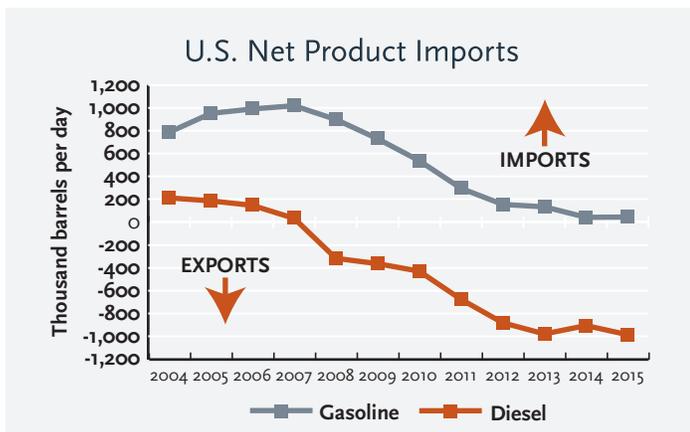


A Complex System

With more than 12 million barrels of transportation fuel consumed every day, the United States lays claim to one of the largest and most complex fuel-supply chains in the world. This report evaluates the U.S. supply chain, how it works and what limitations/weaknesses exist at each point to accommodate diverse fuel specifications and achieving higher rates of biofuels penetration. Understanding the fundamentals of this complex system is essential for anyone considering introducing a new product into the market or adjusting market dynamics for any reason.

Changing U.S. Supply Landscape

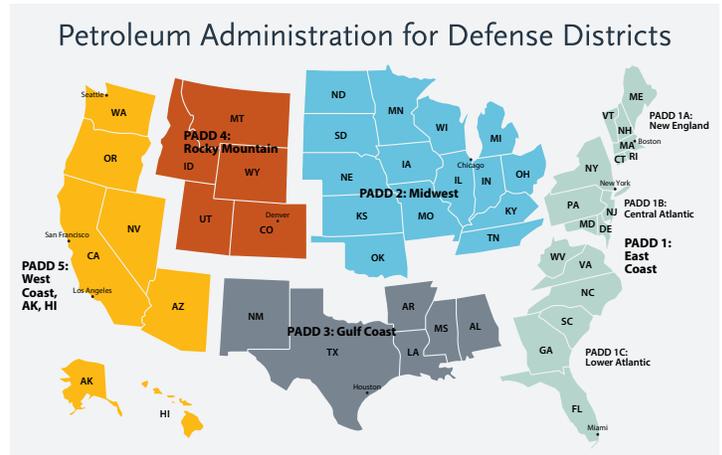
During the past decade, the U.S. transportation fuel market has shifted dramatically. The U.S. has gone from being one of the world's largest importers of petroleum products to a net exporter of transportation fuels. Prior to 2007, the U.S. was growing at a strong pace in its demand for both gasoline and diesel and was importing a substantial amount of those volumes from foreign markets. Now, the U.S. is close to being balanced on gasoline (produces almost as much as it consumes) and is long on diesel (is a net exporter).



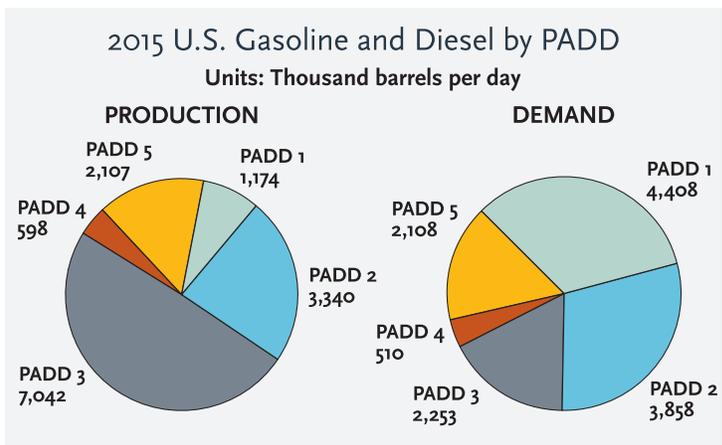
(Source: U.S. Energy Information Administration)

Distribution Logistics

The U.S. is divided into five unique sections, called PADDs (Petroleum Administration for Defense Districts). Major data collection on pricing and market fundamentals is divided this way. With the exception of the West Coast (PADD 5), each PADD has an imbalance of supply and demand that is resolved through logistical connections that are used to make up those imbalances. In many cases the imbalance is resolved not just by inter-PADD movements but also through foreign imports and exports.



(Source: U.S. Energy Information Administration)

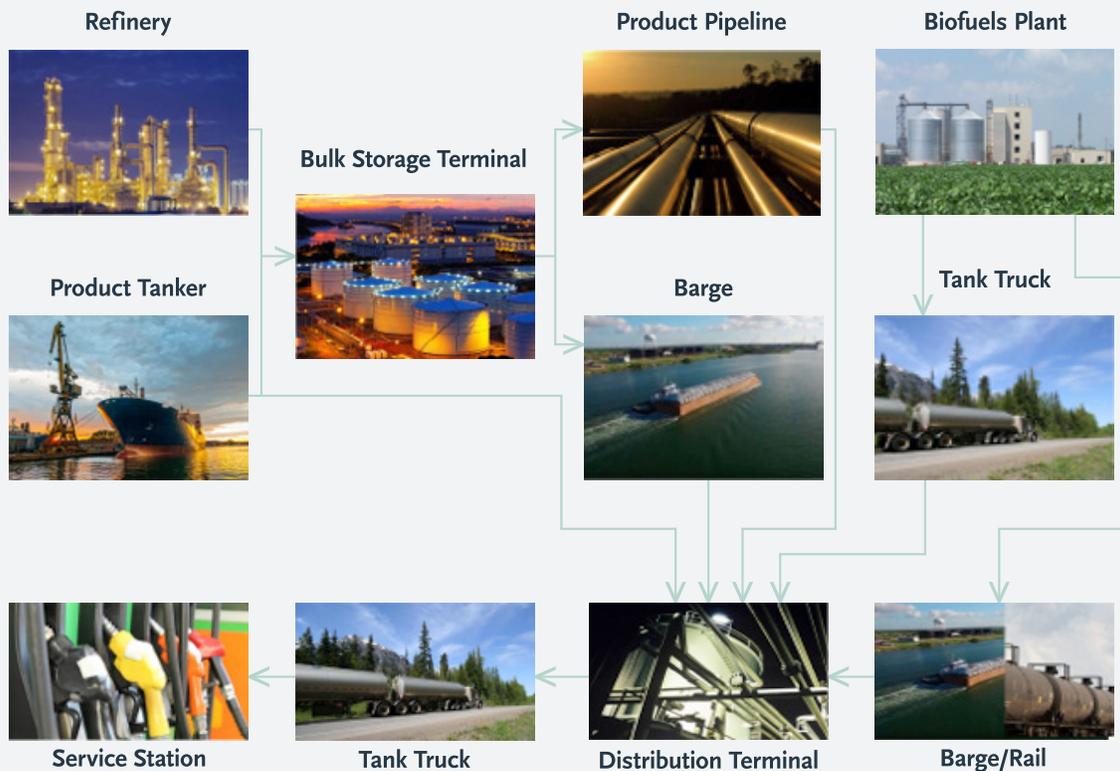


(Source: U.S. Energy Information Administration)

Because of the imbalances that exist within the U.S. transportation fuel market, there are several major product flows that occur between PADDs to make up the shortfall. Logistically, these flows can occur by pipeline, tanker, barge or truck, and carry fuel from key production or import centers like the U.S. Gulf Coast to key demand centers like the East Coast.

One of the key limiters of the U.S. transportation fuel value chain flexibility is the varying specifications and mandates that exist across the country, known as boutique fuels. Within each specified market, it is impermissible to sell a fuel that does not meet the region's specification. This adds complexity as the system works to deliver required fuels to the appropriate markets.

Understanding the Supply Chain



(Source: Stratas Advisors)

Distribution Infrastructure

Gasoline and on-road diesel both begin either at the refinery or as imports. Once being refined or imported, it is placed in terminal bulk storage either at the refinery or at a centralized location such as a port. Once in bulk storage, either finished fuel or blending components are transported by pipeline, rail or barge to the distribution terminal. Concurrently, biofuels are produced at a plant and loaded into a rail line or tank truck and shipped to the same distribution terminal. Once at the terminal, any blending with biofuels takes place before it is then transported by tanker truck to the service station.

Conclusion

The U.S. fuels production and distribution market is a complex system that efficiently accommodates various challenges. It is essential to understand how the various components of the system interact to better recognize why market disruptions may occur or how changes in fuel specifications or regulations could affect the efficient supply of transportation energy to consumers. This summary presents a very high level overview of the system—for a more thorough examination, the report itself contains more specific information analyzing each component of the system.

About the Author

This report was prepared for the Fuels Institute by Stratas Advisors, a Hart Energy Company, a global consulting firm that covers the full spectrum of the energy sector and related industries. Stratas Advisors can be reached at stratasadvisors.com or (713) 260-6426.

About the Fuels Institute

The Fuels Institute, founded by NACS in 2013, is a non-profit research-oriented think tank led by a diverse Board of Directors and driven by a Board of Advisors. We are dedicated to evaluating the market issues related to vehicles and the fuels that power them. The Institute incorporates the perspective of interested stakeholders by commissioning and publishing comprehensive, fact-based research projects. These stakeholders include but are not limited to fuel retailers, fuel producers and refiners, alternative and renewable fuel producers, automobile manufacturers, environmental advocates, consumer organizations, academics, government entities and other stakeholders with expertise in the fuels and automotive industries.

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