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“CHANGES IN U.S. PROPANE SUPPLY”

Presented by:

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Muse, Stancil & Co.**

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MUSE, STANCIL & Co.

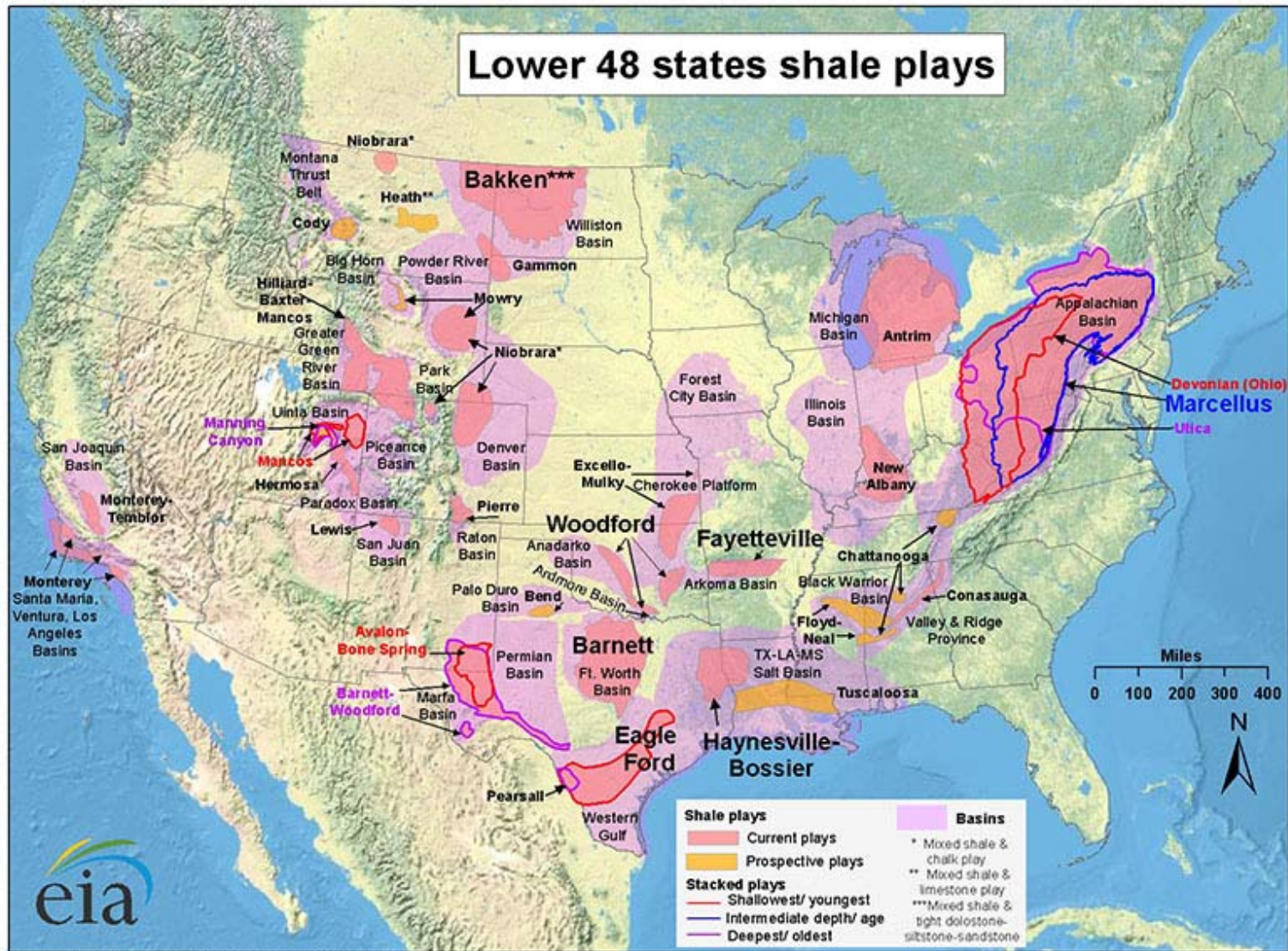
- **Independent energy consulting firm founded in 1984, providing industry expertise from wellhead to end-user; www.musestancil.com**
- **Energy Sectors Served**
 - Crude Oil
 - Refined Products
 - Natural Gas Liquids
 - Power/Cogeneration
 - Refining
 - Natural Gas
 - Petrochemicals
 - Biofuels
- **Representative Assignments**
 - Market Studies
 - Project Development
 - Transactional Due Diligence
 - Insurance Claims (Property & Business Interruption)
 - Contract Negotiation/ Dispute Resolution
 - Litigation Support
 - Asset Valuation
 - New Technology Assessment
 - Royalty Negotiation/ Auditing



AGENDA

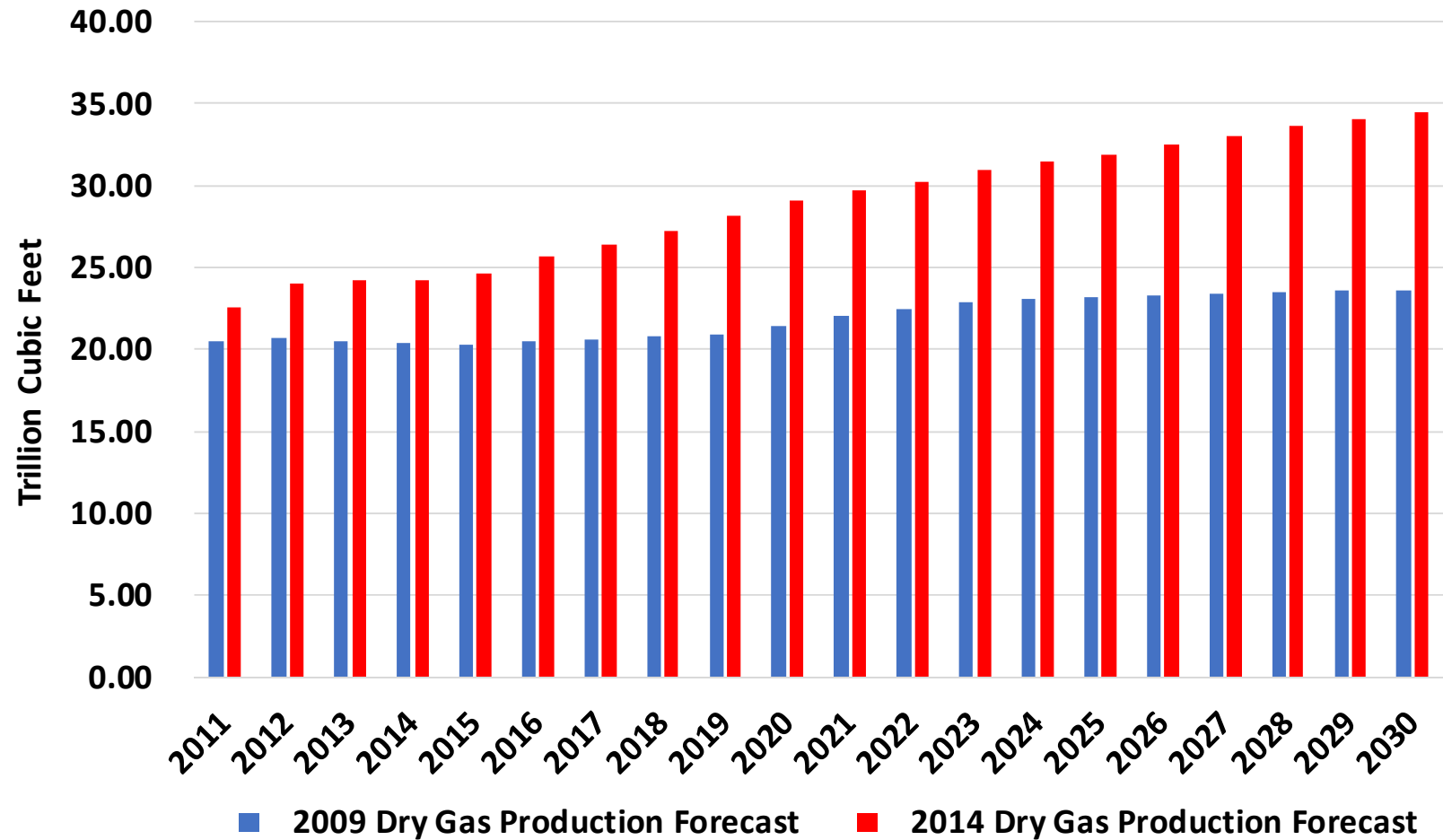
- **How the Shale Revolution is changing the NGL landscape in North America**
- **Current and Projected Propane Production**
- **Minnesota Propane Supply**
 - Where does it come from
 - How does it get to here
- **Export markets and their effect on propane markets**
- **Impact of the Panama Canal Expansion**

THE SHALE REVOLUTION HAS CHANGED EVERYTHING FOR U.S. ENERGY MARKETS



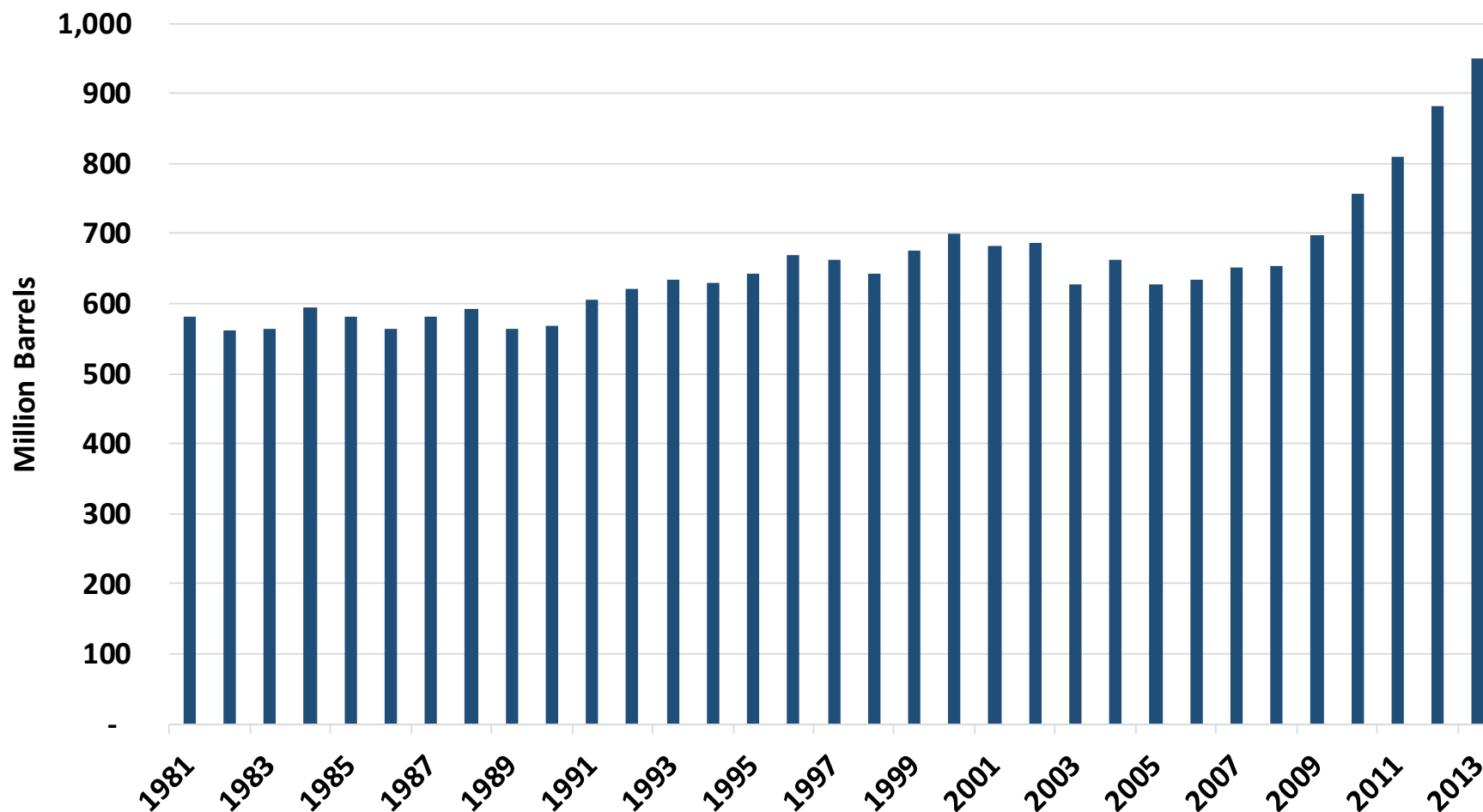
Source: Energy Information Administration based on data from various published studies.
Updated: May 9, 2011

U.S. GAS PRODUCTION FORECASTS HAVE CHANGED



Source: EIA

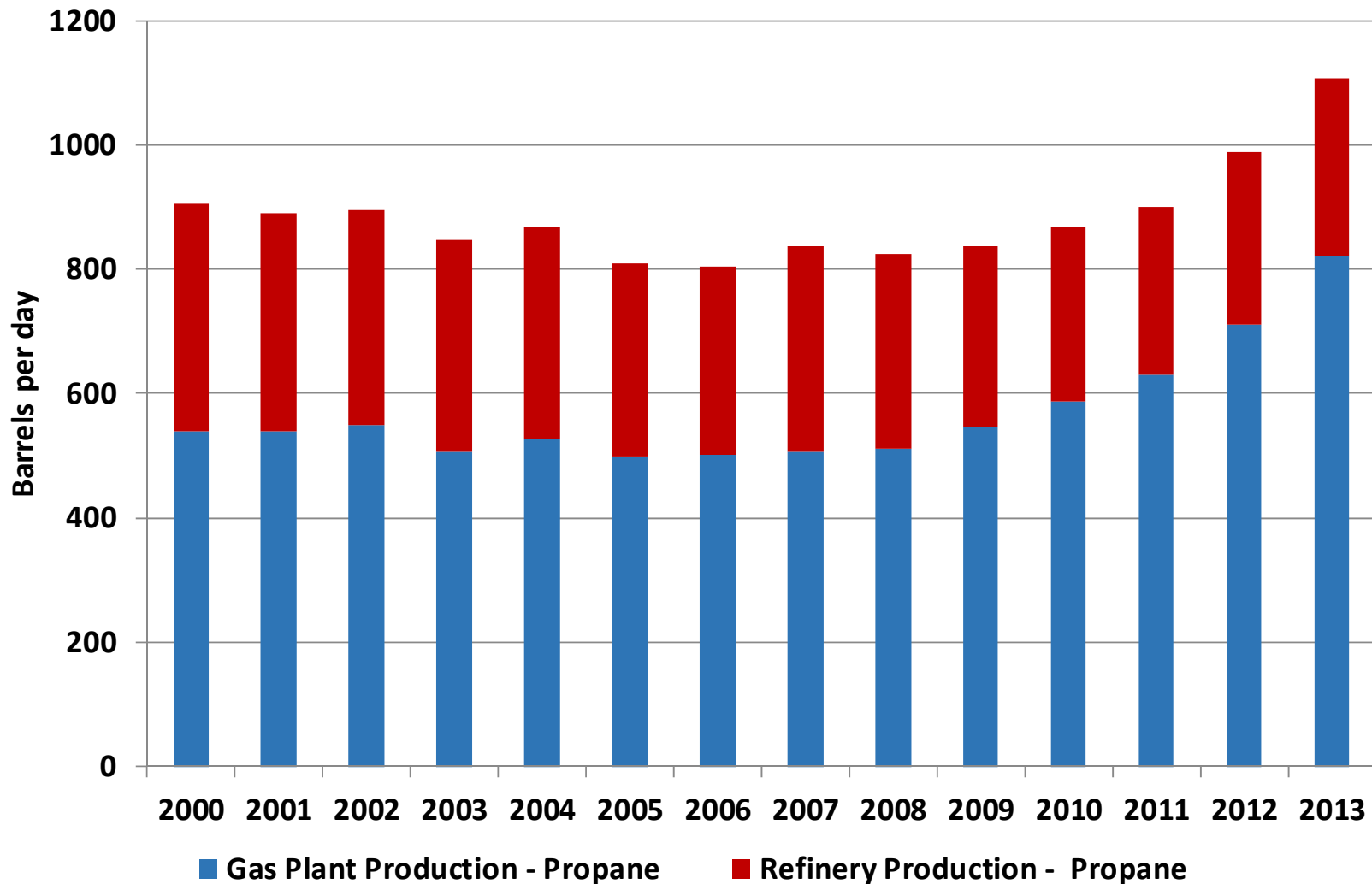
MORE NATURAL GAS = MORE NATURAL GAS LIQUIDS



Source: EIA

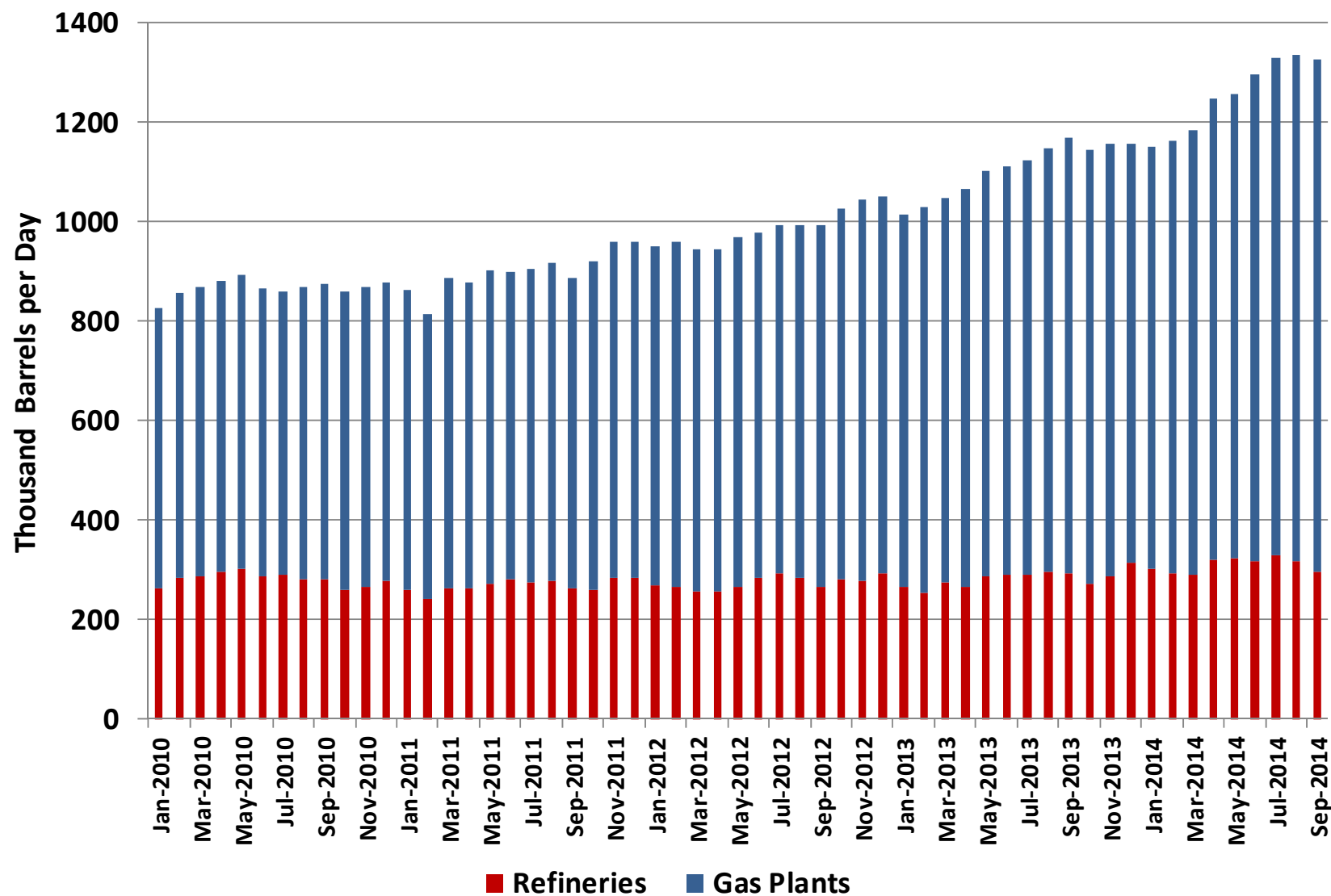
U.S. PROPANE PRODUCTION HAS SURGED

Gas Plant and Refinery Production
(Propane)



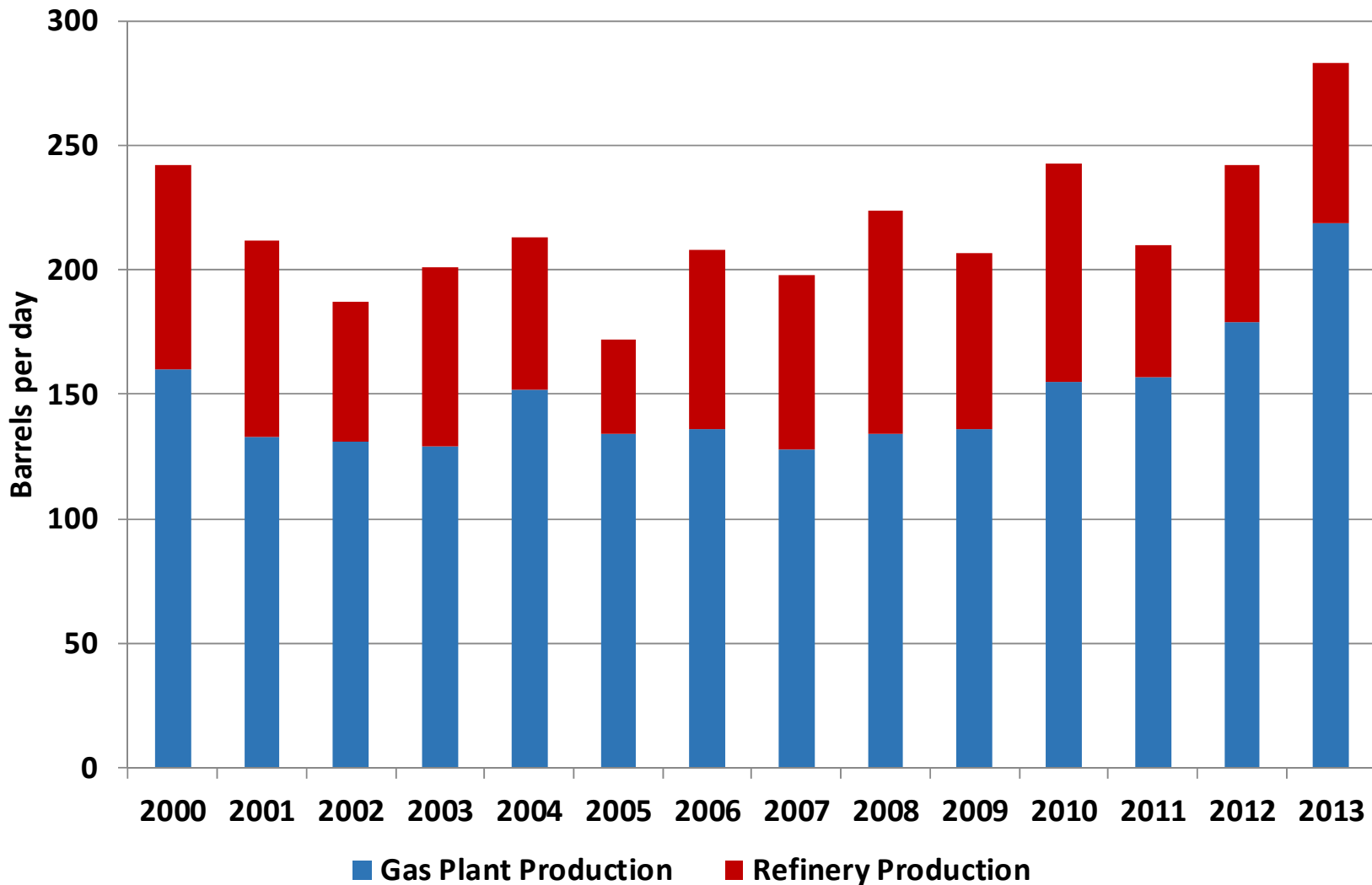
U.S. GAS PLANT PROPANE PRODUCTION CONTINUES TO GROW

Refinery and Gas Plant Propane Production



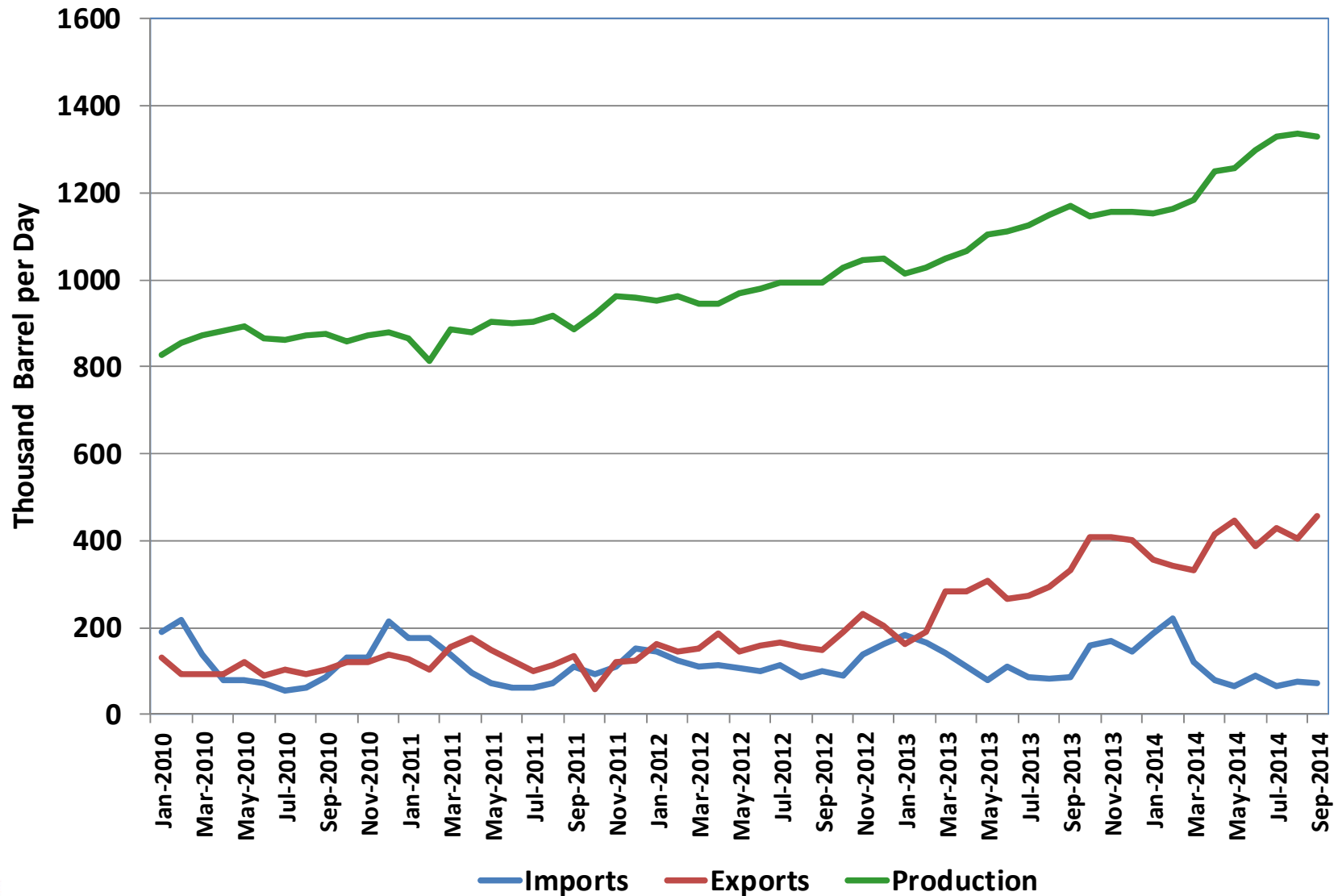
U.S. BUTANE PRODUCTION

Gas Plant and Refinery Production (Butane)

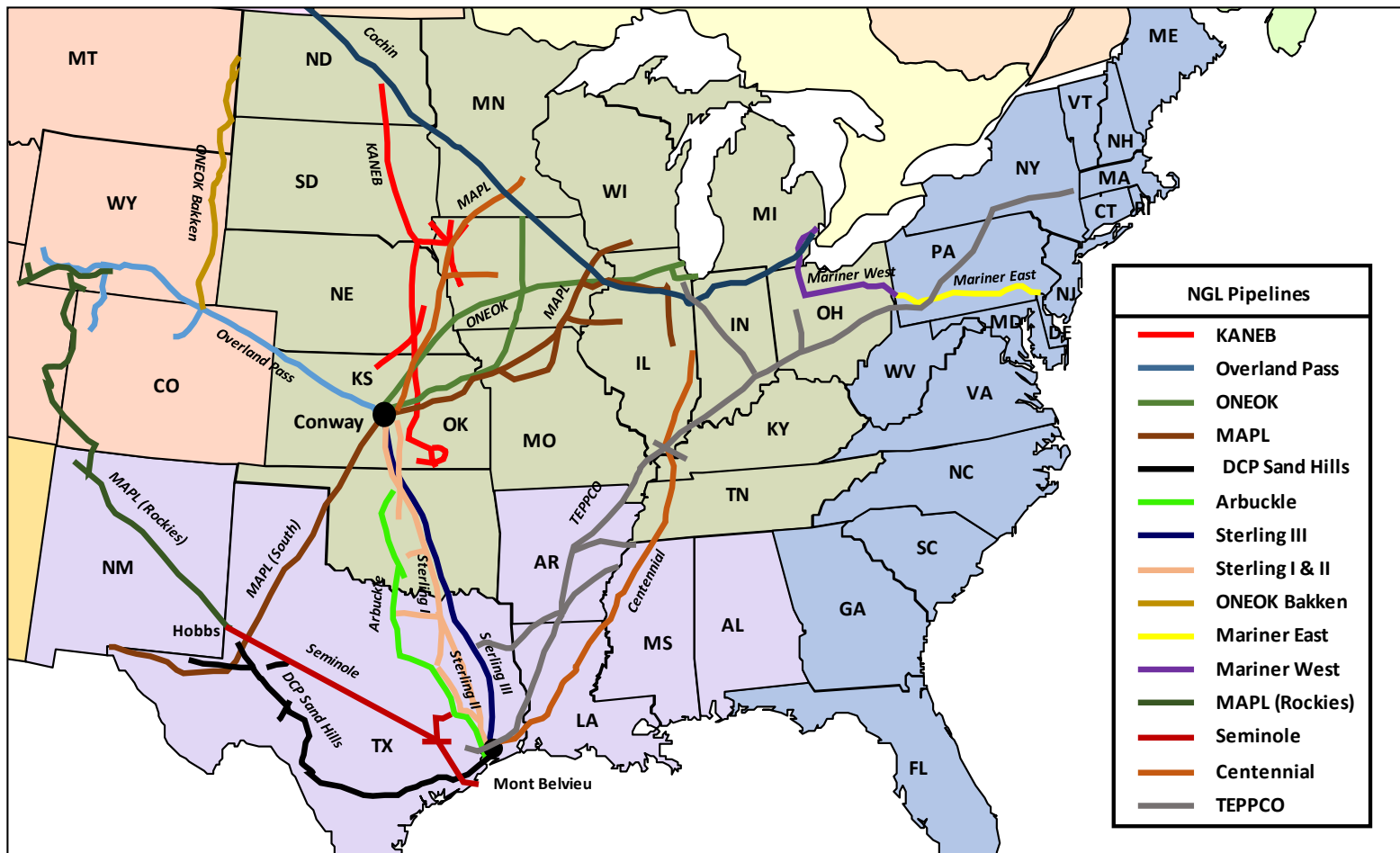


U.S. EXPORTS ARE GROWING SUBSTANTIALLY

Propane and Propylene Production and Trade Trends

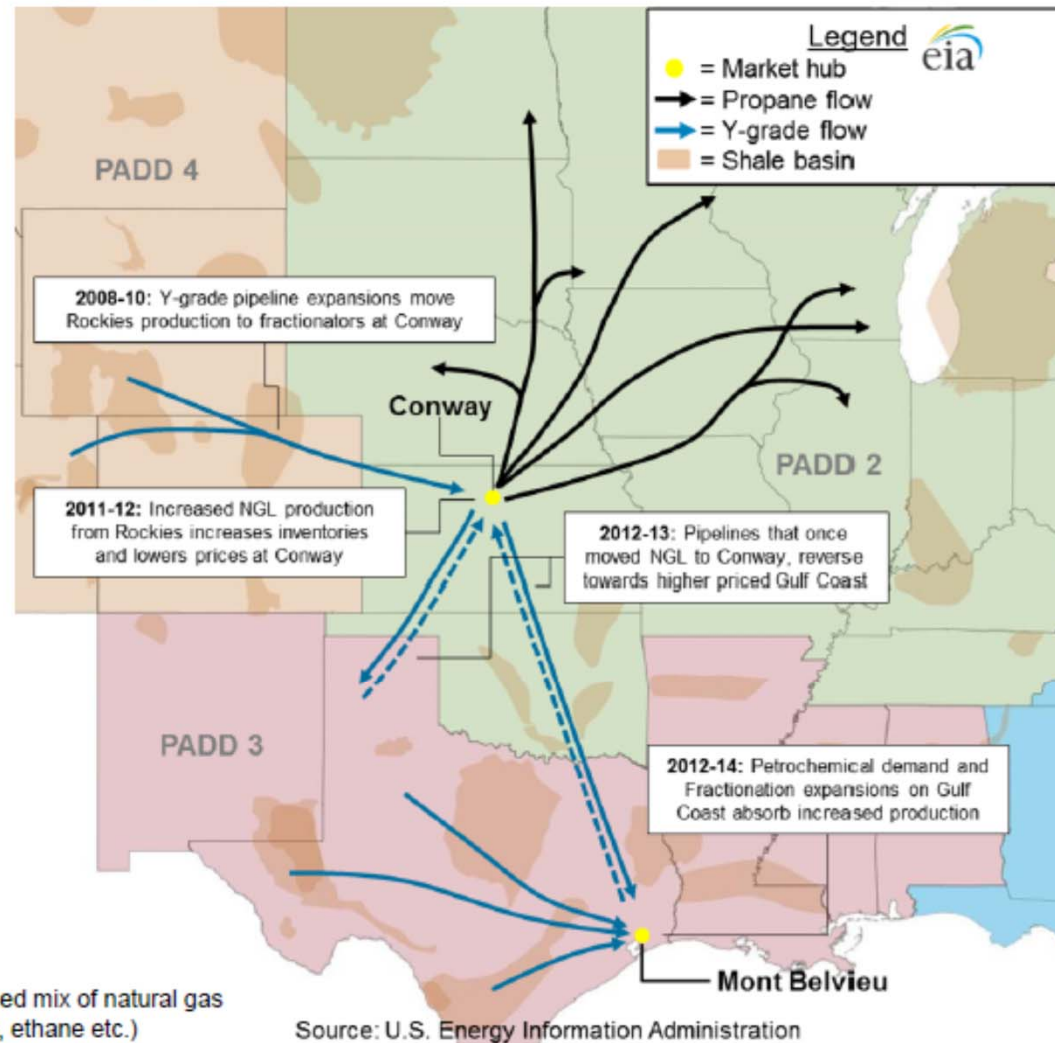


U.S. DISTRIBUTION INFRASTRUCTURE CONTINUES TO EXPAND



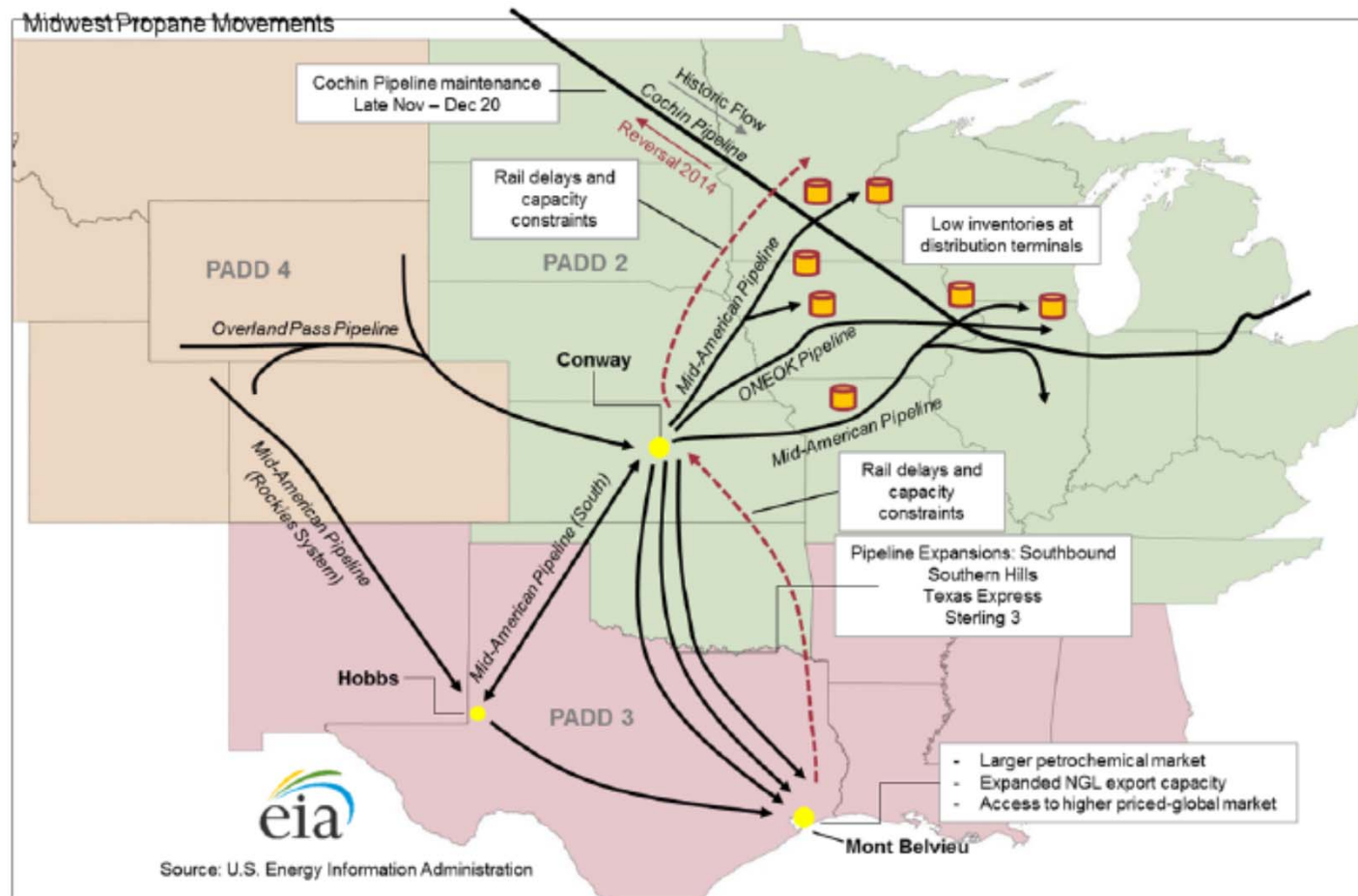
PROPANE DISTRIBUTION FLOWS

Changes in propane infrastructure and flows



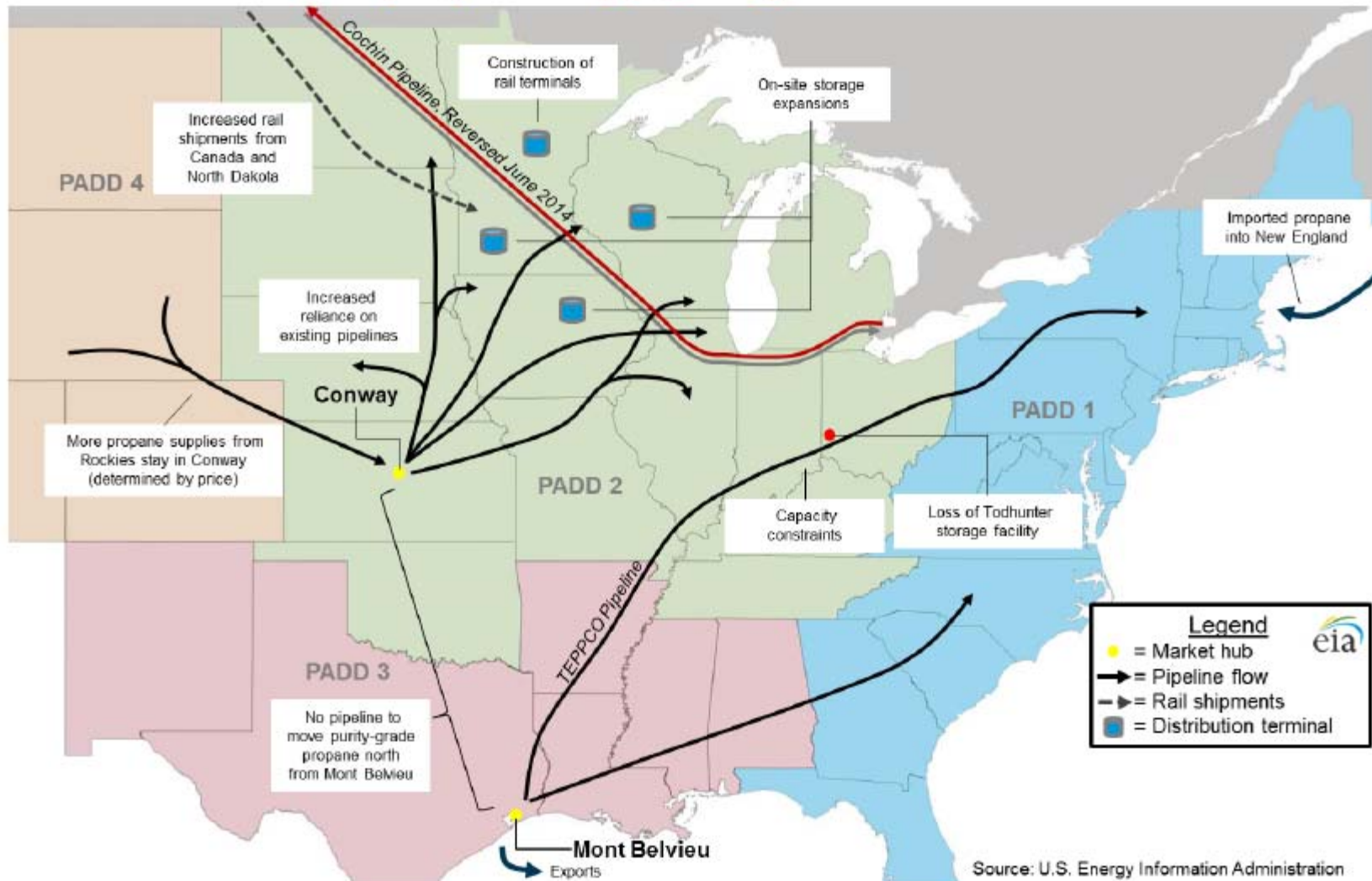
HISTORICAL PROPANE SUPPLY PATTERNS ARE CHANGING

Propane infrastructure and flows: Winter 2013-14

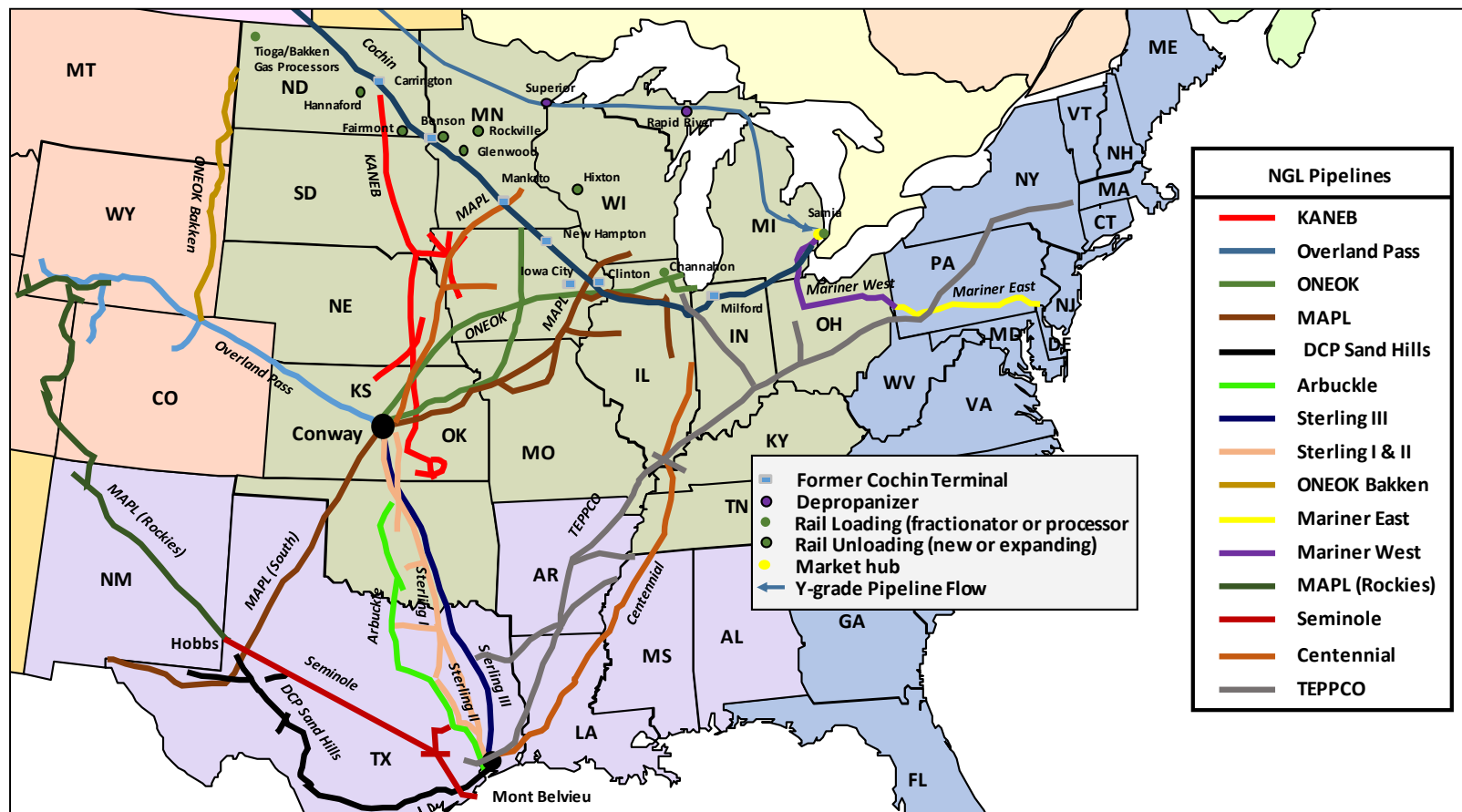


2014 SUPPLY INFRASTRUCTURE HAS CHANGED

Winter 2014-15 propane supply diagram

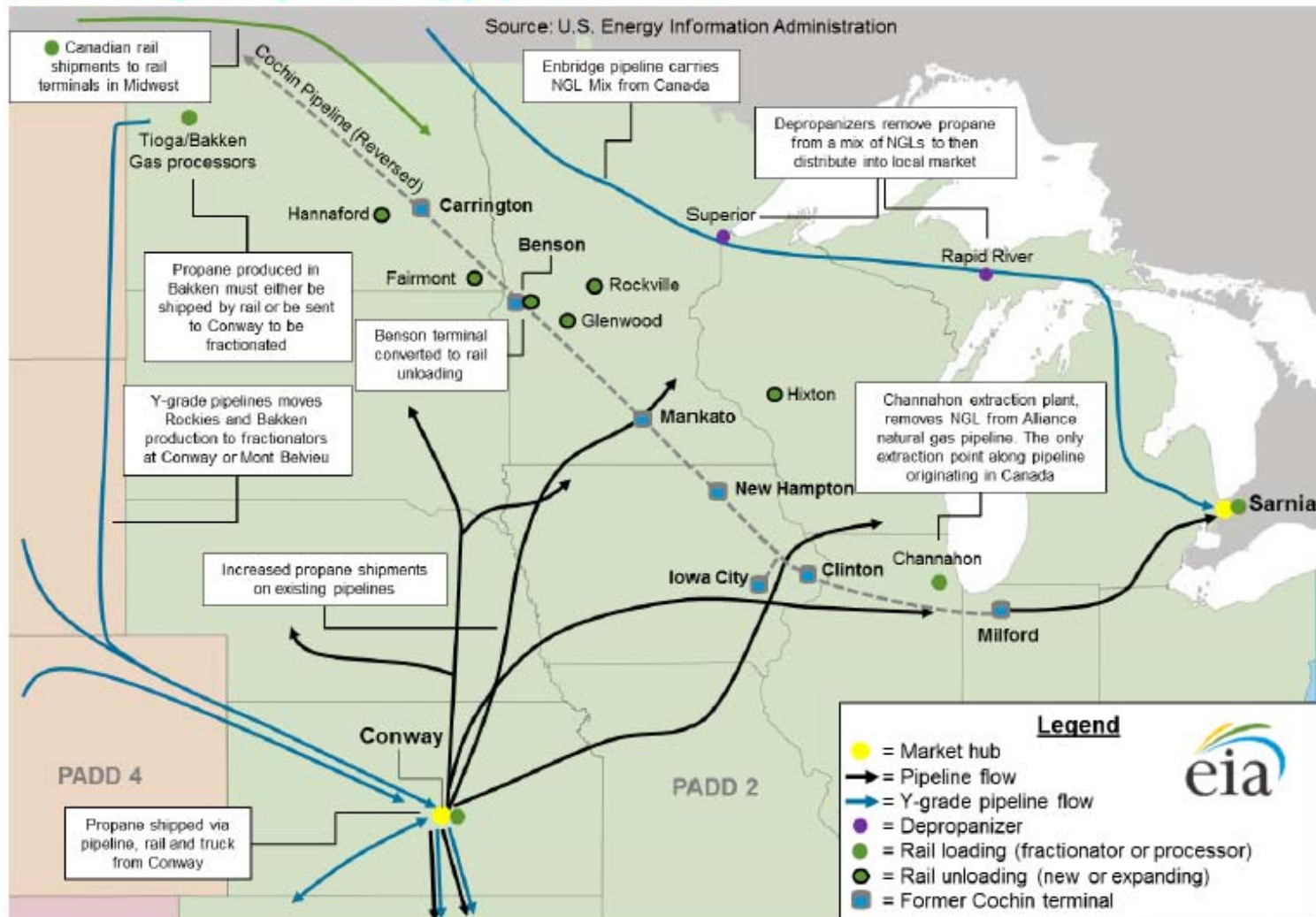


PROPANE DISTRIBUTION INFRASTRUCTURE

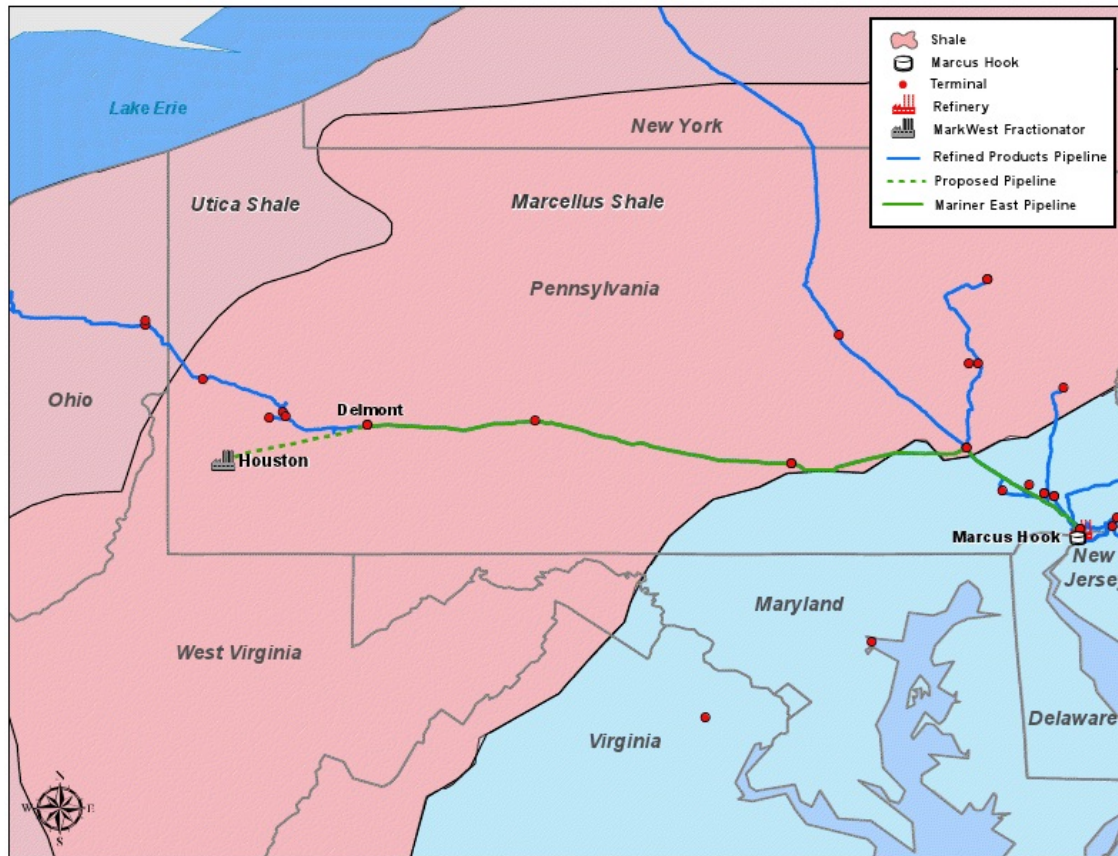


HOW WILL PATTERNS CHANGE IN THE FUTURE?

Evolving Propane Supply Situation



MARCELLUS/UTICA REGIONS – EVOLVING SUPPLY AND EXPORTS

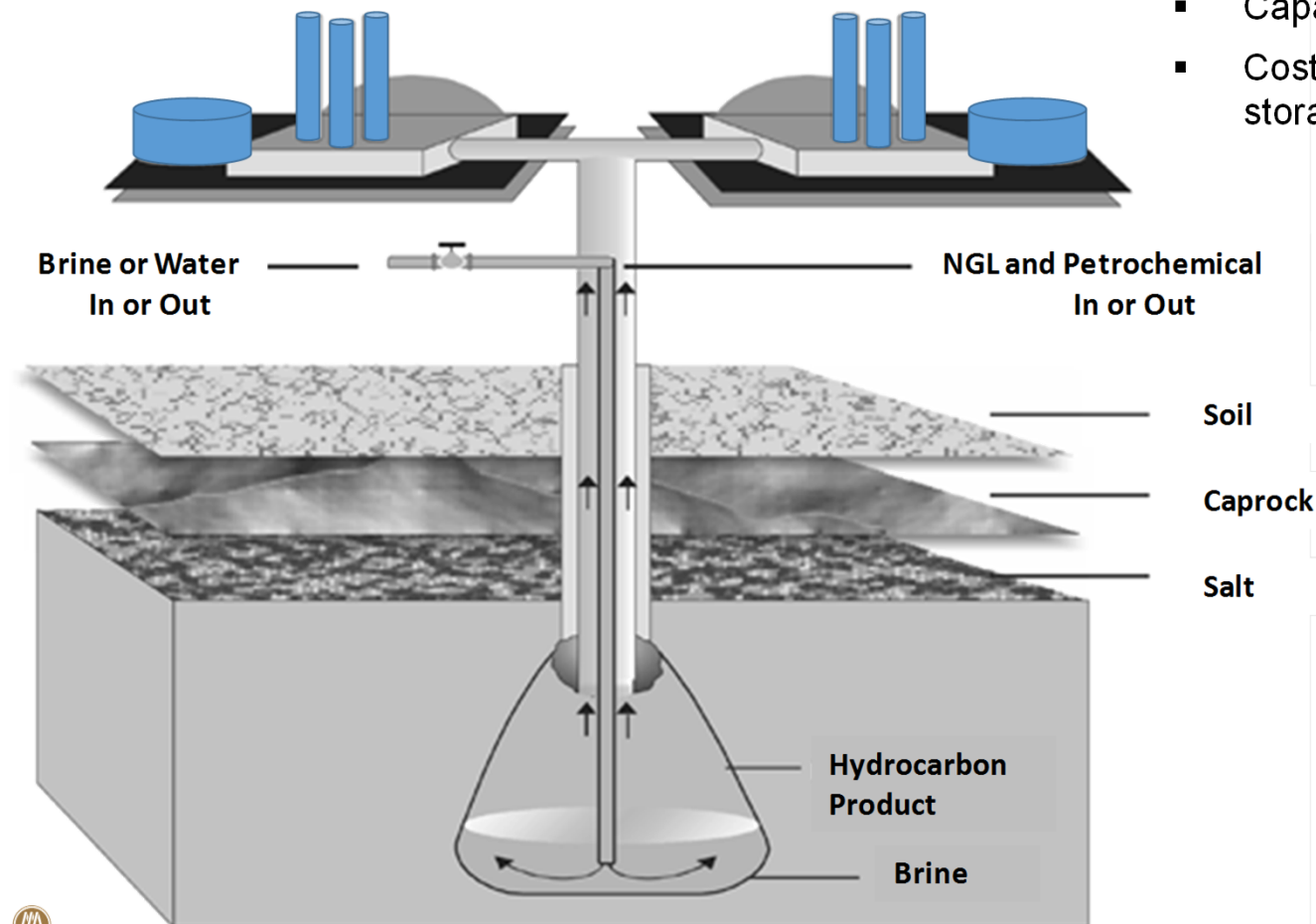


SALT DOME STORAGE OF NGLs

PLAYS AN IMPORTANT PART IN DISTRIBUTION

Owners of storage provide a service

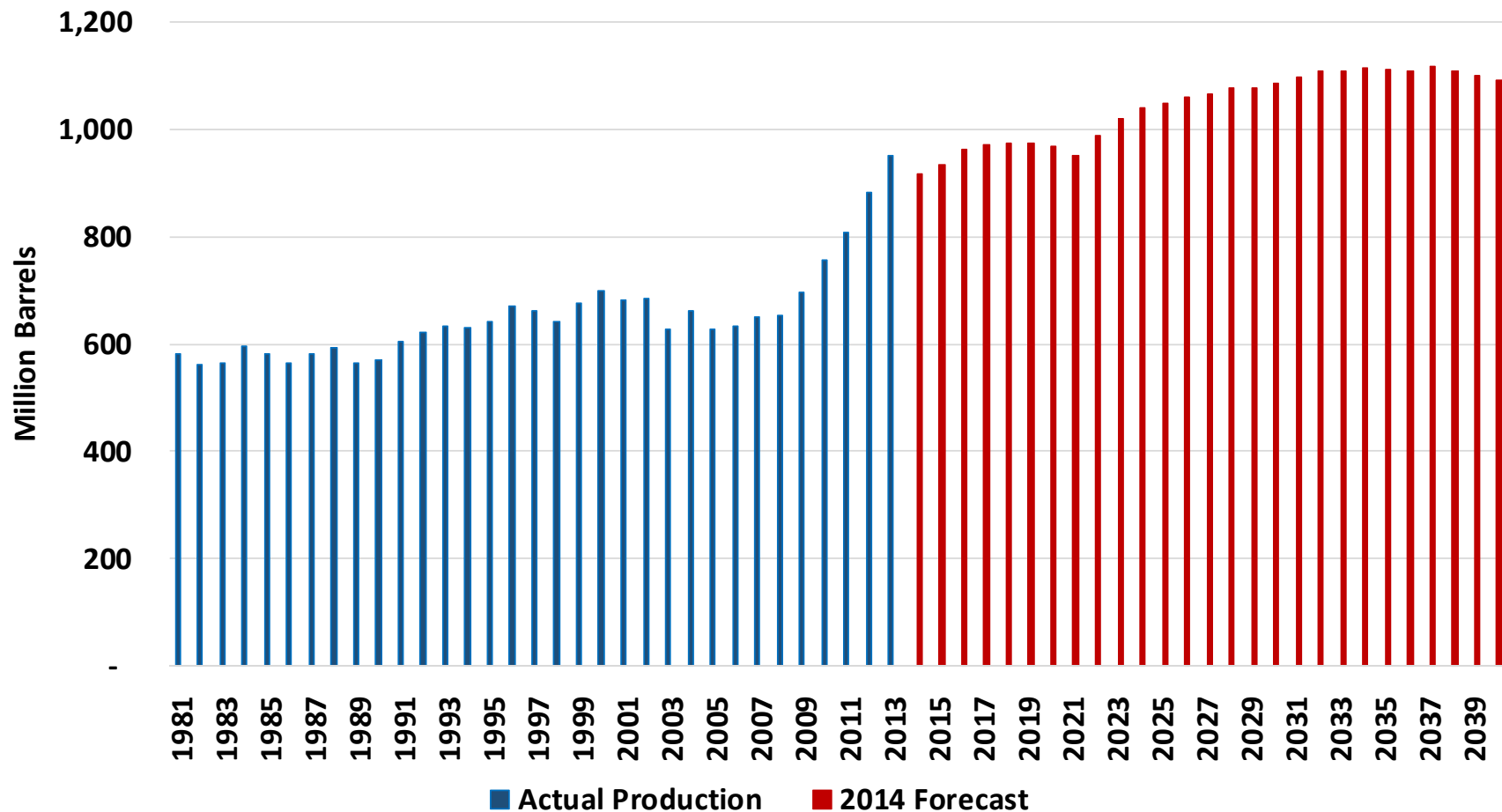
- Do not own the product in storage
- Service fees are based on
 - Capacity reservation Charge
 - Cost of moving product into/out of storage



ALLOCATION OF PRODUCT

- **Why do pipelines go on “allocation”**
 - Need to balance supply and demand
- **What does this mean for the propane distributor**
 - Why can't you get all the propane that you need when you need it?
- **Who determines how much propane you get?**
 - Key elements of pipeline allocation
 - What is the total capacity of the system?
 - When capacity is limited, what is a “fair” way to distribute this capacity?
 - Who has paid for the capacity?
 - Who has historically used the capacity?
 - What about “new” shippers
- **Will rail shipments play a larger role in the future?**

EIA – U.S. NATURAL GAS LIQUIDS FORECAST

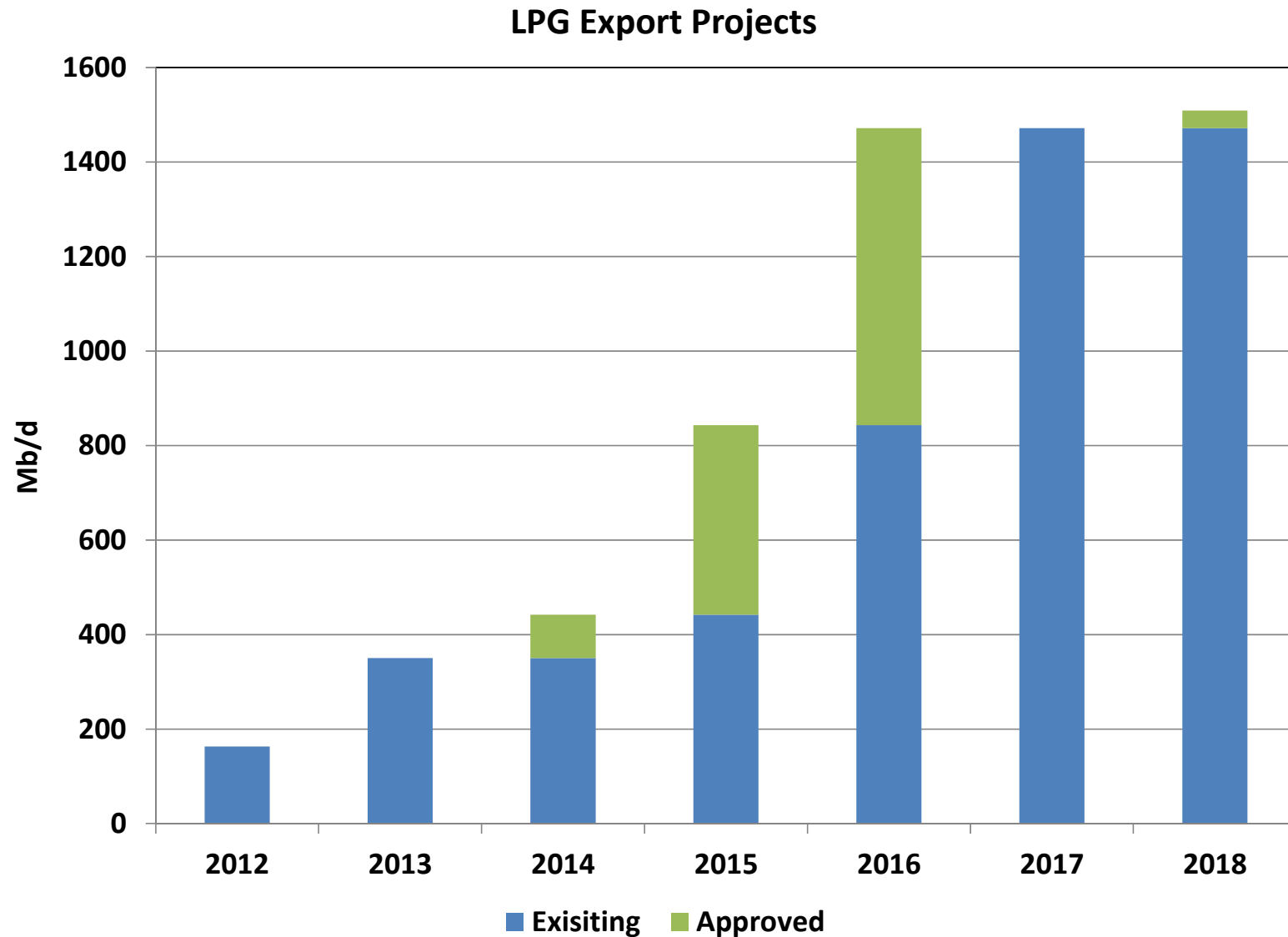


Source: EIA

INCREASE IN PDH PLANTS WILL ABSORB PROPANE PRODUCTION

- **As more petrochemical producers have switched to ethane for ethylene production, the amount of propylene produced has been reduced**
- **Propylene consumption continues to grow faster than GDP growth**
- **Another method for propylene production is propane dehydrogenation (PDH)**
- **Multiple PDH plants are being constructed in the U.S.**
- **This will provide a growing use for “excess” propane in North America**
- **China is planning another 14 PDH plants over the next three-four years**
 - Propane demand in China expected to continue to grow

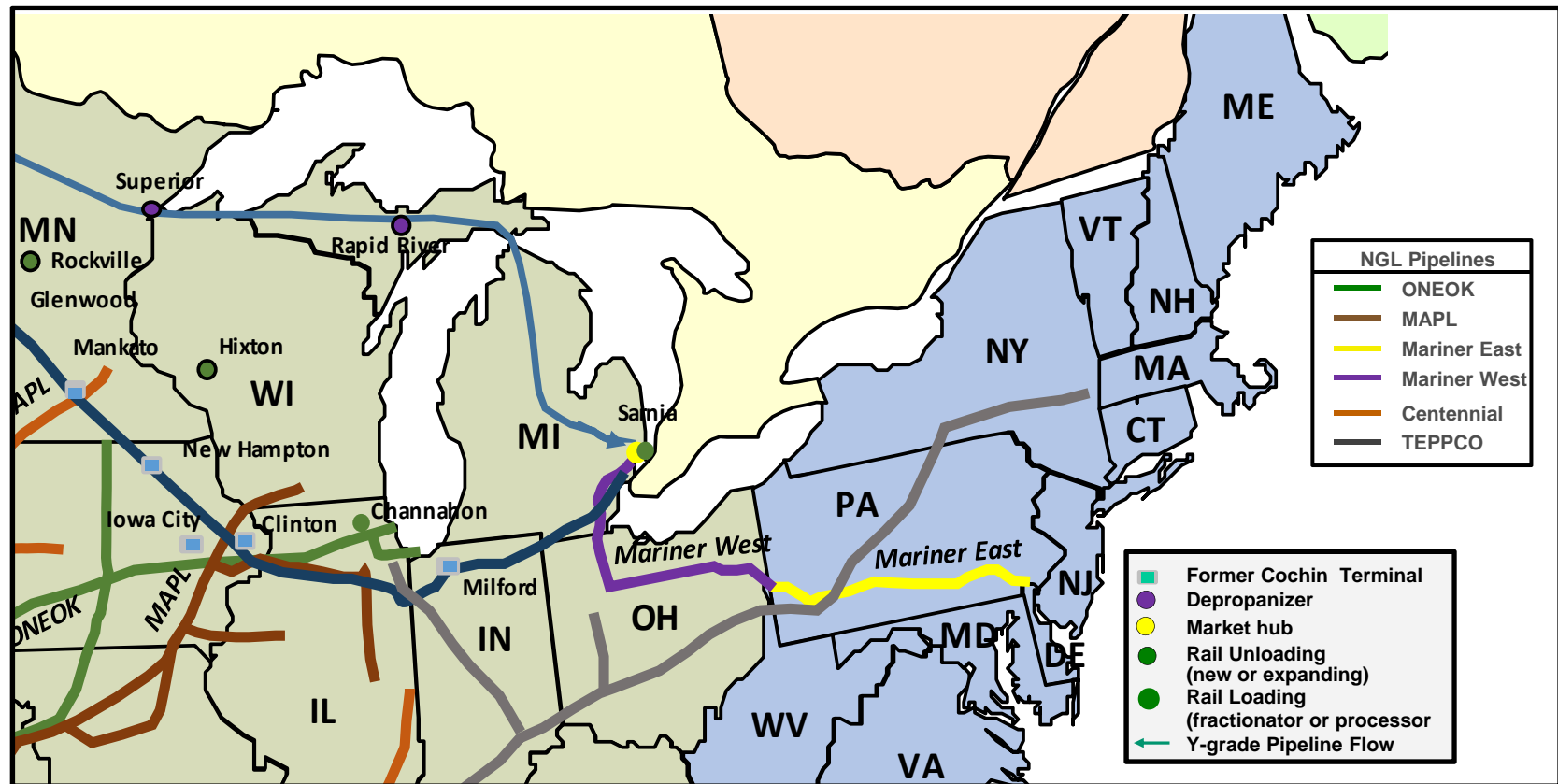
NEW PROJECTS FOR LPG EXPORTS



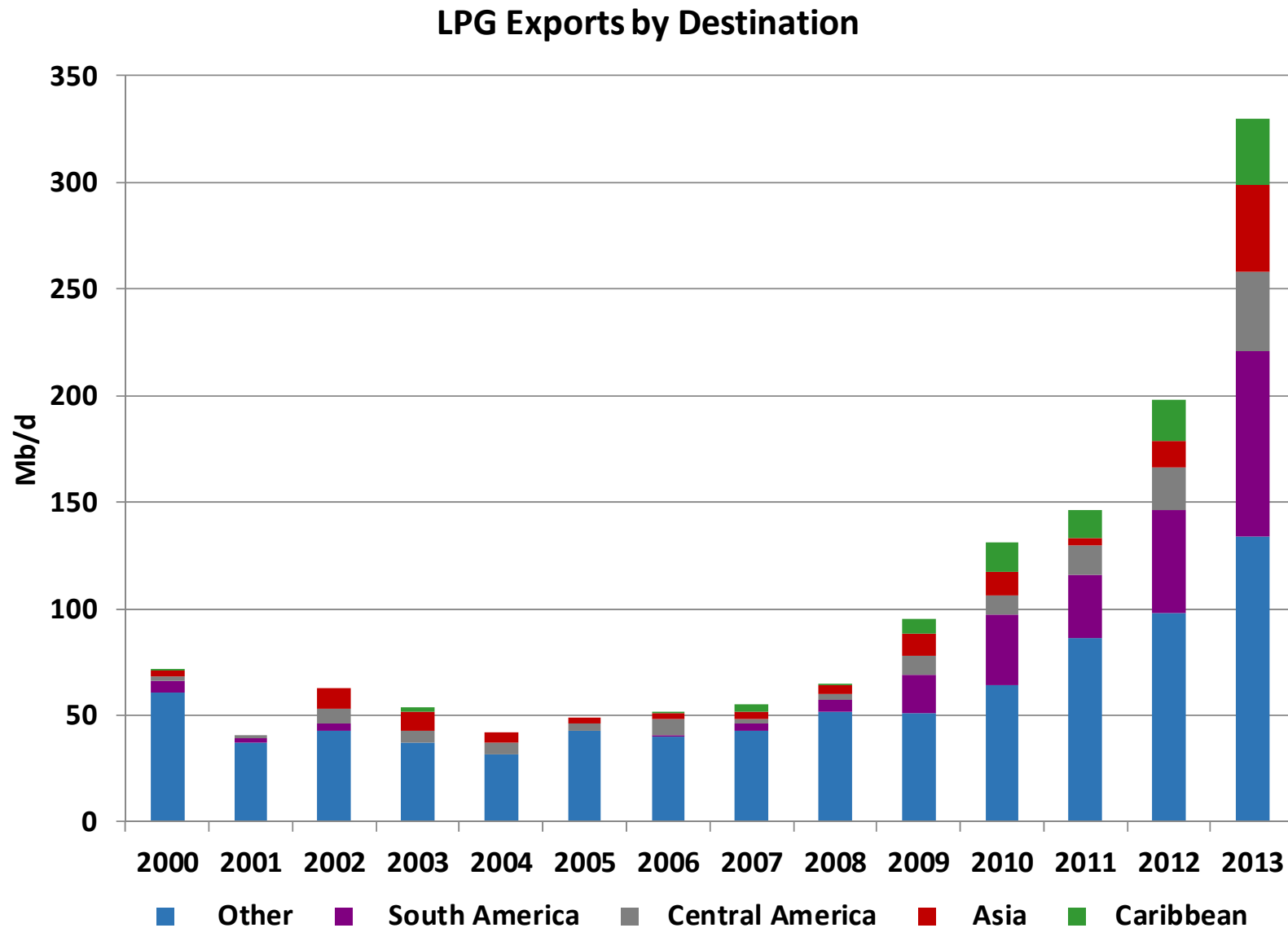
U.S. LPG TERMINAL PROJECTS



EAST COAST PROPANE EXPORTS WILL CHANGE THE COMPETITIVE LANDSCAPE



U.S. LPG EXPORTS HAVE GROWN DRAMATICALLY

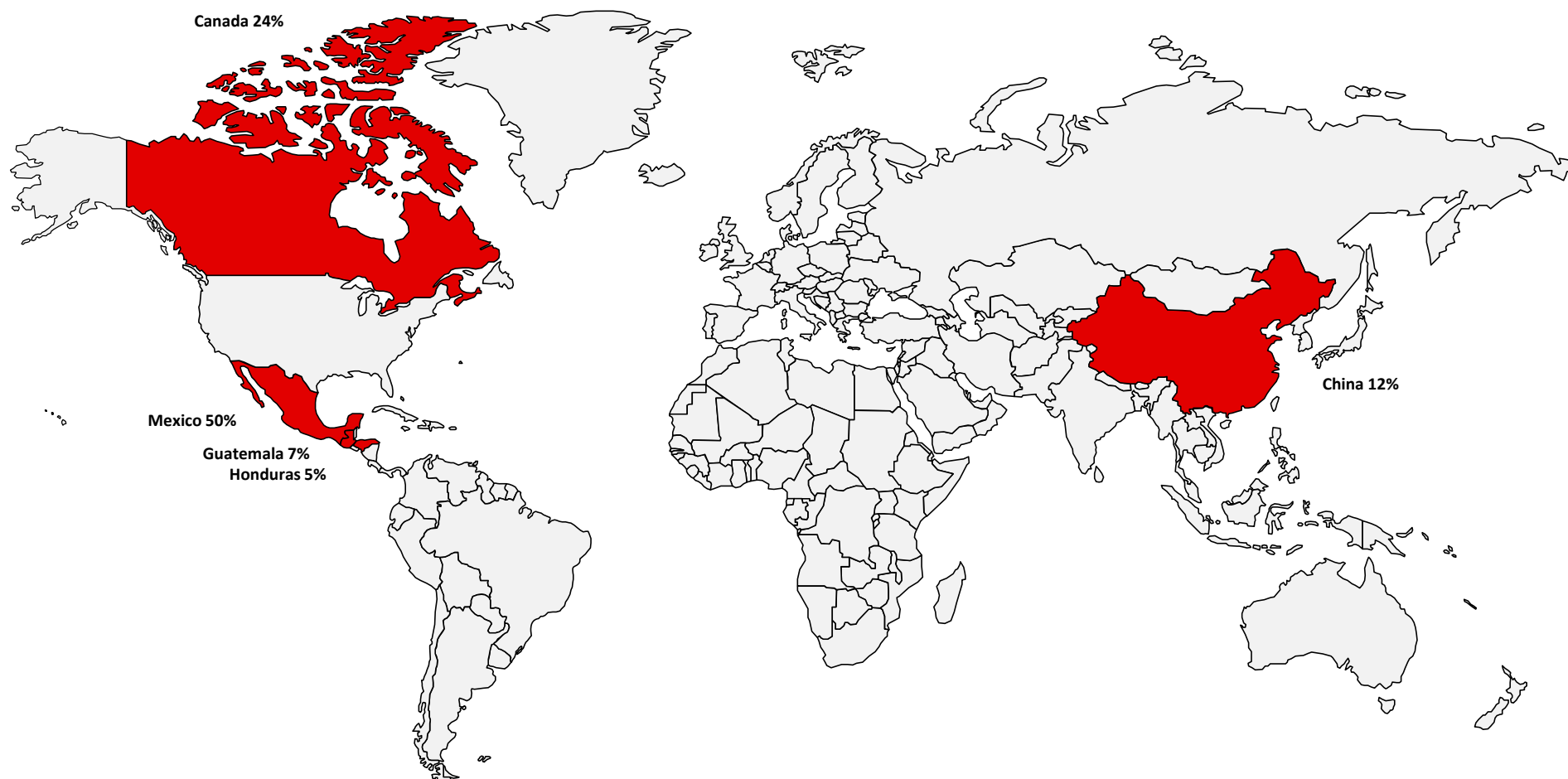


WHERE ARE U.S. LPG EXPORTS HEADED?

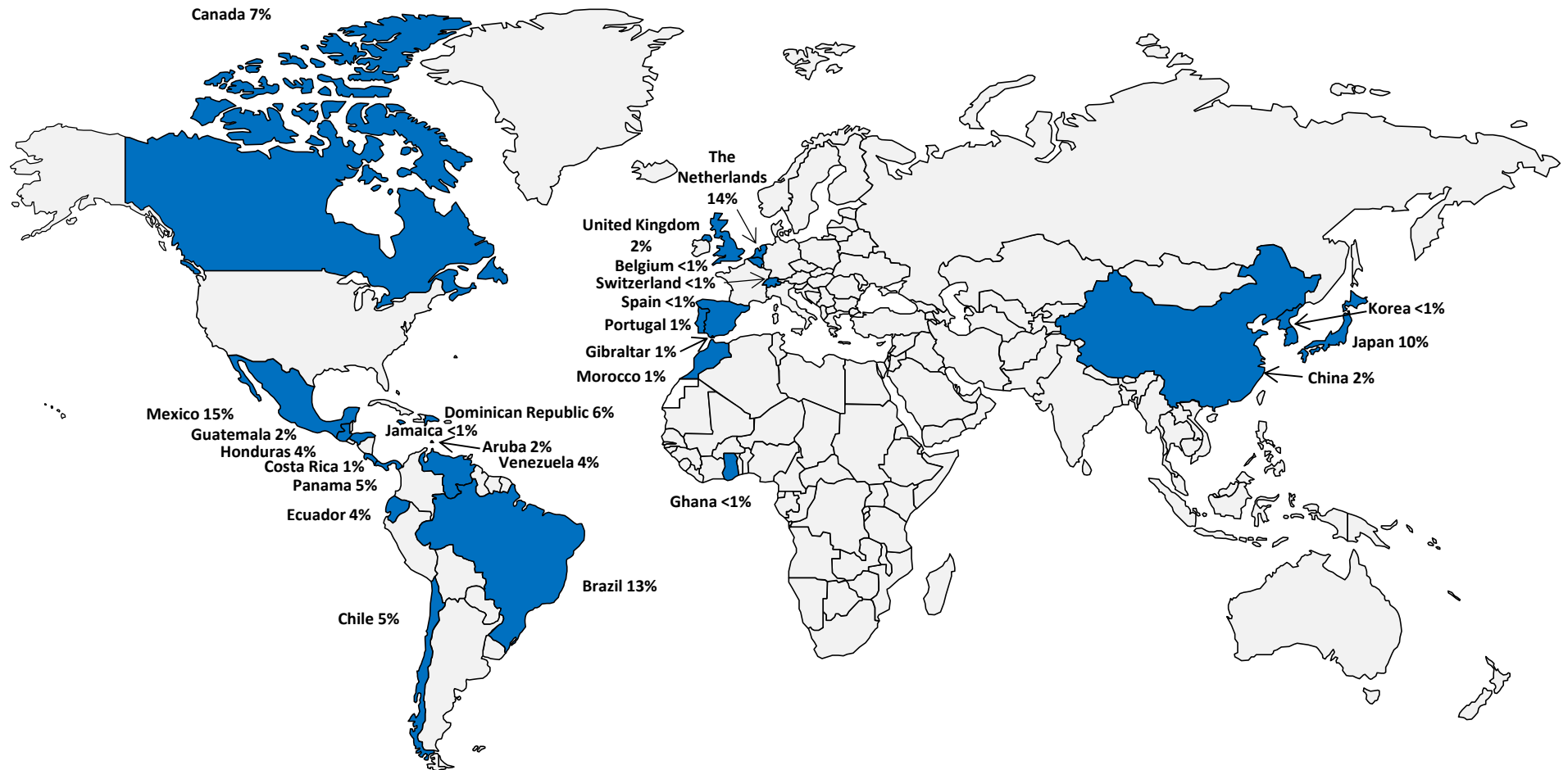


Houston Ship Channel LPG export terminal

IMPORTERS OF U.S. LPG - 2004



IMPORTERS OF U.S. LPG - 2013



PANAMA CANAL EXPANSION



Source: www.micanaldepanama.com

- Third Set of Locks
- Pacific Access Channel
- Dredging
- Improved Water Supply

➤ Percent Complete:

- Design & Construction of 3rd Locks, 77%
- Pacific Access Channel, 80%
- Pacific Entrance Dredging, 100%
- Atlantic Entrance Dredging, 100%
- Dredging, Gatun Lake & Culebra Cut, 88%
- Raising Operating Level Gatun Lake, 93%
- Expected In-Service : 1Q 2016



Source: www.micanaldepanama.com

IMPACT OF PANAMA CANAL EXPANSION

Load Port	Discharge Port	Route	Voyage Time, Days
Houston	Chiba, Japan	Cape of Good Hope	40.2
Houston	Chiba, Japan	Panama Canal	23.3

LPG TANKERS:

- **Panamax – current, 375 Mbbls**
 - Canal Limit 965' L, 106' W
- **Post Panamax, 525 Mbbls**
 - Canal Limit Increases to 1,200' L, 160' W
- **23 VLGCs on order with total capacity of just under 12 MMBbl of capacity to be delivered in 2015**



IMPACT OF THE PANAMA CANAL EXPANSION

- **Significant reduction in transportation costs**
 - Larger ships will be able to transit the locks
 - Significantly shortens transit time to the Asia Pacific region
 - Thus, overall transport costs will see a large reduction
- **Will allow large refrigerated cargos to move to Japan, China, and India**
 - All of these economics continue to grow and are importing more LPG for domestic use
- **Asia Pacific region continues to require new supply sources**
- **Security of supply is an issue**
 - U.S. is politically more stable that other LPG producing areas of the world

CONCLUSIONS

- **U.S. Propane continues to grow dramatically due to increase in shale oil and gas production**
- **Infrastructure to move additional NGLs is rapidly catching up in the new shale areas**
- **U.S. propane consumption is not increasing as quickly as production, and exports will be needed to balance supply and demand**
- **Timing of these exports are lining up well with the new export terminal projects and expansion of Panama Canal**
- **Economies in Asia are looking for supply security through diversification of sources**