

American Fuels

Challenges and Opportunities

American Fuel and Petrochemical Manufacturers

110 Years of Fuels for the American Economy

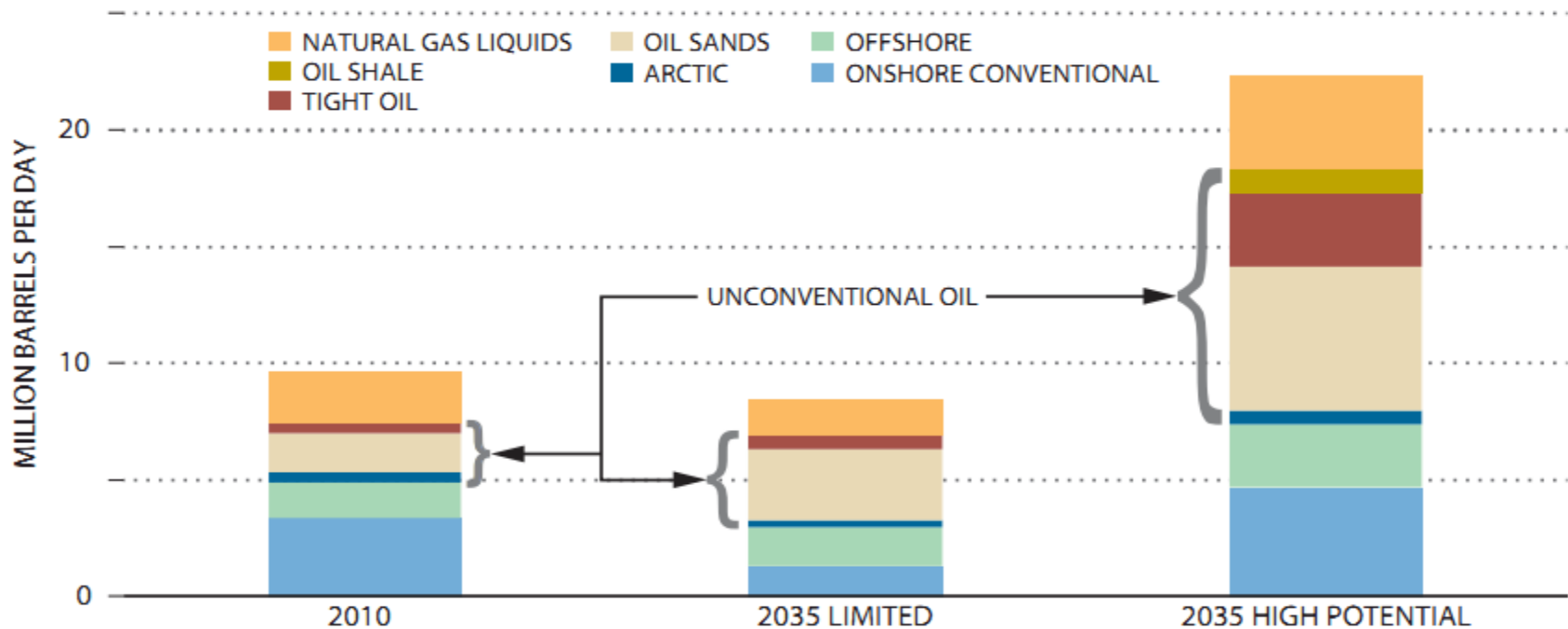
January 25, 2011

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Energy Policy Research Foundation
Washington, DC

Production of American Fuels

- Availability of Feedstocks
- State of the Industry
- Regulatory Risks
- Realizing the Downstream Renaissance

NPC Findings Future Oil Production

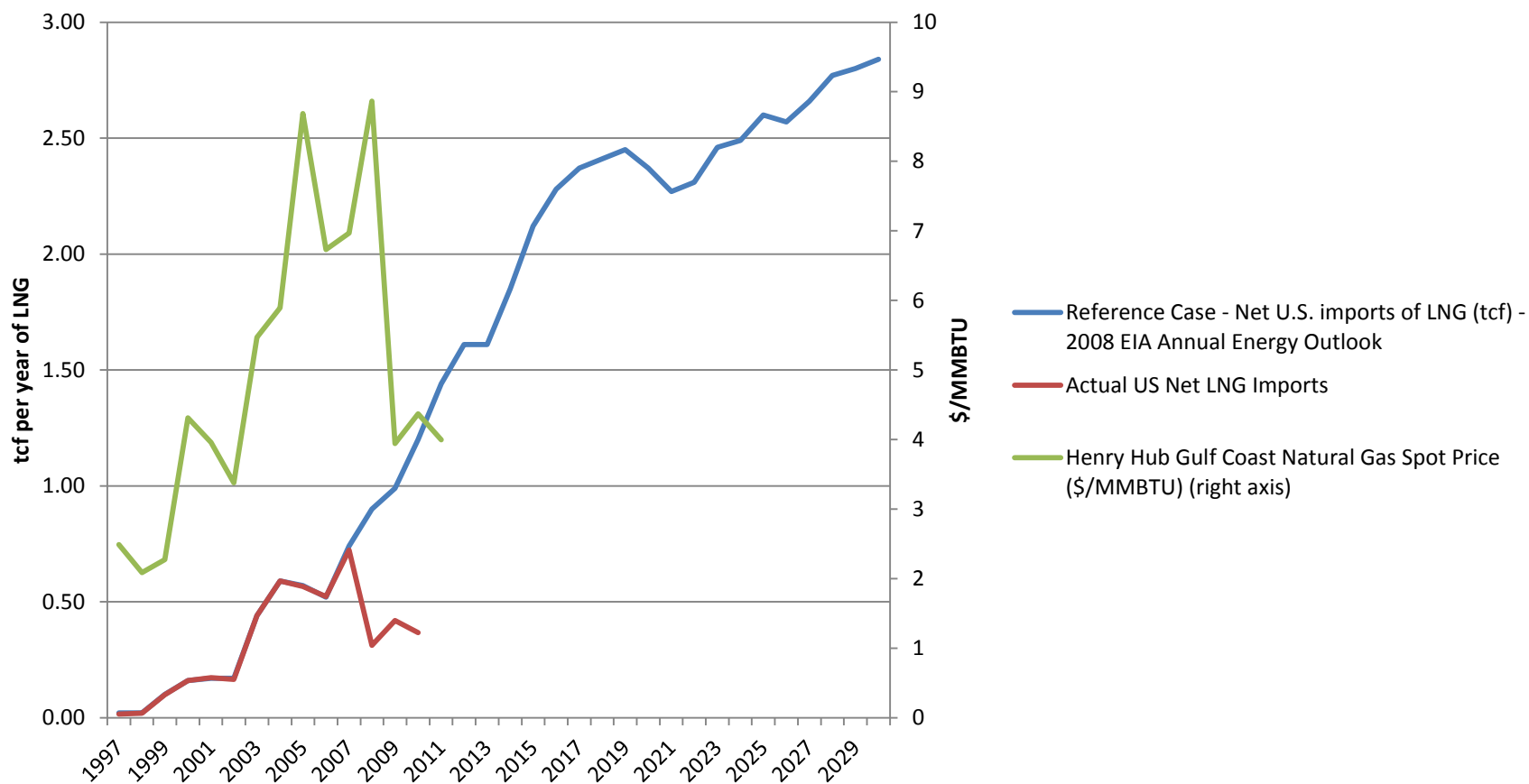


Note: The oil supply bars for 2035 represent the range of potential supply from each of the individual supply sources and types considered in this study. The specific factors that may constrain or enable development and production can be different for each supply type, but include such factors as whether access is enabled, infrastructure is developed, appropriate technology research and development is sustained, an appropriate regulatory framework is in place, and environmental performance is maintained.

Source: Historical data from Energy Information Administration and National Energy Board of Canada.

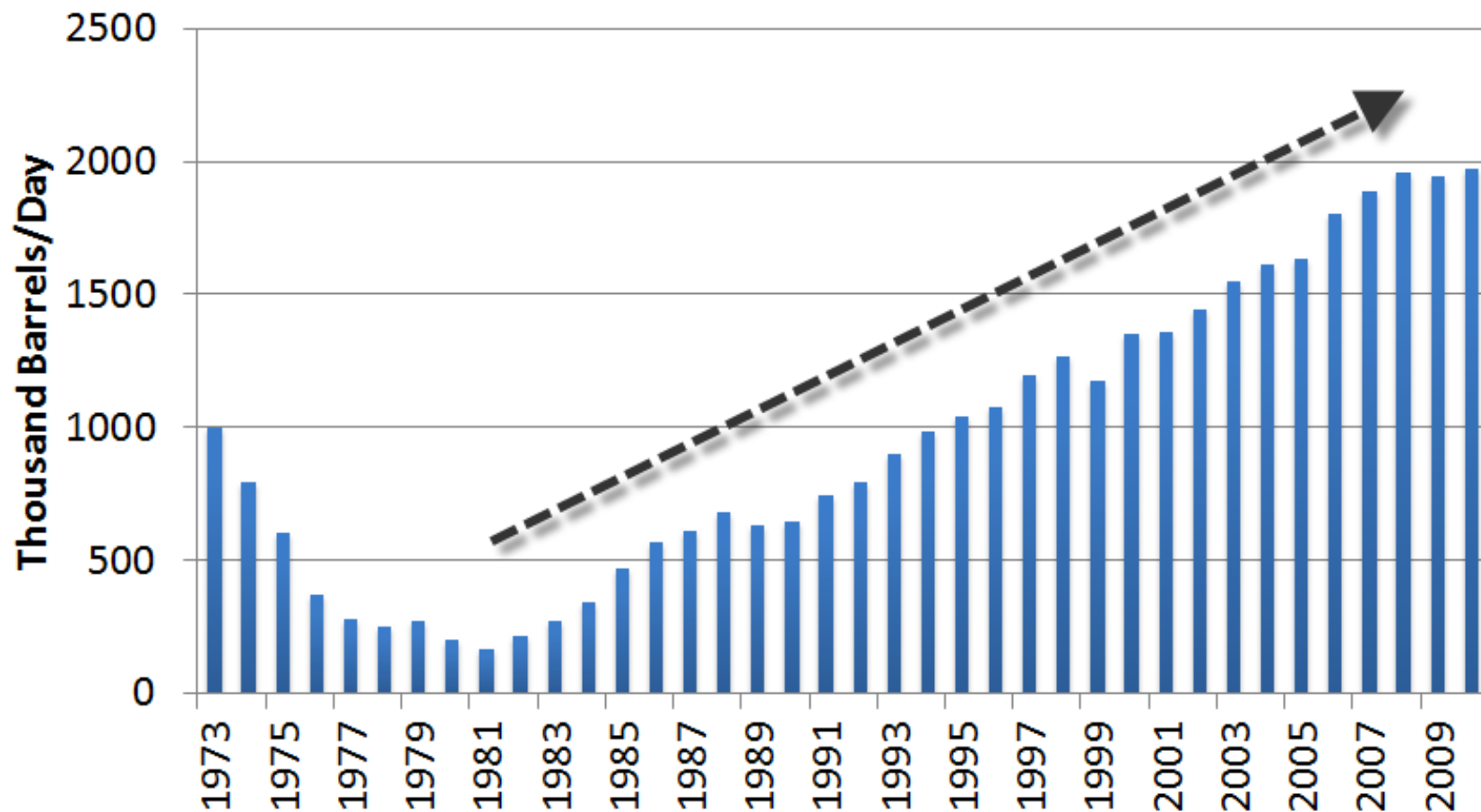
Projected Imports of LNG vs. Actual

(or why forecasters should be humble)



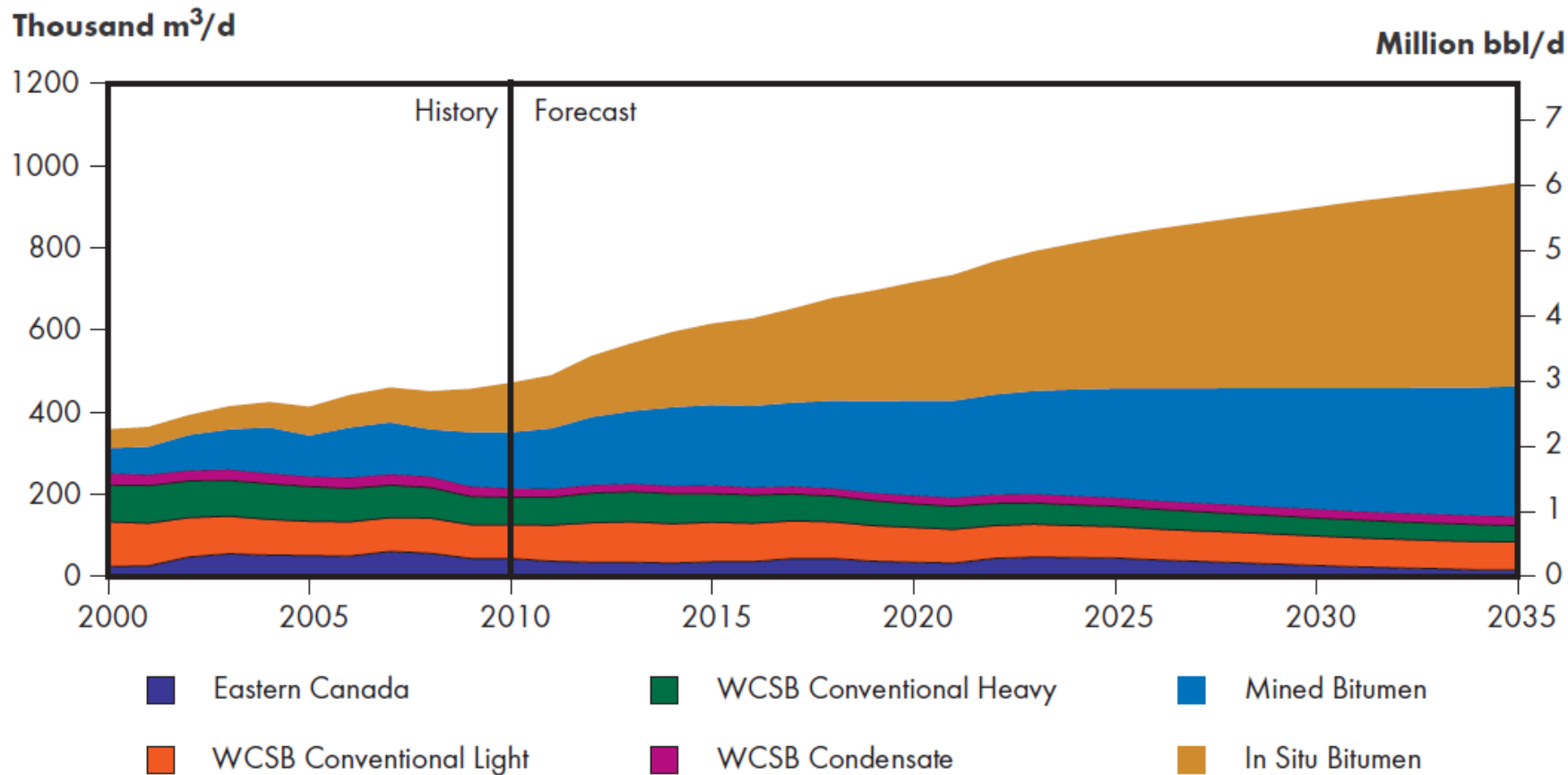
Source : EIA data and forecasts

Canadian Imports



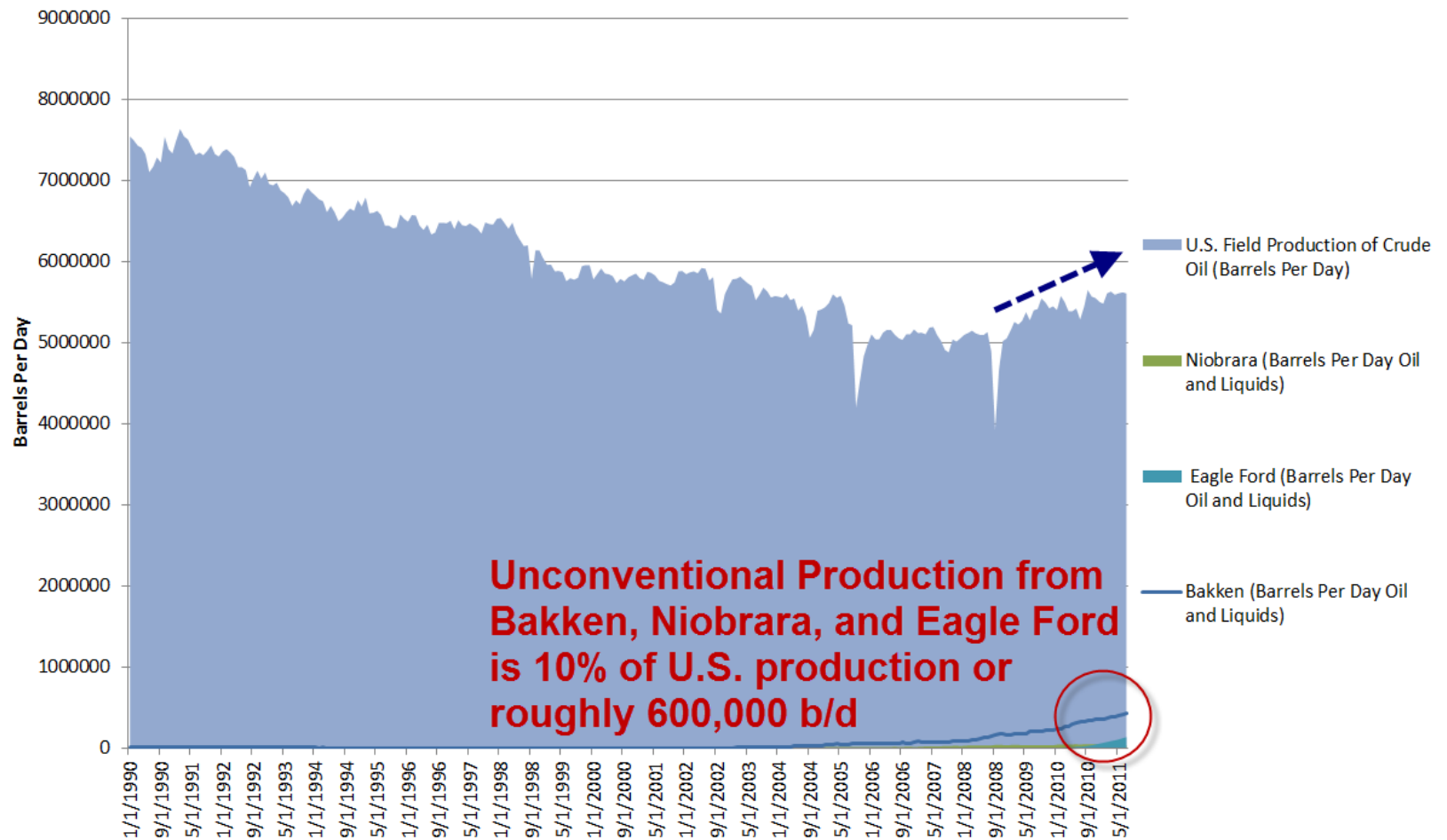
Source: EIA

Total Canadian Oil Production (NEB Reference Case)



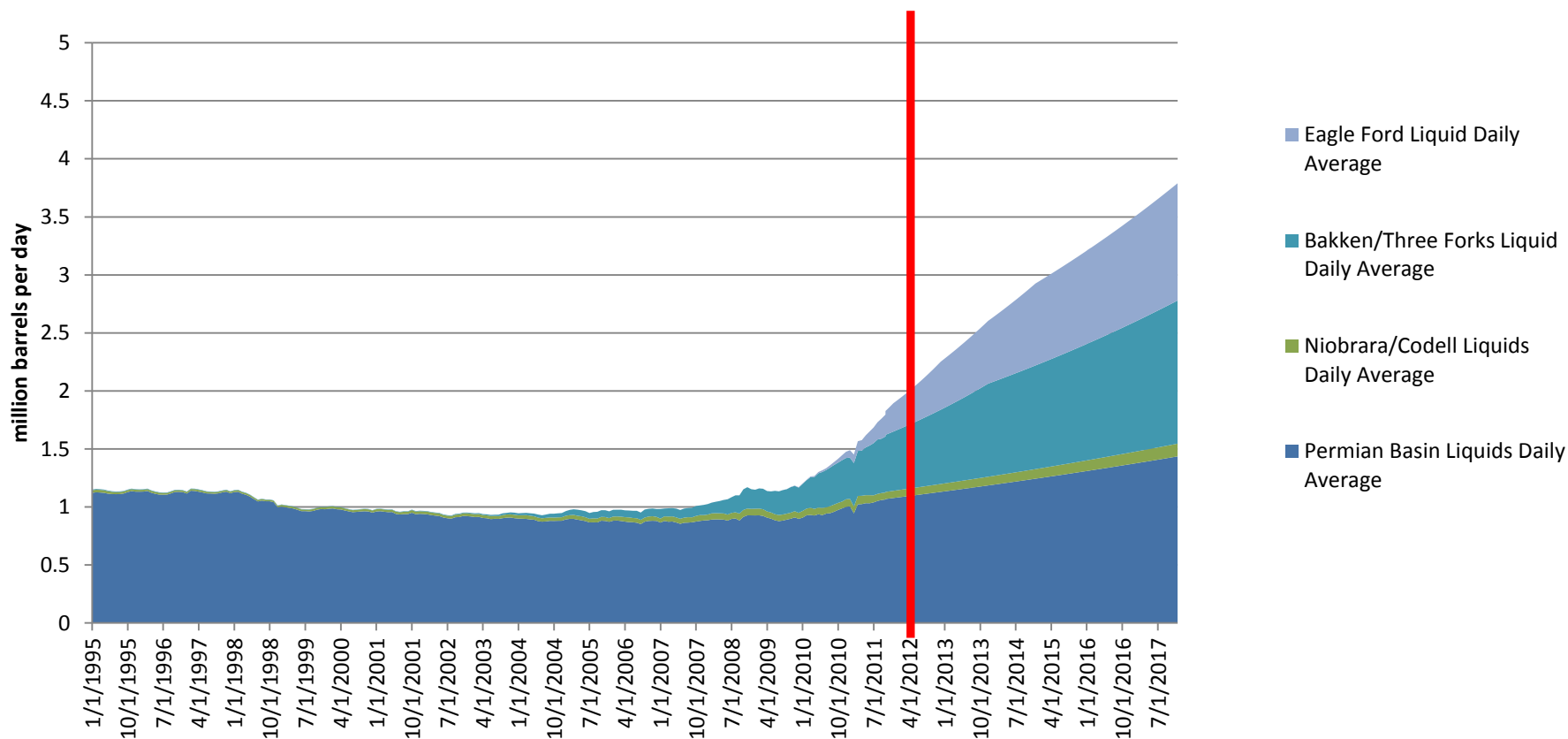
Source: "Canada's Energy Future: Energy Supply and Demand Projections to 2035." Nov 2011. NEB

U.S. Crude Oil Production



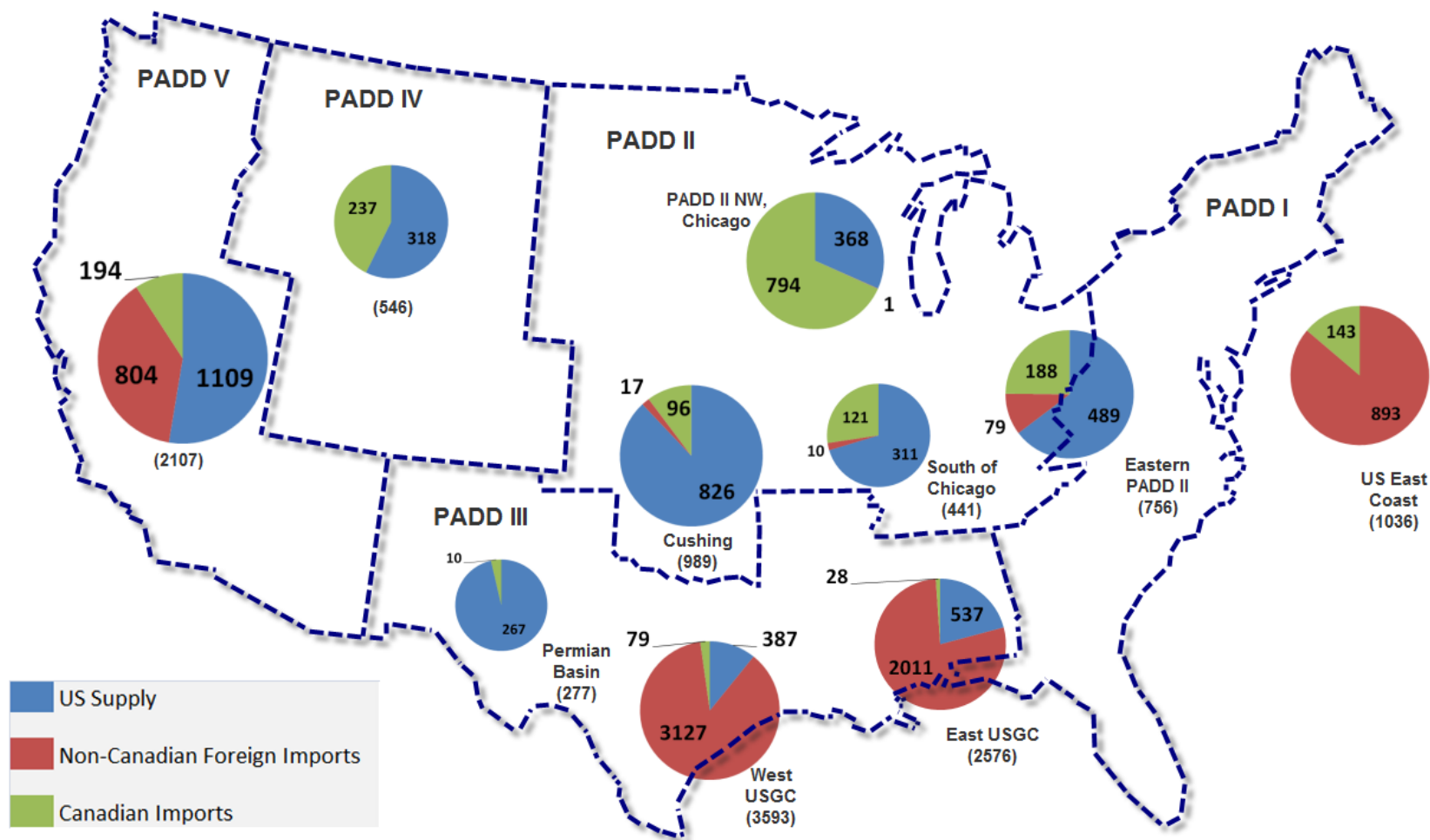
Source: EIA and HPDI Data

Near Term Outlook --Unconventionals



Source: HDPI data, EPRINC estimates

Canadian Imports and Potential Markets

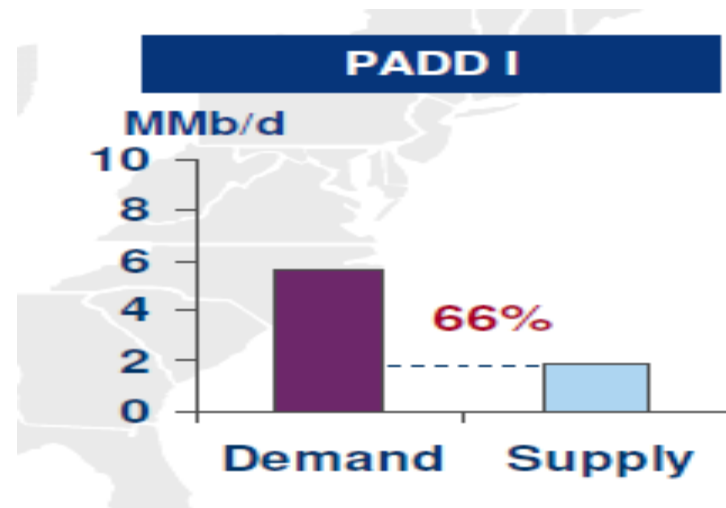
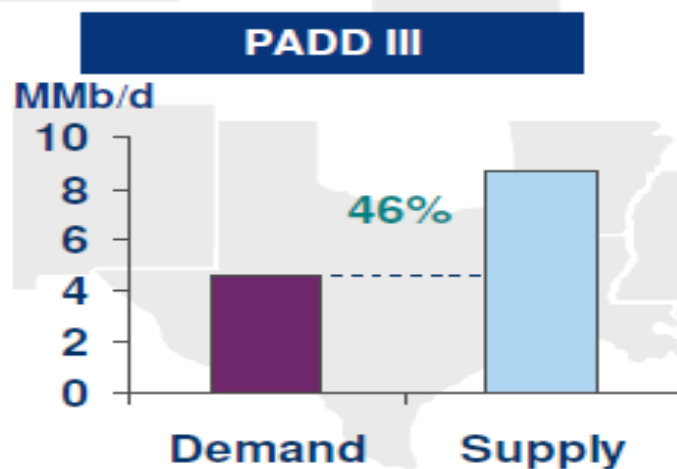


Source: EPRINC rendition from Enbridge. Enbridge; Enbridge used EIA and NEB Data and Enbridge Estimates (with some averages)

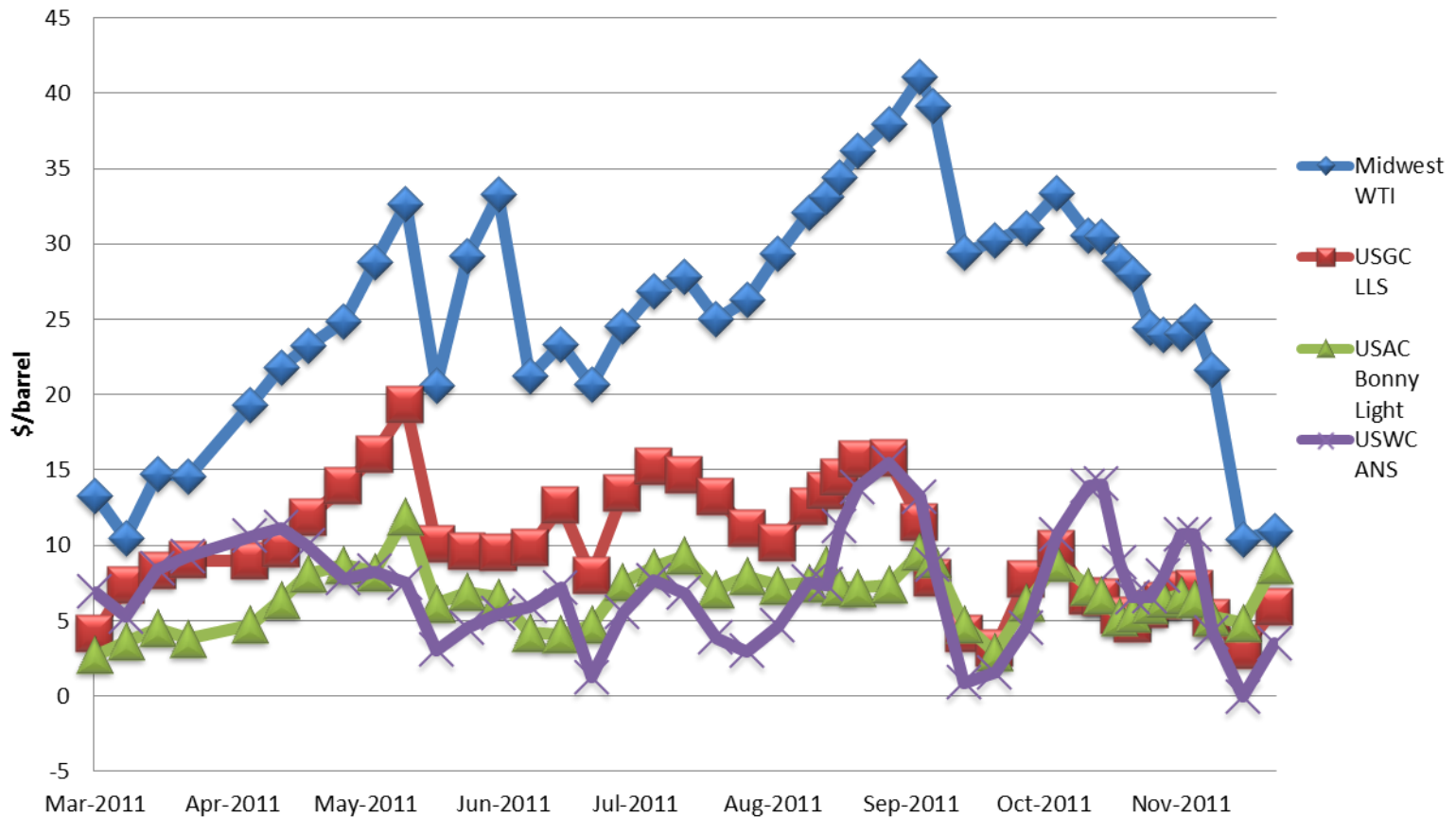
Crude Disposition by Region 2010 (MB/D)

State of the Industry

A Tale of Two PADDs

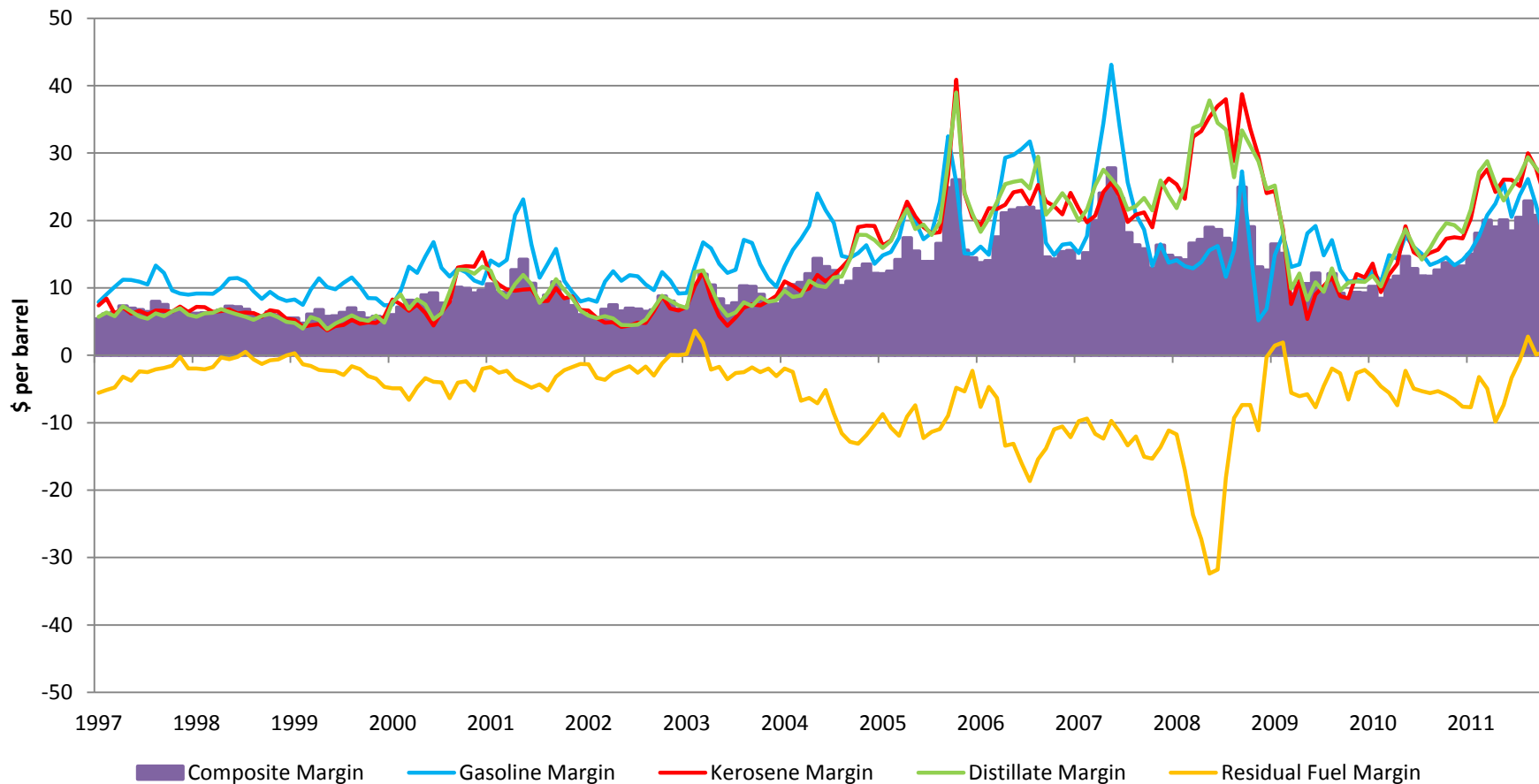


U.S. Cracking Margins



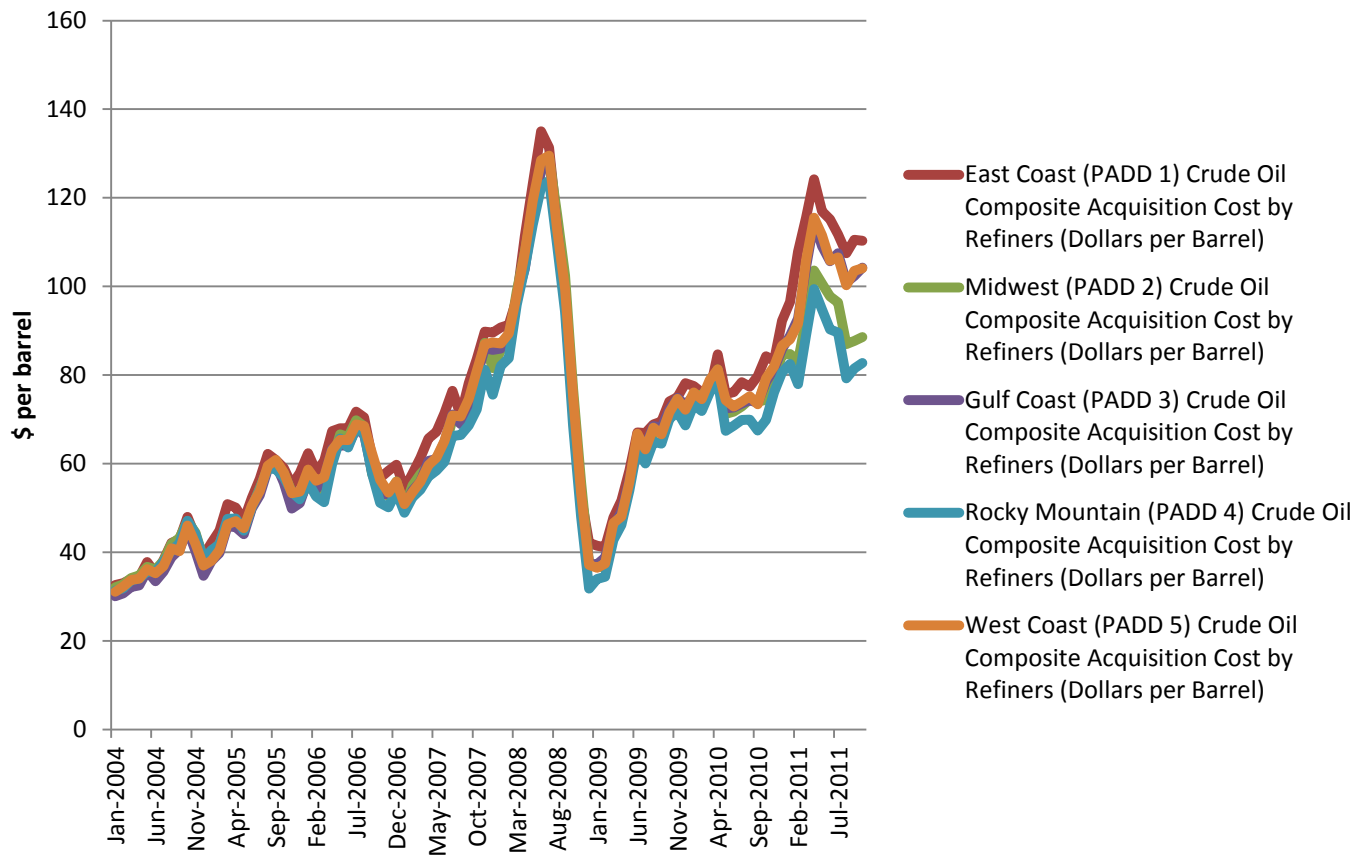
Source: Platts Data

U.S. Refiner Gross Margins on Major Refined Products



Source: EIA data, EPRINC calculations

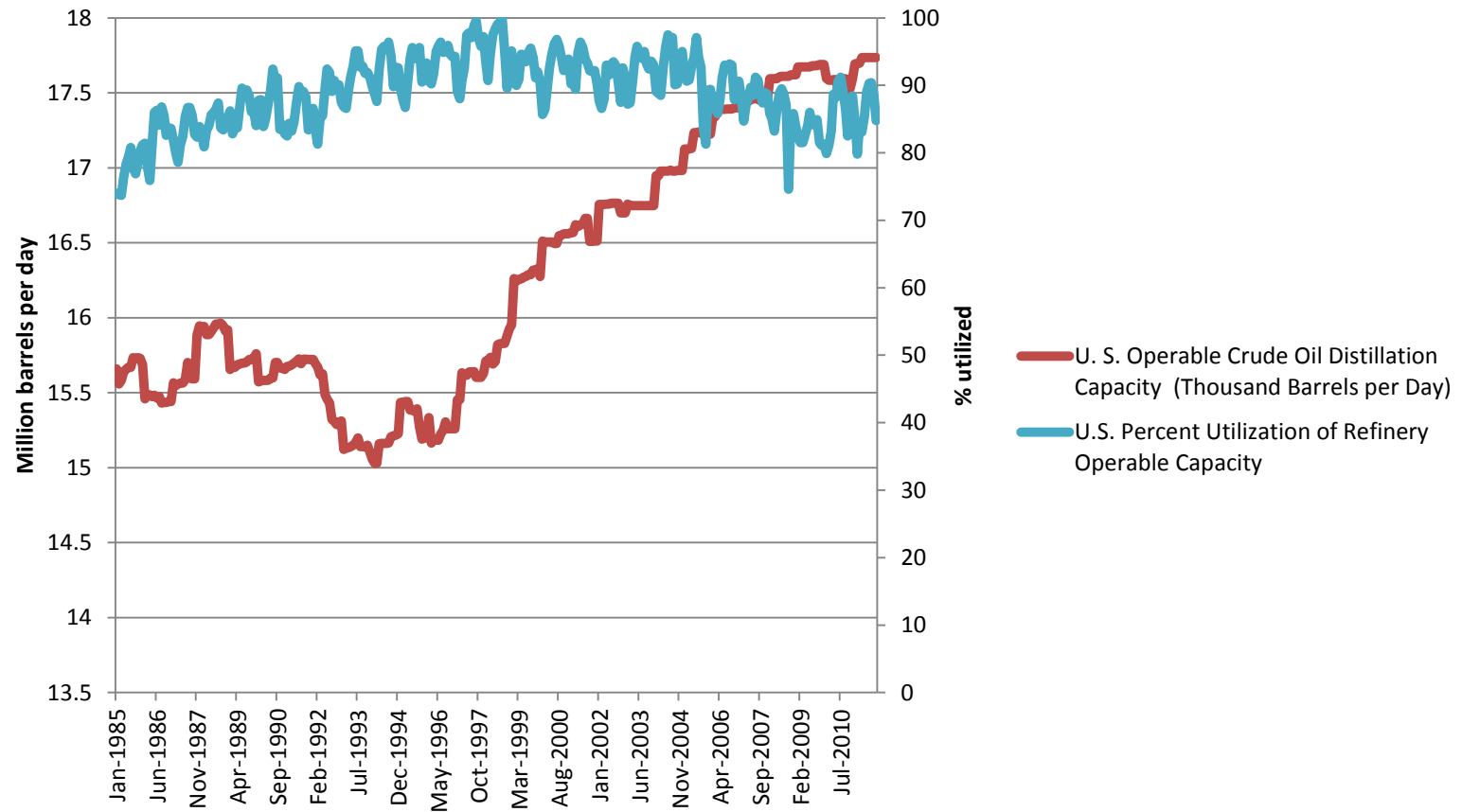
Refinery Acquisition Cost of Crude



PADD 1 has the highest RAC in the U.S. – and the least heavy crude processing capability.

Source: EIA Data

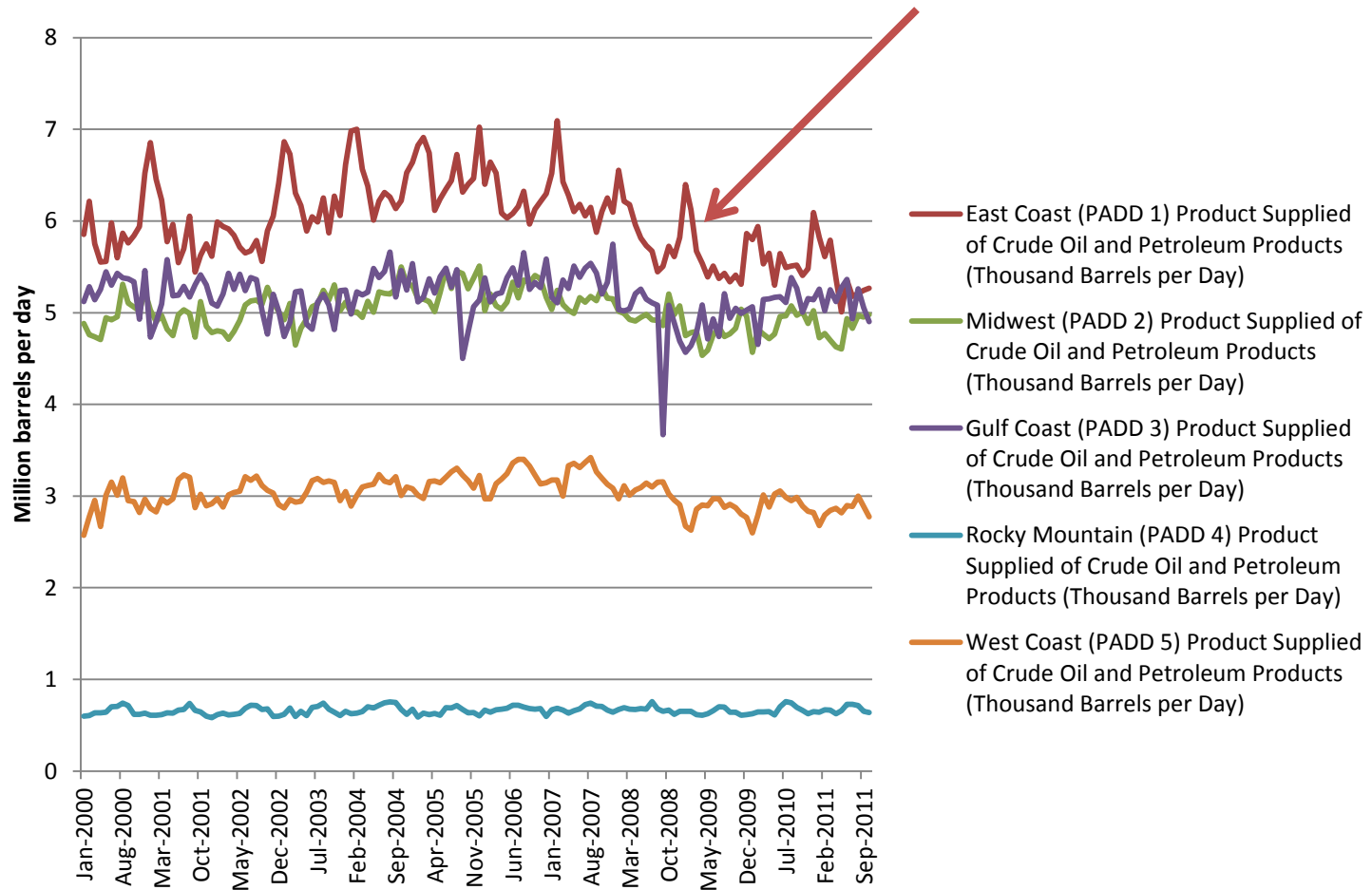
U.S. Refining Capacity, Utilization



Source: EIA Data

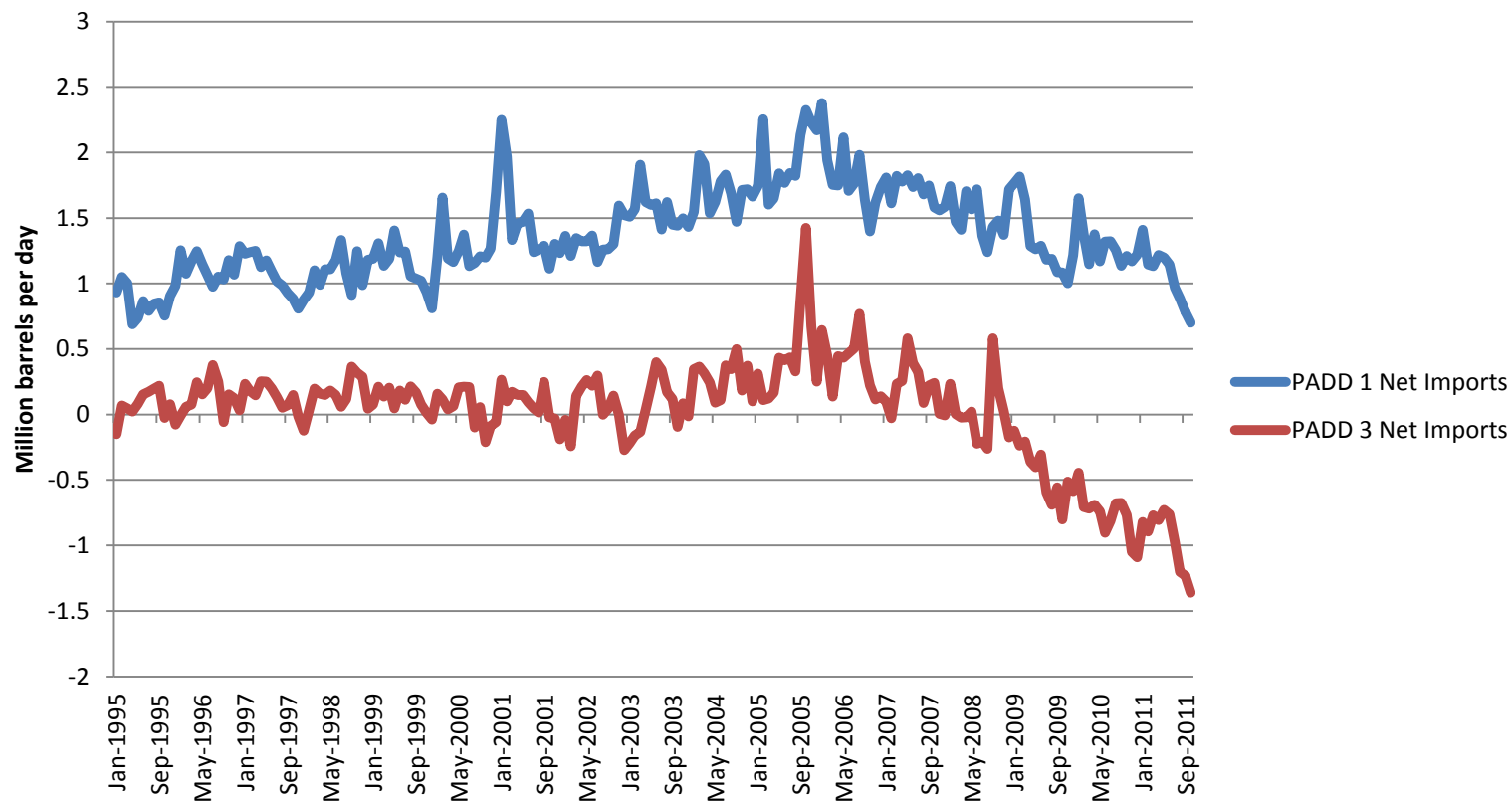
PADD 1: Largest Consumption Decline in U.S.

PADD 1 accounts for approximately ½ of the decline in U.S. petroleum consumption that has occurred during the past 6-7 years.



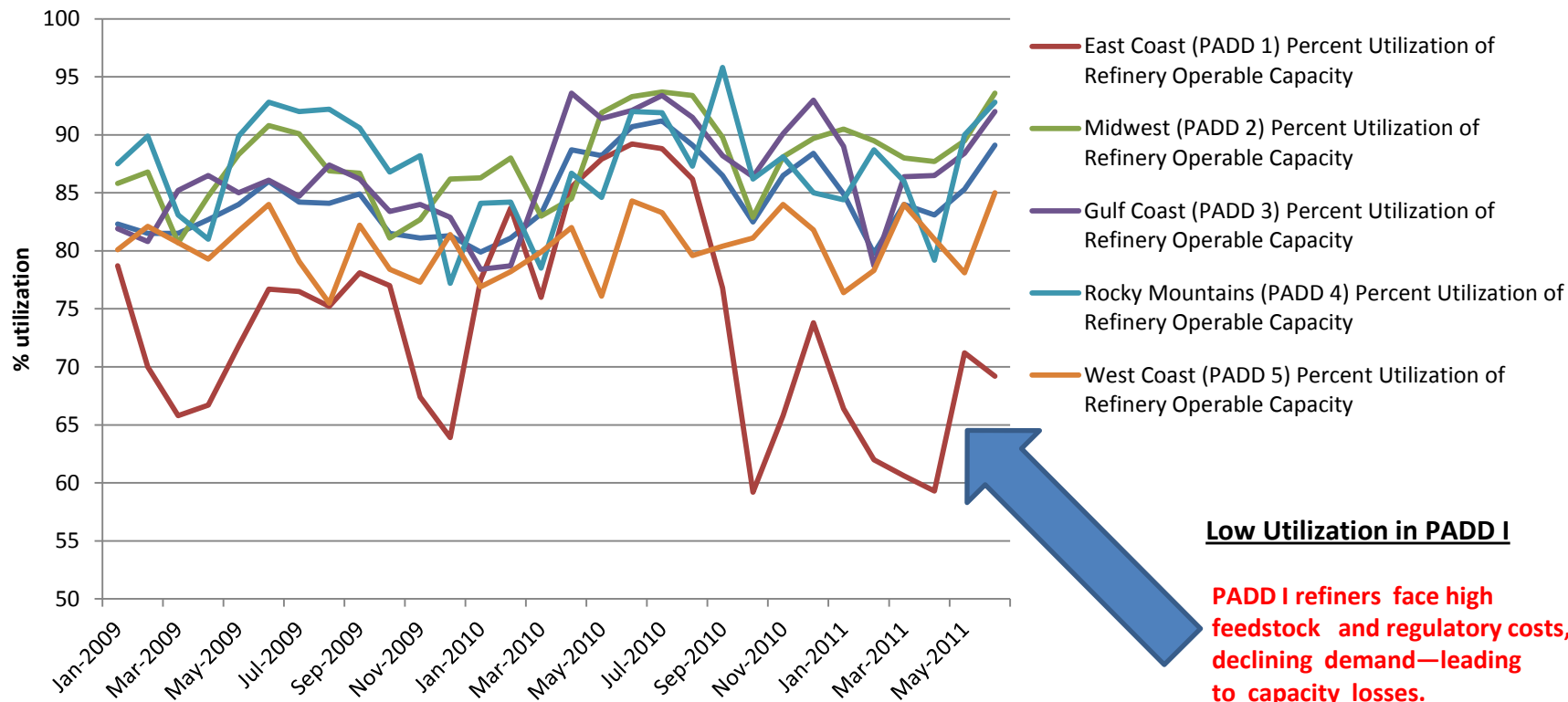
Source: EIA Data

Net Product Imports by PADD



Source: EIA Data

Refinery Utilization by PADD



Source: EIA Data

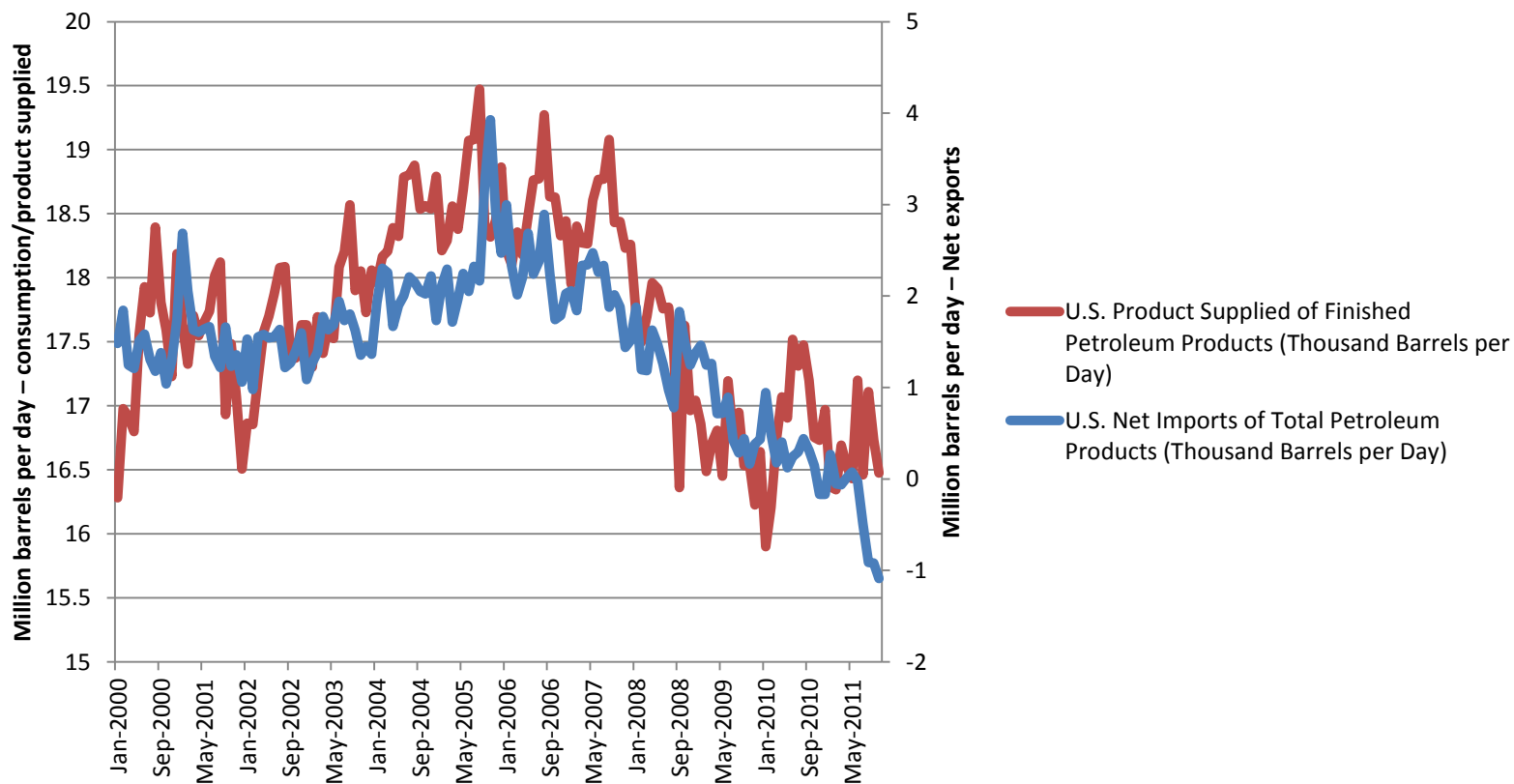
Atlantic Basin Refinery Closures

PADD I closures, 2009 – 2012 estimated at over 700,000 b/d

Main causes include:

- **Rising federal and state regulatory costs (and uncertainties on future regs)**
- **High refiner acquisition cost for feedstock**
- **Limited infrastructure for accessing rising volumes of lower cost domestic feedstock**
- **Low cost gasoline imports from European refiners as U.S. Gulf Coast refiners face obstacles for moving volumes by ocean tanker**

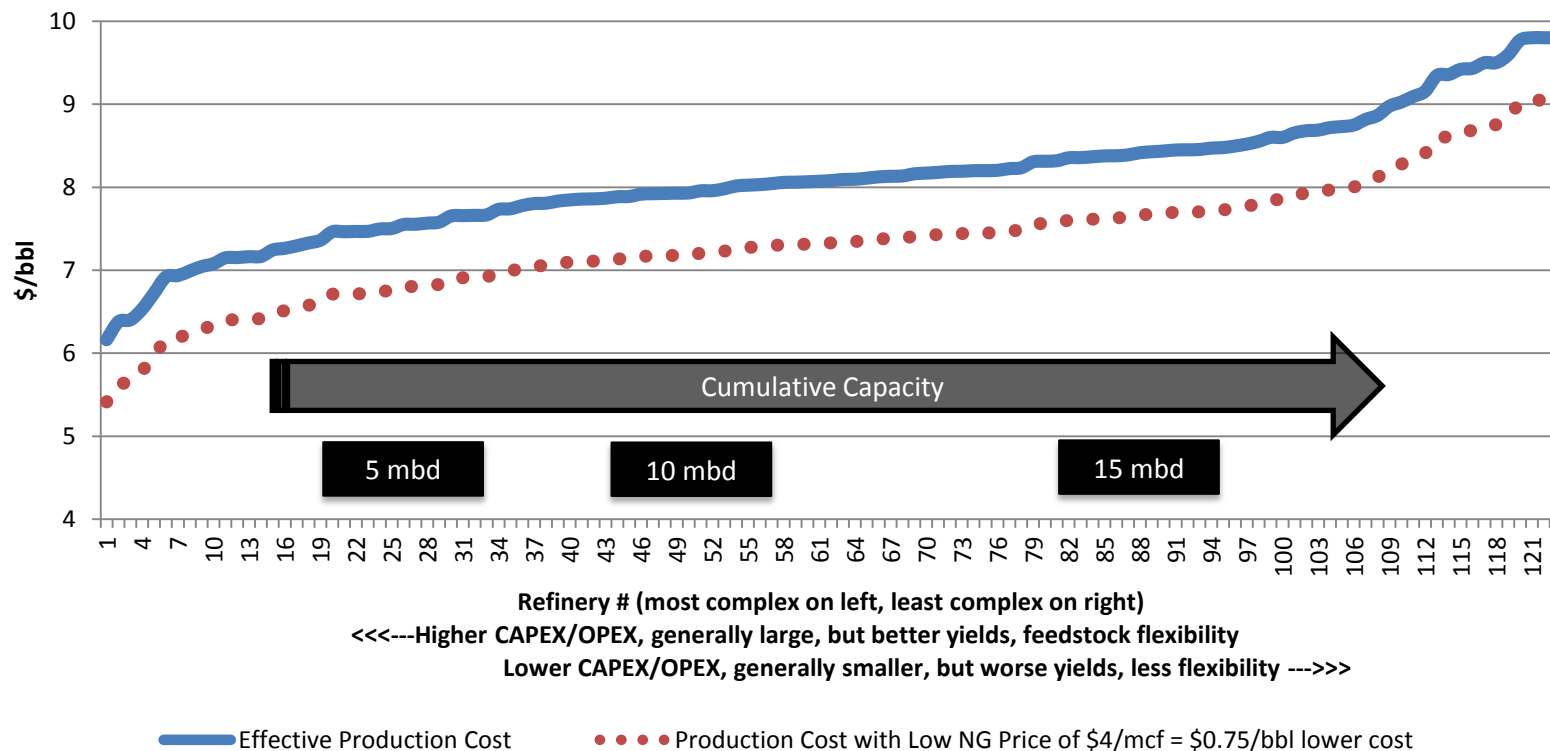
U.S. Refined Product Consumption, Net Imports (now Exports!)



Source: EIA Data

Low Cost NG Lowers Production Costs

U.S. Refiners' Effective Cost of Production



Effective Production Cost takes into account a refinery's ability to use heavy crude feedstocks (complexity), product slate (yields) and operating costs (OPEX).

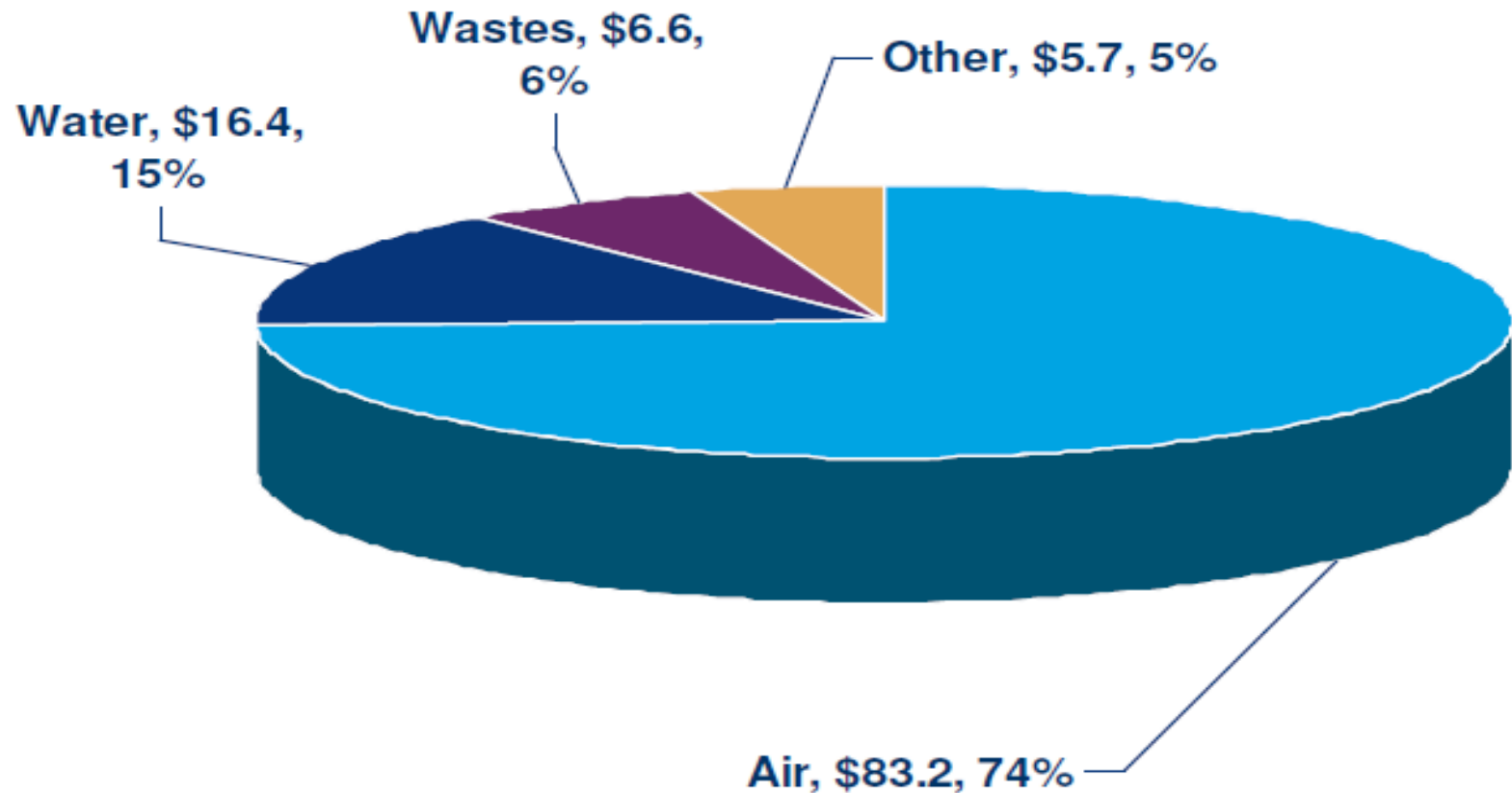
Source : OGJ Data for 2009, EPRINC Calculations

Regulatory Risks

Understanding Legislative and Regulatory Risks

- Tier III gasoline specs
 - Sulfur levels already reduced 70% to 30 ppm in recent years – lower sulfur specs mean more hydrotreating, more CO₂ emissions.
- GHG Tailoring Rule
- LCFS
- New Source Performance Standards
- Unpredictable and uncompetitive tax regimes
- Washington state's proposed \$1.50/bbl fee
- Ethanol and advanced biofuels requirements
- Restrictions on access to low cost feedstocks (e.g., Keystone XL)

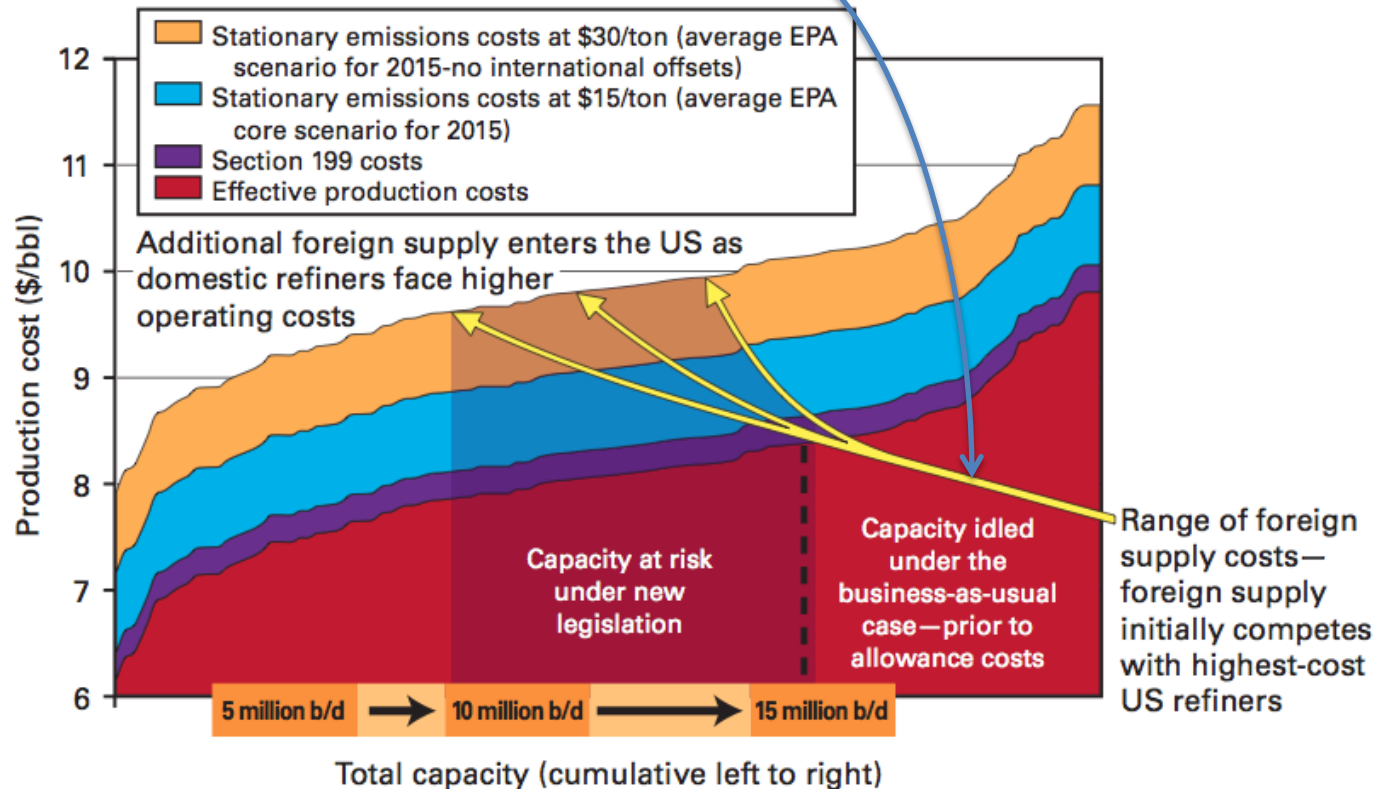
Investment by U.S. Refiners in Environmental Controls, \$112 billion in environmental improvements, from 1990 to 2008



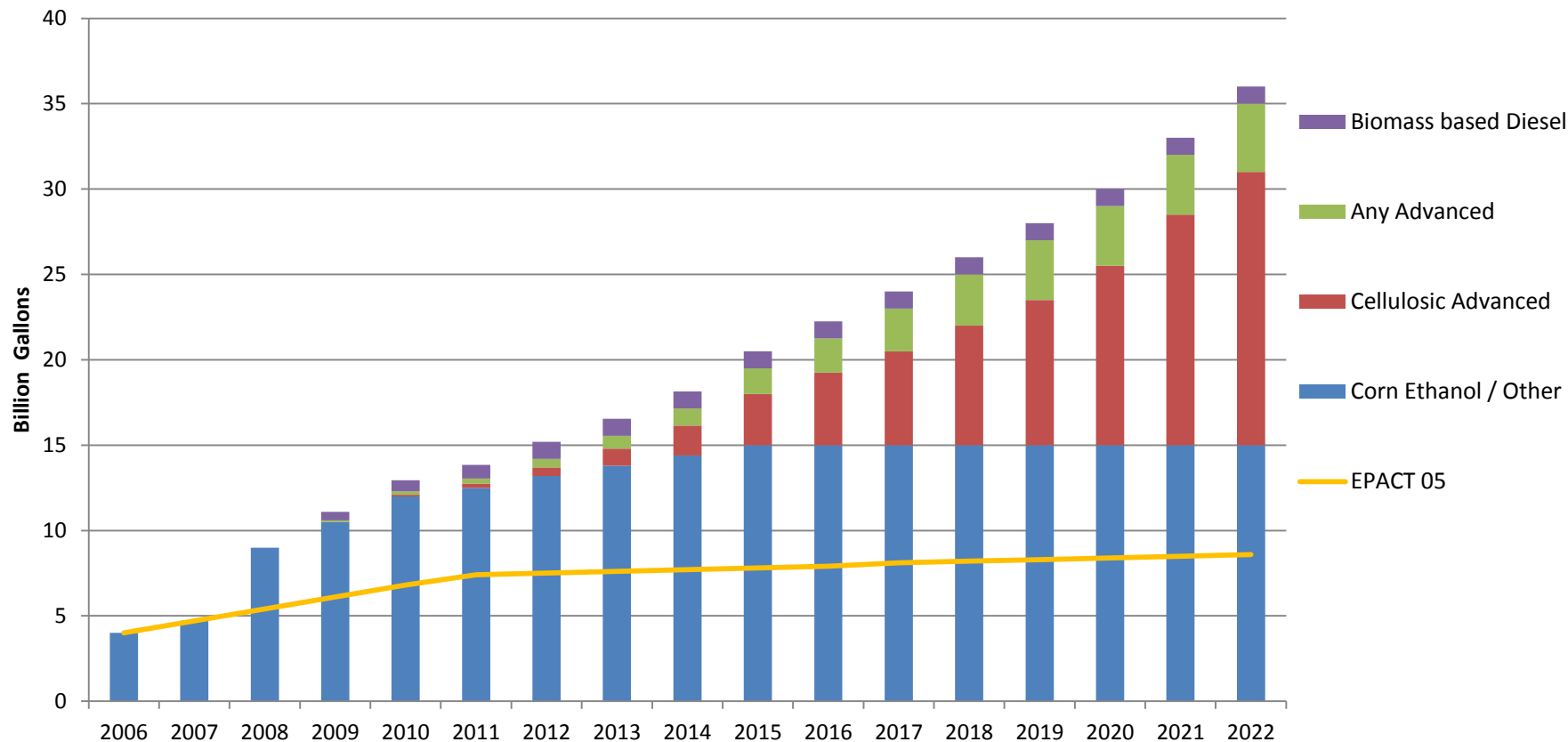
Source: Wood Mackenzie analysis

Industry Remains at Risk from Regulatory Costs

In our 2009 study of the Waxman-Markey bill, we estimated that up to 2.5 mm b/d of U.S. capacity would be idled/closed.....

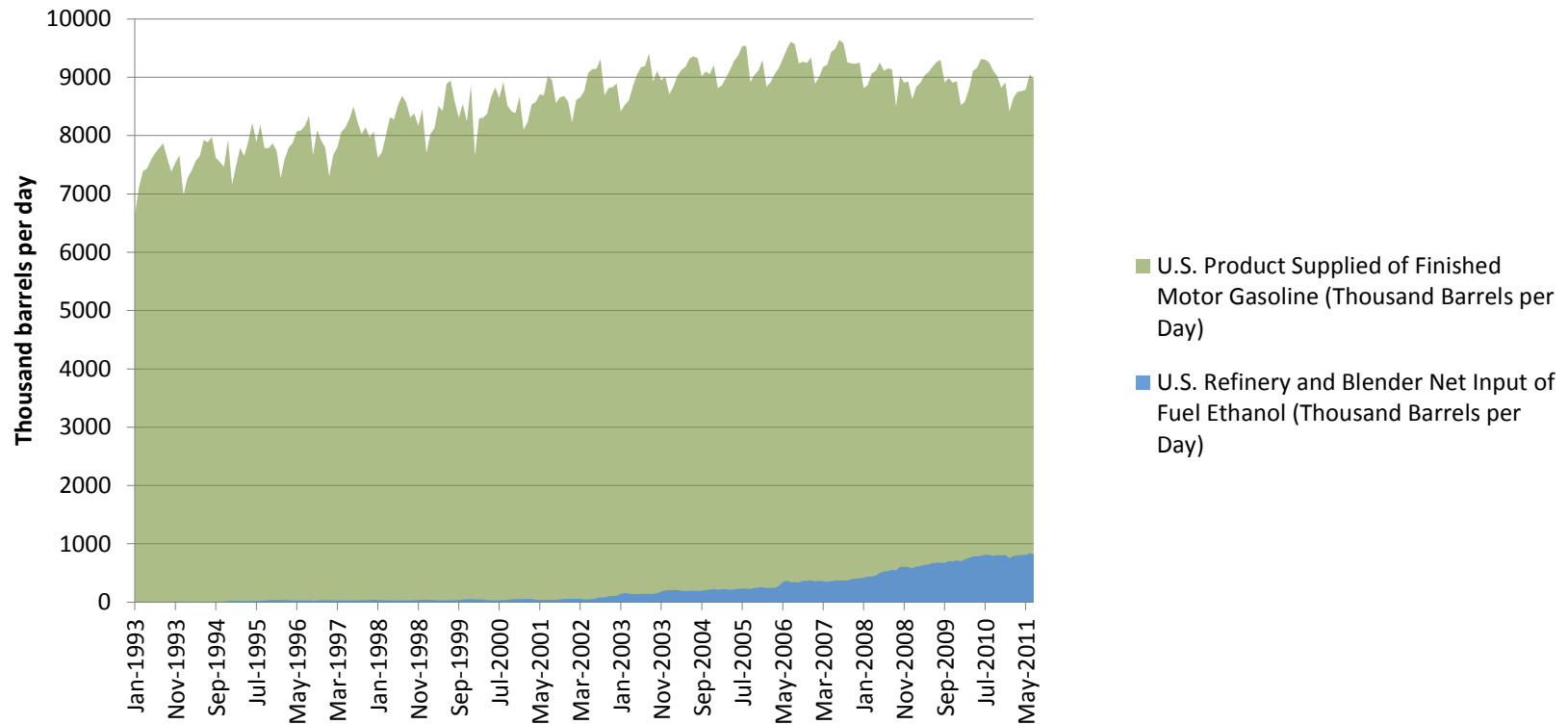


EISA '07 Renewable Fuels Standard



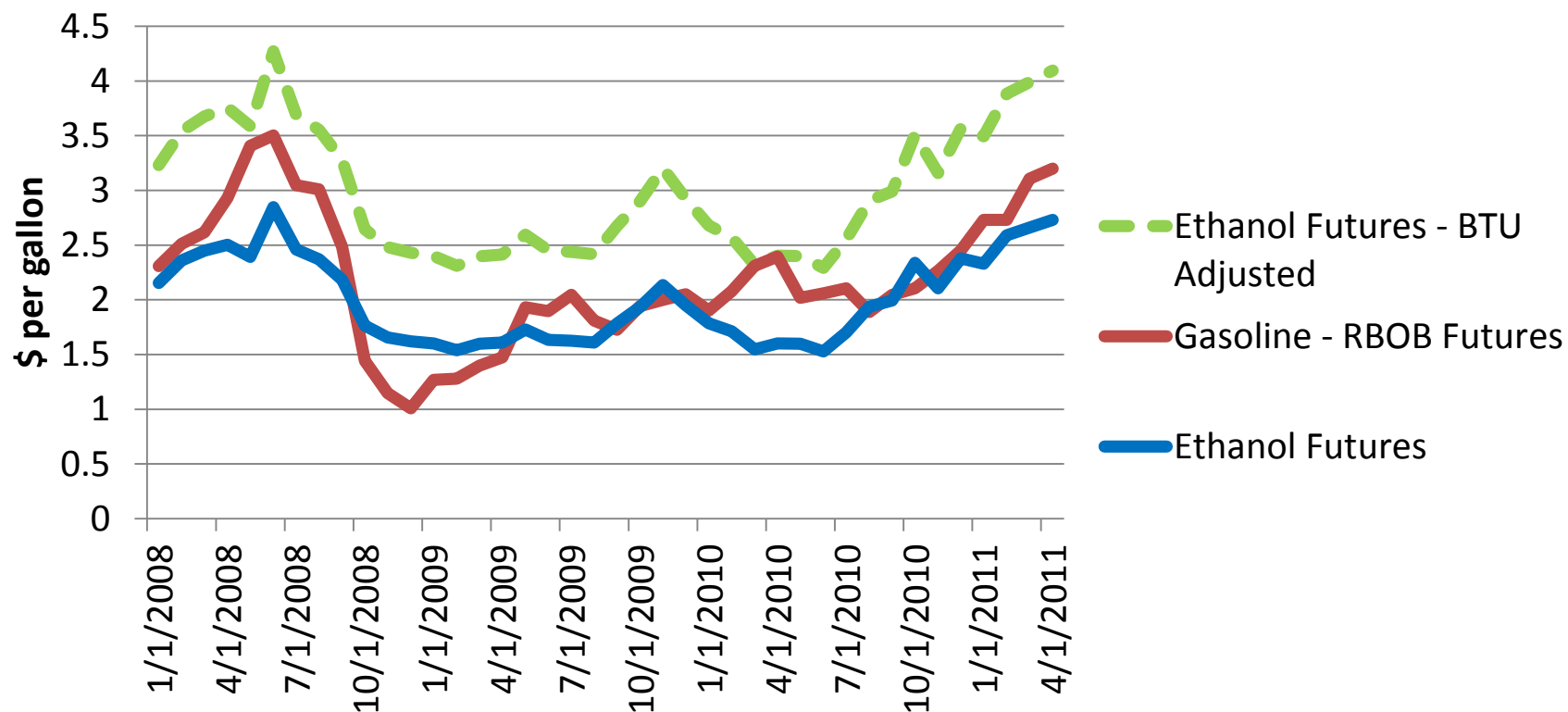
Source: DOE

Gasoline Consumption and Ethanol Blending



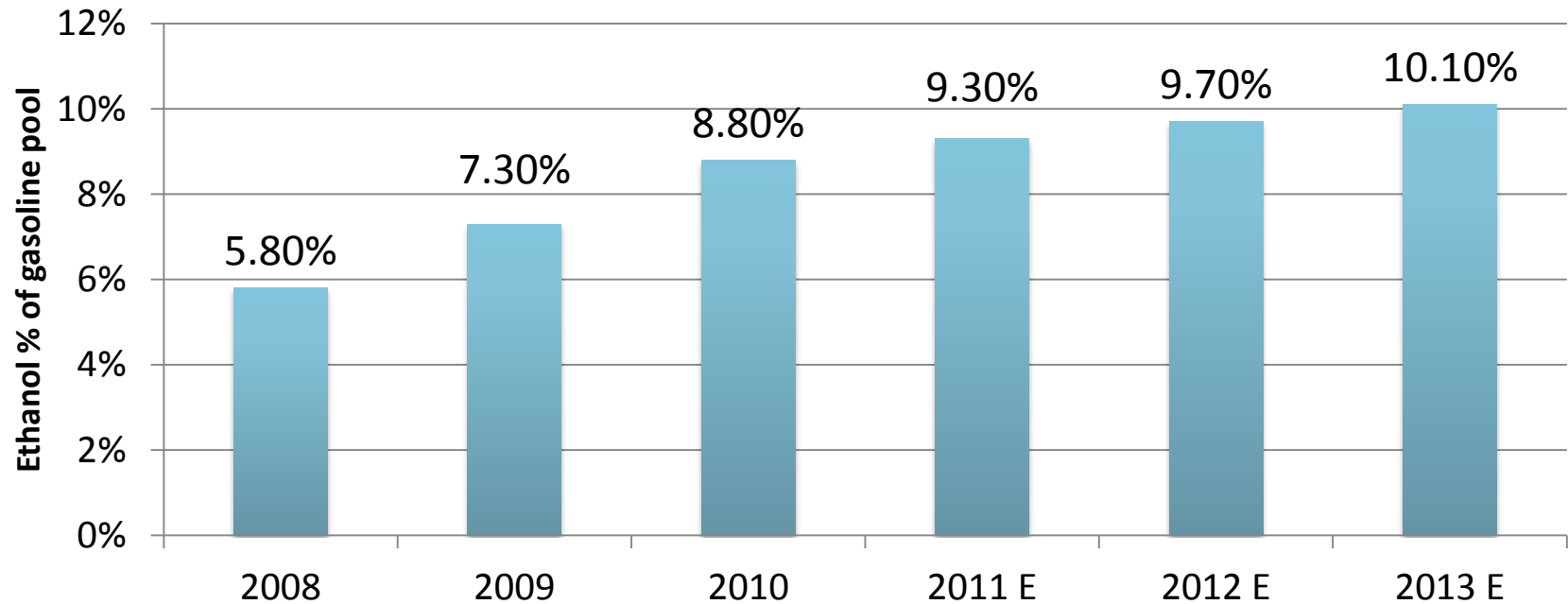
Source: EIA Data

Ethanol and Gasoline Futures Prices



Source: CME Group data, EPRINC conversion for ethanol

Approaching the Blend Wall



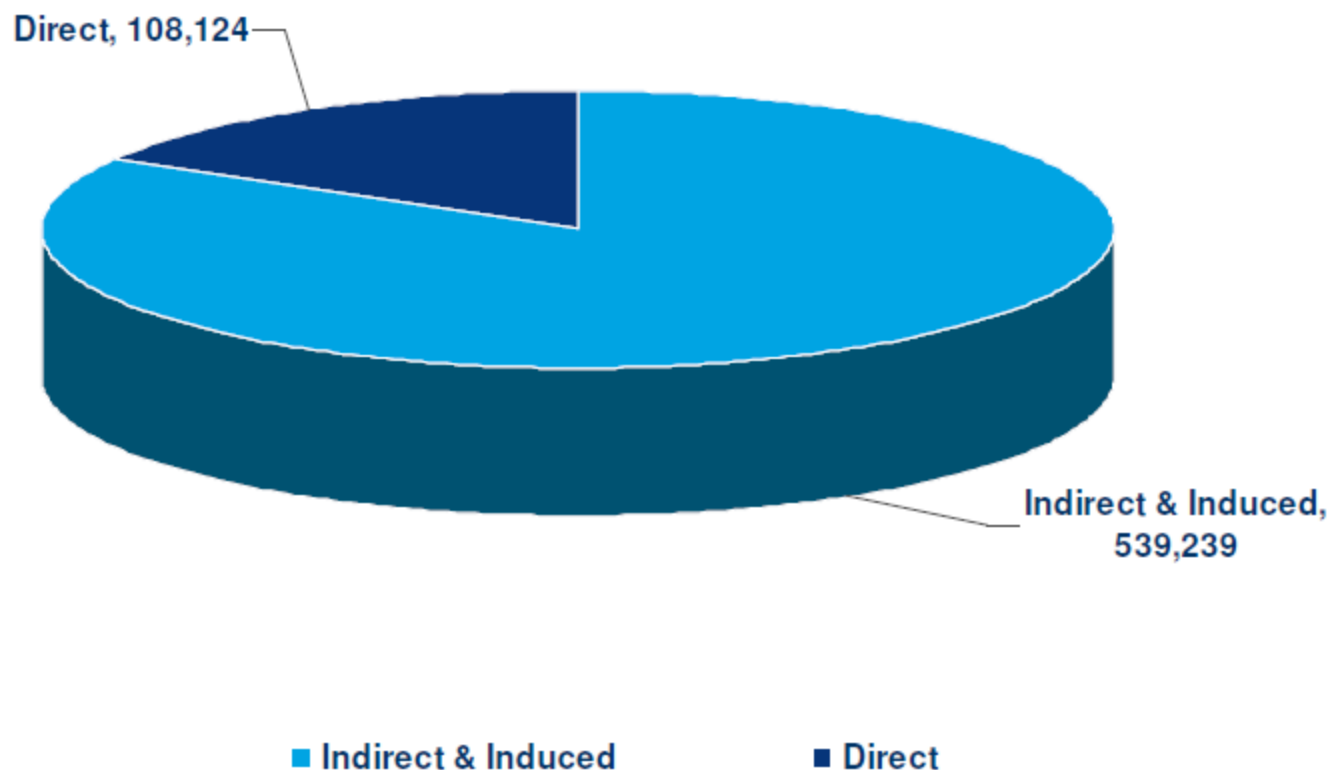
Source: EIA Data, EPRINC Calculations and Assumptions. 2012 and 2013 assume RFS mandates of corn based ethanol (renewable ethanol) only and 8.9 mm b/d of total gasoline demand.

Importance of the Downstream Renaissance

Refining Value to the U.S. Economy

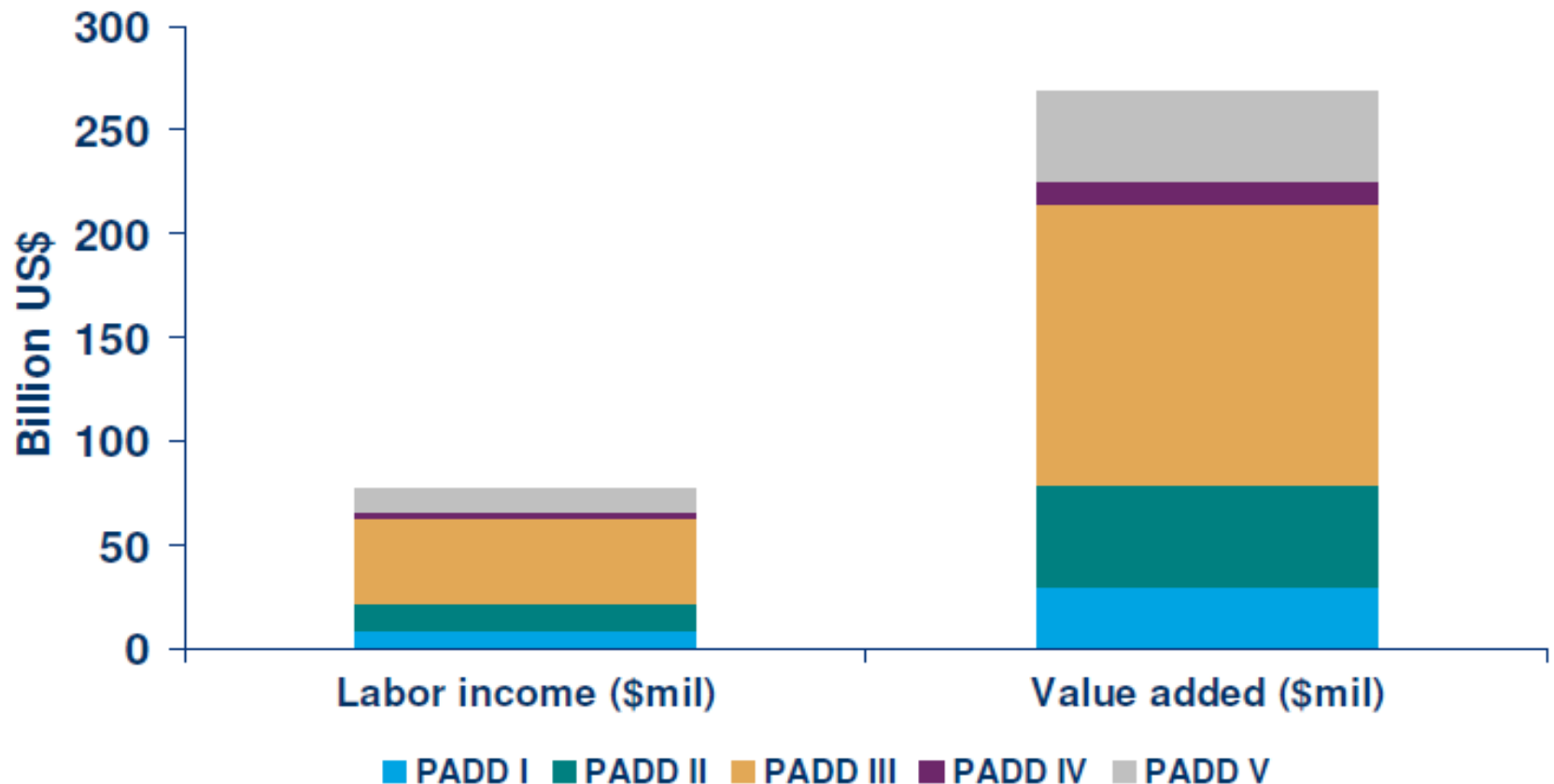
- America's refining and petrochemical community employs nearly 2 million people directly and indirectly.
- The refining sector employs 108,124 people directly and created 431,115 American jobs through indirect and induced employment.
- Workers in the refining industry earn an average hourly wage nearly 50 percent higher than the national average and have a safety performance five times safer than the average U.S. manufacturing facility.
- 48 percent of refining facilities utilize union labor, the highest of all American manufacturing sectors.

Employment in the American Refining Industry, 2009



Source: PwC Economic Impact & Employment Report 2011; Wood Mackenzie analysis

Refining Labor Income and Value Added by PADD (2009)



Source: PwC Economic Impact & Employment Report 2011; Wood Mackenzie analysis

Refining Capital Expenditures (2004-2010)



Source: Oil & Gas Journal, 2010; Wood Mackenzie analysis

Major Challenges and an Opportunity for U.S. Refining Industry

- **Declining demand, especially severe during 2007-2009 economic downturn.**
- **Low cost imports from growing capacity abroad, gasoline imports remain a by-product in Europe as diesel requirements grow**
- **Operable capacity too low, especially difficult for Northeast and West Coast refineries**
- **High cost and high risk regulatory environment for plant operations, barriers and infrastructure limitations movement of crude and product.**
- **But surge in U.S. and Canadian feedstock and low cost refinery fuel offer enormous opportunity for refining and contribution to U.S. economic growth.**