

Top of the Barrel: The Future for Gasoline, Naphtha, and LPG

PIRA expects the next 15 years will witness radical shifts in the supply/demand balances for gasoline, naphtha, LPG, and other light products, which will have profound impacts on crude and product pricing, and refining margins. The traditional demand for gasoline in the passenger vehicle market will shift from growth to decline for the major industrialized countries — but offset by growth in the developing world. Demand for feeds for petrochemical plants will grow robustly, but will shift both regionally and qualitatively. Supply of condensates, NGLs, and ethanol will all grow rapidly, while crude production will increase more slowly. Substantial changes will occur in utilization of both distillation and conversion capacity, refinery yields, and trading patterns. These changes cannot be studied in isolation. The changing composition of crude/other supply, light product vs. middle/ heavy product demand, and refinery distillation and conversion capacity all interact through price and trade to balance the world.

PIRA Energy Group assesses the impact of these supply/demand forces in its multi-client study, TOP OF THE BARREL: THE FUTURE FOR GASOLINE, NAPHTHA, AND LPG.

ABOUT THE STUDY

This study — featuring a written report, comprehensive online database, and briefing (see next page) — provides the following:

- **An in-depth analysis of the impact of supply-demand forces on product price spreads, crude and condensate differentials, and refining margins.** Although the focus is on the top of the barrel, the changes there will affect all products.
- **A detailed outlook of the factors driving global/regional light product usage.** Demand trends by region/country and by end-use sector (e.g., petrochemical plant feed, gasoline, etc.) are examined to show how and why demand growth is expected to accelerate in some areas/sectors, but slow or decline in others.
- **A comprehensive look at the production of light products, examining changes in refinery runs, crude slate, condensate and NGL production, ethanol mandates, and refinery conversion capacity.** The rapid growth in non-crude light supplies will increasingly challenge the supply system to adapt.
- **Analysis of interregional trade flows for LPG, naphtha, and gasoline and how they will evolve** as supply, demand, and product quality requirements change.
- **Regional price forecasts for light products and key crudes/condensates,** with comparisons relative to competing fuels, arbitrage opportunities, and the key factors that will drive these relationships.
- **Regional PIRA Reference Case projections through 2025,** by year, as well as alternative scenarios that test the impact of key variables on those projections.

WHAT DO STUDY SUBSCRIBERS RECEIVE?

Subscribers receive the following study deliverables:

- **Written Report (Released in February 2011).** Online access to, and printed copies of, the final report that spell out the findings of the study and the bases underlying those results, as well as lay out the key uncertainties that impact the major findings. This roughly 200-page document includes an executive summary, as well as detailed discussion and illustrative charts on: Demand, Supply, Quality/Environmental, Price, Trade, and Alternative Scenarios.
- **Online Database (March 2011).** Access to an online database containing multiple Excel spreadsheets of annual **historical actuals back through 1995 and forecasts through 2025**, including:
 - **Country-level demand by sector for ethane, LPG, naphtha, and gasoline.** With multiple products, covering 145 countries, 5 end-user sectors (including feed to petrochemicals for olefins/aromatics), and spanning 30 years from history through forecast, the scope and level of detail are unmatched compared to other studies.
 - **Regional light product supply, with the impact of refinery capacity changes** broken out. Annual refinery unit capacities and product production for LPG, naphtha, and gasoline are reported for each of thirteen regions spanning the globe. Crude/condensate production by type, total regional refinery runs, and ethane/LPG production from gas plants are also included.
 - **Inter-regional LPG, naphtha, and gasoline trade flows.** Net trade between 13 trading regions that span the globe show how demand and refinery/gas plant production changes lead to evolution in trading patterns.
 - **Price forecasts for light products, and key crudes and condensates,** both absolute and relative to crude, by region for annual averages from 1995 to 2025.
- **Online Briefing (April 12, 2011).** An audio-visual presentation of the key results, where attendees can discuss those findings and their implications and question the study's authors. Those subscribers who miss the live Webcast will be able to access the recorded version for later review via PIRA's Website.

Study Background

TOP OF THE BARREL builds off two highly acclaimed prior studies from PIRA that looked at heavy products and middle distillates.

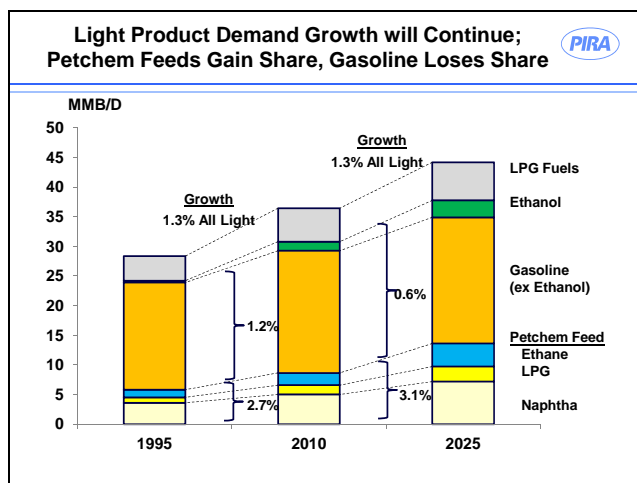
Issued in 2007, **BOTTOM OF THE BARREL, THE FUTURE FOR RESIDUAL FUEL OIL** provided details on demand, supply, and blending for fuel oil and other heavy products. One of its key conclusions was that fuel oil prices relative to crude were likely to strengthen over the medium term — a conclusion that has since been borne out.

Issued in January 2009, **HEART OF THE BARREL, THE FUTURE FOR MIDDLE DISTILLATE FUELS** also provided in-depth analysis of oil fundamentals, this time for diesel, gasoil, and kero/jet fuels. One of its key conclusions was that the price spike for diesel relative to crude seen in 2008 was unsustainable — also a conclusion since seen in the market.

BACKGROUND AND STUDY DETAIL

A Fresh Look at Demand Trends

The long historical growth in overall light product demand is expected to continue, but individual products will show diverging trends. Gasoline demand in the OECD will peak — driven by mandated efficiency improvements in the United States and continued diesel penetration into passenger vehicles in Europe — but it will be offset by rapid increases in the developing world. Petrochemical feedstock demand will continue to grow robustly, but the share from ethane/LPG will increase. The growth in LPG demand for fuels use will be slower than its growth as a feedstock.

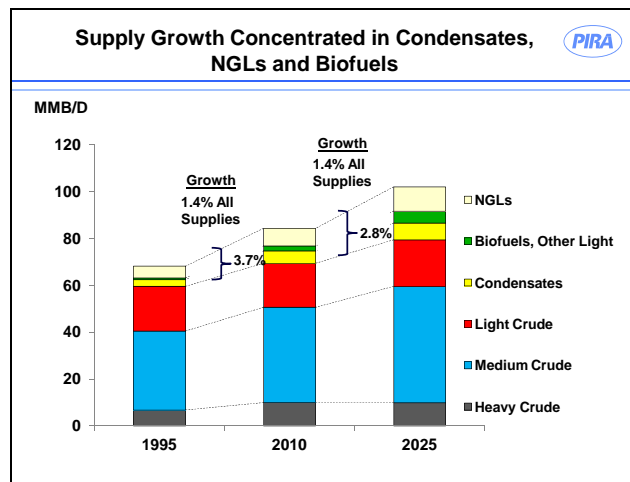


TOP OF THE BARREL examines demand trends for gasoline/ethanol for transportation (in competition with diesel, electric, LPG, and natural gas), petrochemical feedstocks including ethane/LPG/naphtha for olefins manufacture and aromatics extraction, and LPG used for heating applications. Regional/country forecasts with end-use sector splits are included. Factors influencing these trends — including policy, substitution potential, availability/price of unconventional supply, efficiency improvements, and quality requirements — are addressed. Demand scenarios that test the impact of a range of possible economic and

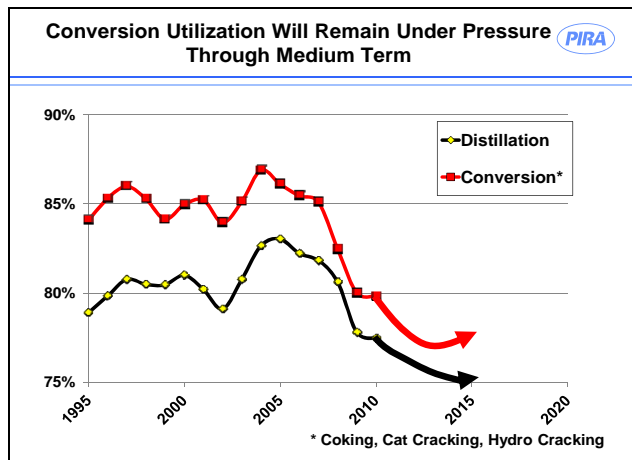
regulatory factors provide bounds around PIRA’s Reference Case forecast.

A New Assessment for Light Product Supply

Raw liquids supply will grow, meeting overall demand growth, but its composition will shift. The growth of condensates, NGLs, ethanol, and other light supplies will be much more rapid than for most crude grades. The refinery system that is now expanding conversion capacity partly based on the historic rapid growth in heavy crude will need to adapt.

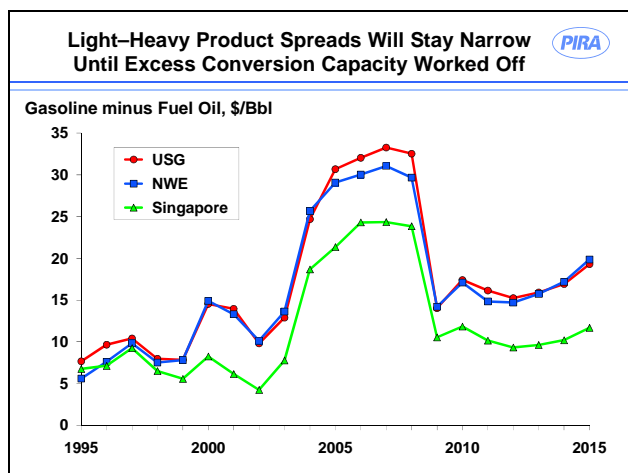


Compounded by the recent recession and consequent lower demand, refinery capacity utilization for both distillation and conversion has declined. PIRA expects that this surplus will generally persist for the next few years at least. Capacity additions in rapidly developing countries and oil producers will continue. Capacity reductions in mature markets will be limited and slow. Some surplus conversion capacity will likely be re-purposed to better match demand profiles — including yield shifts towards middle distillates and other faster growing products.



Rapidly Changing Price Relationships

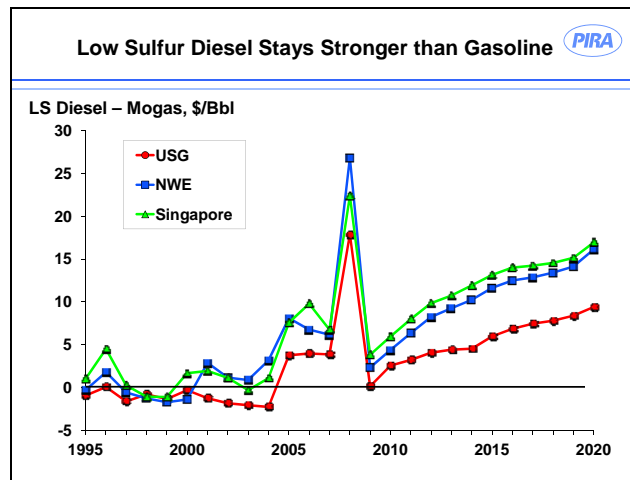
With these changes in demand trends and refining capacity will come changes in pricing relationships. TOP OF THE BARREL addresses these impacts. Changes in light product prices relative to other products and crude are quantified. The impact of rapidly growing NGL/condensate supplies are assessed. Quality and regional differences are described.



These changes in product price spreads will fundamentally affect refinery margins, inter-regional arbitrage opportunities, and crude/condensate price differentials.

A simple extrapolation of recent trends in aggregate light product demand, supply, and price will *not* give a reasonable forecast for future trends. A careful examination of the regional demand trends by end-use, and the

layers of supply on the margin, are needed to assess light product prices.



TOP OF THE BARREL shows how a detailed and nuanced look at the underlying trends builds up to conclusions for the future. This study uses PIRA's proprietary tools to model demand, refining capacity, trade flows, and price, allowing the careful build-up of the Reference Case outlook and alternative scenario cases.

The study also answers these important questions:

- 1) To what extent will the global balances for light products in general, and gasoline in particular, loosen? When will they tighten again and what will be the implications for price spreads, refining margins, and crude differentials?
- 2) How are the balances for NGL and condensate production and new steam cracker capacity expected to shift regional olefins production?
- 3) How will these trends affect future refinery operations and margins?
- 4) What are the changes in trade patterns and arbitrage relationships that can be expected?

WHO WILL BENEFIT FROM THIS STUDY?

The stakes are high when it comes to making decisions regarding future gasoline, naphtha, LPG and other light product supply, demand, and pricing. Inevitably, market participants will end up on either side of multi-million-dollar gains or losses. **TOP OF THE BARREL: THE FUTURE FOR GASOLINE, NAPHTHA, AND LPG** will help market participants keep ahead of the competition through a better understanding of the future interplay between regional light product balances, regional product pricing, inter-regional trade, and the impact of these factors on refining margins. The following market participants will all benefit from this study:

- **Crude/condensate/NGL producers** know the importance of product supply/demand balances, which set relative values for products and consequently impact crude/condensate price differentials. This study will help them identify and evaluate the future refinery value for heavy versus light, and distillate-rich versus naphtha-rich, crudes and thus the potential value of different heavy crude upgrading processes.
- **Refiners** need to plan capacity changes based on the outlook for product demand and relative crude/product pricing. By providing a firm basis in evaluating future changes in these factors, which define refinery conversion margins, the study will help refiners evaluate the future profitability for different refinery configurations.
- **Trading companies** want to anticipate regional supply/demand changes and price dynamics. This analysis will aid in planning terminal and shipping infrastructure needs to best capture trading opportunities.
- **Financial institutions** must make sound evaluations of how changing market conditions will affect the economics and financing of new refining, oil infrastructure, and marketing ventures. This study will allow for more informed decision-making on potential projects.
- **Chemical companies, gasoline consumers, and other end-users** constantly consider how changing price dynamics will influence service choices and future capacity decisions. The study will make these end-users better equipped to adapt to supply and price shifts, and it will help new project developers make more effective evaluations of supply options and project viability.
- **Biofuels producers** need to know what gasoline demand will be in the future and the volumes of ethanol that will be included. This study explores regional refinery production/blending constraints and likely regulatory changes that impact ethanol economics.
- **Shipping companies** need to know how trade will change for clean products. **TOP OF THE BARREL** provides key light product trade flows.
- **Policy makers** need timely insight into how proposed changes in renewables and other product quality regulations will affect supply, demand, price, and industry profitability. This study will enable them to better evaluate the impact of future regulatory changes.
- **Manufacturing companies** need a sound understanding of gasoline pricing in order to develop products (autos, etc.) that will best meet future market demand.

FEES AND OPTIONS

TOP OF THE BARREL: THE FUTURE FOR GASOLINE, NAPHTHA, AND LPG can be purchased by both PIRA retainer clients as well as non-clients. **Existing PIRA retainer clients receive a reduced price.** For detailed service pricing options, see the Acceptance Form on page 8.

ABOUT PIRA ENERGY GROUP

The PIRA Energy Group, founded in 1976, is an international energy consulting firm, offering Retainer Client Services as well as customized consulting on a broad range of subjects in international oil, natural gas (and LNG), coal, electricity, biofuels, freight markets, and related environmental issues. PIRA provides evaluation of key U.S. and international energy issues that impact the behavior and performance of the industry and its various markets and sectors. Currently, more than 550 companies worldwide retain PIRA, including international and national integrated oil and gas companies, independent producers, refiners, marketers, oil and gas pipelines, electric and gas utilities, industrials, trading companies, financial institutions, and government agencies.

KEY MEMBERS OF THE “TOP OF THE BARREL” STUDY TEAM

Richard Joswick (Study Leader; Managing Director, Global Oil Group) develops PIRA’s outlook for crude and products pricing, refinery margins, and inter-regional supply balances. He authors PIRA’s monthly European Oil Market Forecast and numerous special projects. Over the last three years he was the study leader for the hugely successful multi-client studies: *Bottom of the Barrel*, *The Future for Residual Fuel Oil* and *Heart of the Barrel*, *The Future for Middle Distillate Fuels*. He joined PIRA in 2004 after 20 years with ExxonMobil in supply logistics, planning, refining, and engineering. During his time at ExxonMobil, he had assignments developing near-term oil market forecasts, designing heavy oil upgrading processes and evaluating refining economics. Rick has M.S. and B.S. degrees from Rutgers University in chemical engineering.

Dr. Mark Schwartz (President) works closely with PIRA’s Global Oil and Natural Gas groups to evaluate the key assumptions underlying their outlooks and to develop plausible alternative assumptions and outcomes. Before joining PIRA in 2002, he was the Chief Economist of ExxonMobil Corp., where he was responsible for developing the company’s long-range economic and energy outlook. During his 25 years at Exxon he also had assignments in Upstream Planning, Treasurers, and Corporate Planning functions. Mark holds a Ph.D. in economics from the University of Pennsylvania.

F.W.A. (Bill) Fuller (Sr. Director, International Oil) had over 30 years of energy forecasting and analytical experience with Exxon International before joining PIRA in 1997. He now oversees PIRA’s analysis and forecasting of near-term industry oil balances, with particular emphasis on international supplies, and monitors events impacting PIRA’s oil market view. Bill has a B.S. in chemical engineering from Cornell University.

Gary Greenstein (Director, Global Oil Group) joined PIRA following 38-year career with ExxonMobil, where he was involved in all aspects of the refining business, including planning, operations, engineering, and research. Gary has a B.Ch.E. from City College of New York, an M.S. in chemical engineering from New Jersey Institute of Technology, and an M.B.A. from Fairleigh Dickinson University.

Peter Jaquette (Director, Global Oil Group) is a key contributor to PIRA's Scenario Planning Service, and was the coordinator for PIRA's Planning For Tomorrow study. He joined PIRA in 2007 with more than 25 years of experience in corporate strategic planning and economic consulting, including 14 years with ARCO and nine years with Weyerhaeuser, where he was involved in evaluating cellulosic ethanol and other energy projects. Peter has a B.A. in economics from Swarthmore College and an M.A. in economics from Stanford University.

David A. Zinamon (Managing Director, Refining and Environmental Affairs) specializes in refined products, refinery operations, NGLs, alternative fuels and environmental matters, particularly as they affect petroleum product markets. Among other activities he is responsible for PIRA's World Refinery Database. Dave also authors PIRA's monthly NGL market report. Dave joined PIRA in 1984 after seven years of international energy consulting experience with Chem Systems. This followed several years of manufacturing, marketing and planning positions with Celanese Chemical, GAF Corp., and Airco. Dave has a B.Ch.E. from City College of New York and an M.B.A. from Rutgers University.

Dr. Naing Oo (Associate Director) joined PIRA's Global Oil Group in 1995. He focuses on quantitative and econometric analysis for forecasting oil demand and prices. He is also involved in analysis on crude and product balances and trade flows. Naing holds a Ph.D. in economics from the City University of New York.

Su Hyung Ryu (Associate Director) focuses on crude and product price forecasts. Ms. Ryu maintains and develops integrated oil demand and pricing models and information systems. Since joining PIRA in 1998, she has participated in numerous benchmarking and competitive analysis projects, crude and product marketing assessments, and asset valuations. Prior to joining PIRA, Su worked at Citibank Global Banking, where she analyzed and developed investment database applications. She holds M.S. in business computer information systems from Baruch College in New York.

Dr. Bruce H. Pickover (Senior Director, Biofuels) manages PIRA's Global Biofuels Retainer Service. He began his career at ExxonMobil where he worked on petrochemicals and the refinery/chemical interface. Bruce spent 27 years at consulting company Chem Systems, where he was responsible for the Petroleum and Petrochemical Economics (PPE) program, multi-subscriber reports, and commercial proprietary studies. Bruce has a Bachelors of Chemical Engineering from the City College of New York and earned an M.Ch.E and a Ph.D. from New York University.

Daniel J. Dorsky (Senior Analyst, Global Oil) specializes in global exploration and production, responsible for maintaining and expanding PIRA's production forecasts and quality models as well as developing PIRA's short-term oil supply outlook. He regularly authors special reports on oil supply topics and has created PIRA's models for biodiesel and Canadian oil sands production forecasts. Dan graduated from Brown University with a degree in geological sciences.

ACCEPTANCE FORM

(Company Name) _____ wishes to subscribe to the multi-client study **THE TOP OF THE BARREL: THE FUTURE FOR GASOLINE, NAPHTHA, AND LPG.**

We understand and agree that the fees are as follows:

	PIRA Client, 3 Users	PIRA Client, Add'l Users	Non-Client, 3 Users	Non-Client, Add'l Users
Standard Fee	\$19,500	\$1,000 each	\$25,000	\$1,250 each

* New York City-based companies, please add 8.875% sales tax; Long Island-based companies, please add 8.625% sales tax; all other New York State companies, please add the county-appropriate sales tax.

Total number of users: _____. **Total fee:** _____

Name/Title: _____

Company: _____

Address: _____

Phone/Fax/e-mail: _____

Signature: _____

PLEASE MAIL OR FAX TO: **PIRA Energy Group**
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Phone: 1-212-686-6808; Fax: 1-212-686-6628; sales@pira.com

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