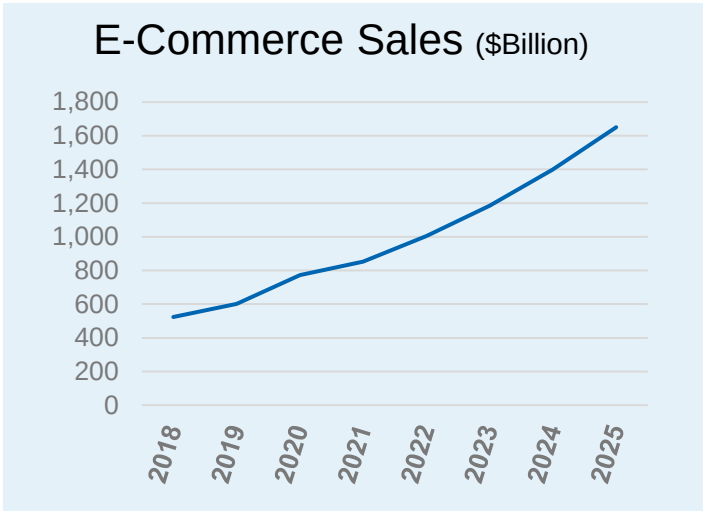


Source: Resource Recycling Systems



Source: CLP

E-Commerce Warehouse & Logistics "Gold Rush"



Source: JLL

3x

More warehouse space is needed for E-Commerce to conduct the same sales volume in traditional retail.

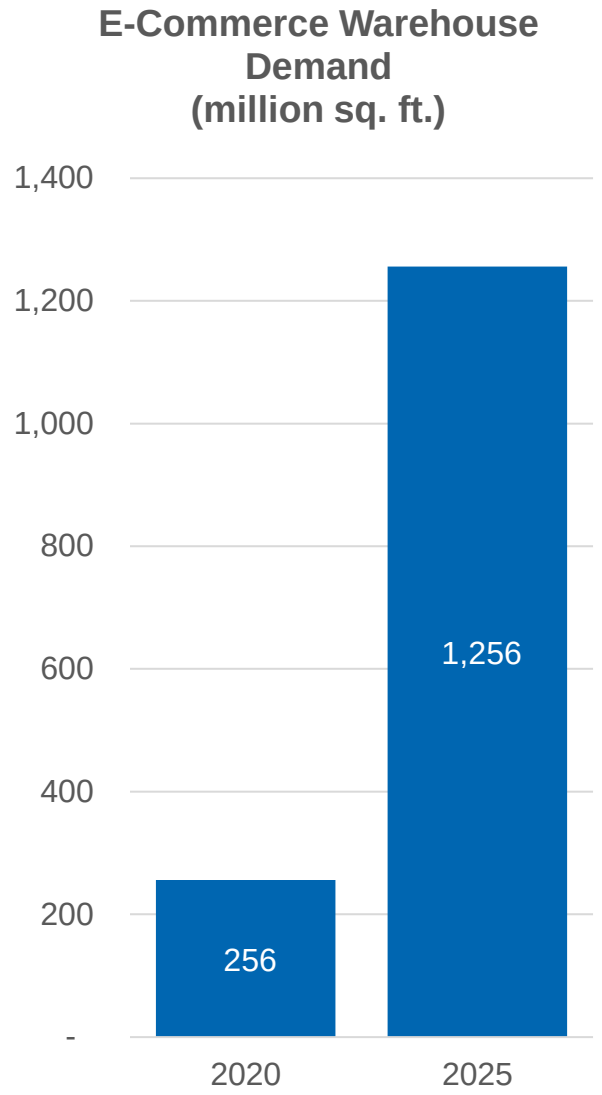
Source: Prologis

100

MILLION SQ-FT

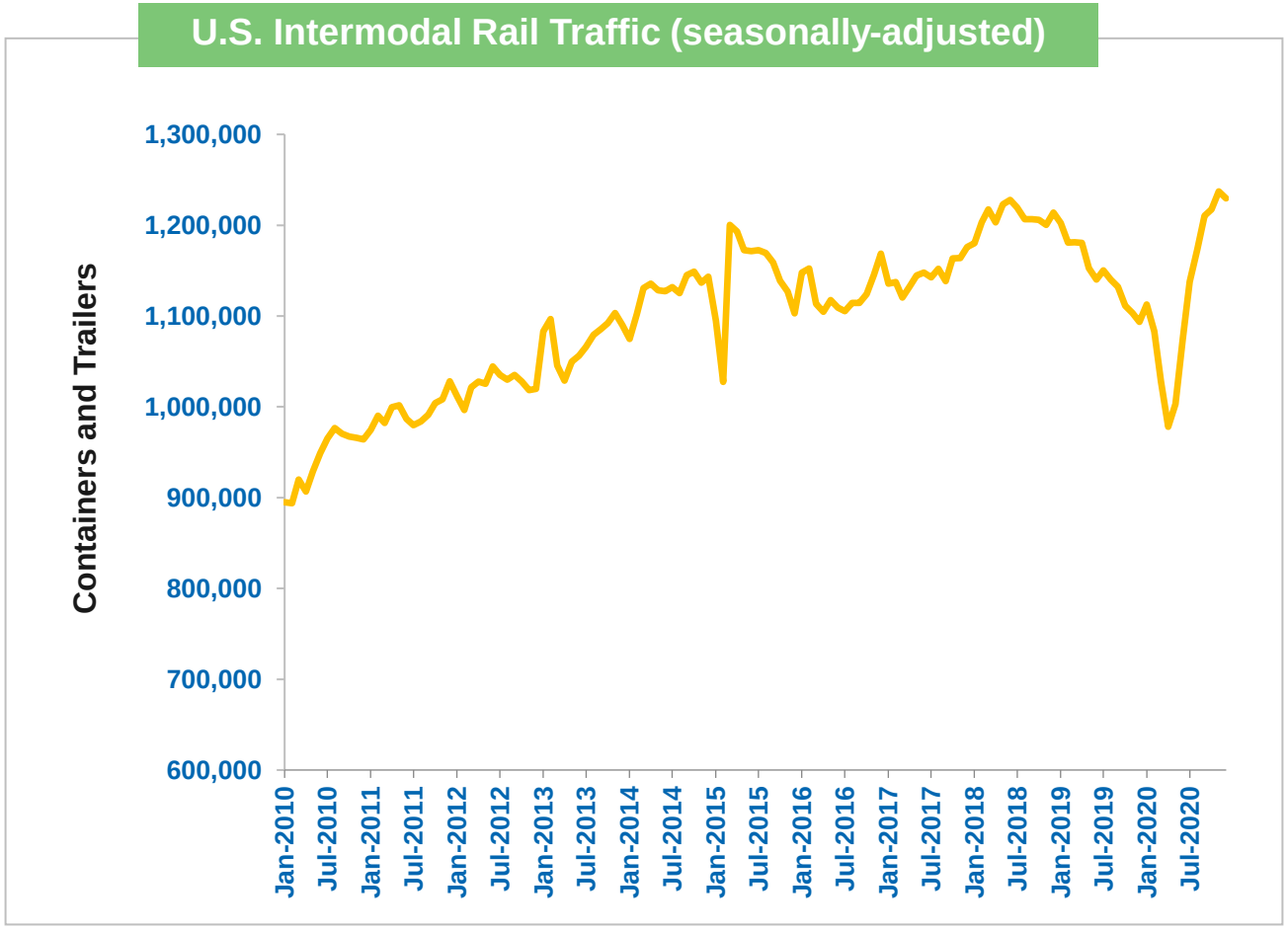
Needed for cold storage by 2025 for grocery e-commerce growth.

Source: JLL



Data source: JLL

E-Commerce Represents a "Mixed Bag" for Intermodal



Source: BTS

- E-Commerce distribution requires a faster, less-centralized model that gets products closer to the consumer. As such, intermodal products are less suited for e-commerce than TL and LTL.
- However, a "rising tide will lift all boats" as truck capacity tightens and rates increase
- Intermodal rail volumes today are generally concentrated in the big population centers and ports. With PSR, the tendency is to consolidate services, not expand them as may be required by e-retailers. These business models may need to be reconsidered if greater e-commerce penetration is sought by carriers.
- "Peak season" will be more amorphous and occur at various times and durations throughout the year
- Amazon & Wal-Mart are buying boxes. Will they be customers or competitors of intermodal marketing companies?

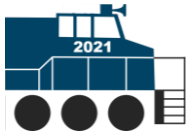
Key Takeaways to Capture the Decade of Opportunity

KEY **TAKEAWAYS**

SHIPPERS

- Managing costs and maximizing efficiency through best practices is more critical than ever.
- Effective negotiations, network design, fleet assets, and inventory management all matter!
- Superior logistics is a competitive advantage, especially for “fungible” commodities.

CARRIERS & SERVICE PROVIDERS



- Market penetration requires a deep understanding of target markets.
- Be prepared to take advantage of opportunities to diversify services and industries to avoid over-dependency on a single commodity or industry.

INVESTORS

- First-mover advantage counts within these evolving markets.
- A clear, post-transaction strategy is just as important as the initial, “as is” diligence.

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THANK YOU!

James Shefelbine

Executive Vice President

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For follow-up questions & information:

+1 (312) 957-7757 ● jshefelbine@plgconsulting.com