The Crude Oil Quality Shift and Expected Future Market Response

Platts N. American Refined Product Conference
May 18th-19th

David K. Bellman

dkb@allenergyconsulting.com

www.alllenergyconsulting.com

614-356-0484

All Energy Consulting

Adding insights to energy markets for your success.

Table of Contents

- About AEC
- Changing Landscape – Humbling Times
- Refining Economics
- Potential Market Responses and Ramifications
  - Humbling Outlook
- OMA

About AEC

About All Energy Consulting

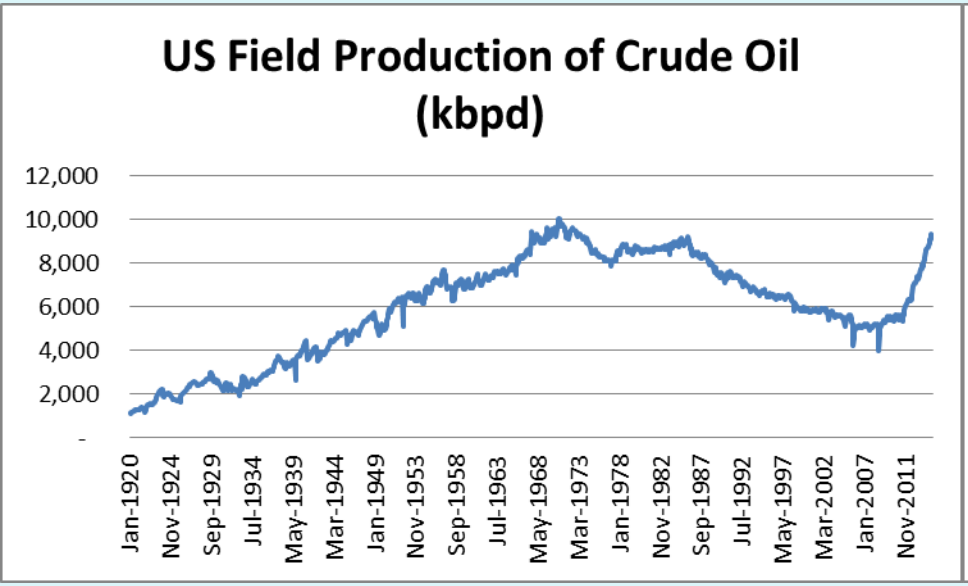
- Founded by David K. Bellman with almost 20 years of energy market analysis experience.
- Recognized and published energy analyst covering the front pages of USA Today to other media outlets.
- Developed refinery and power models used worldwide.
- Recently working with Hedge Funds and Utilities in understanding and quantifying market risk relative to the futures market.

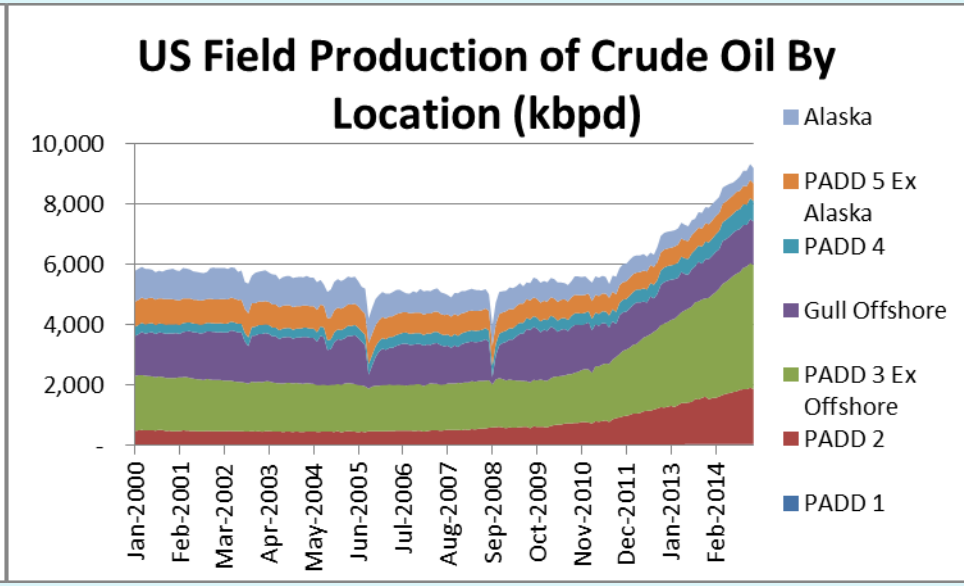
Mission at AEC

- ✓ Quantifying risk to empower effective decision making.
- ✓ Going beyond information – creating a collaborative knowledge transfer.
- ✓ Adding insights to energy markets today and for years to come for your success.

Changing Landscape – Humbling Times

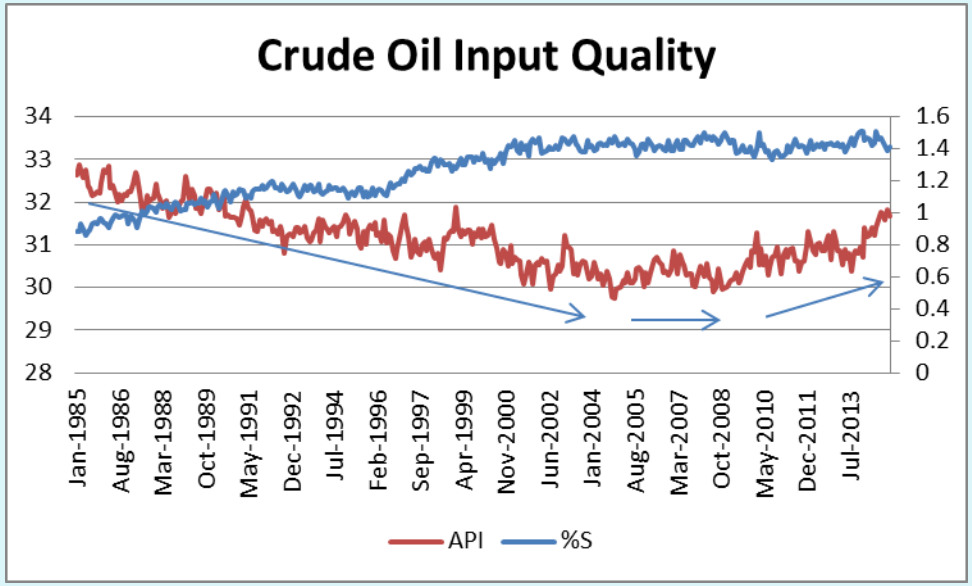
Changing Production Landscape





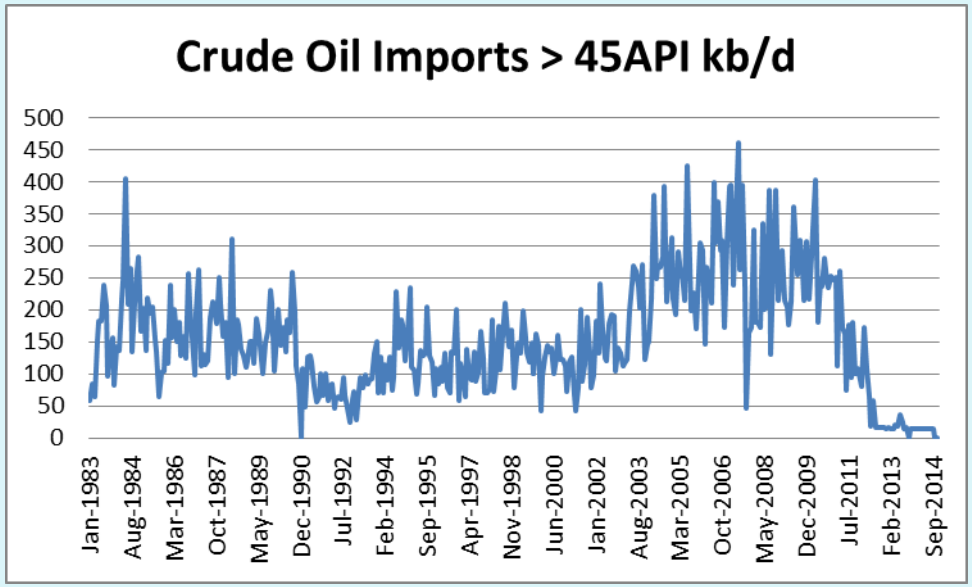
- Peak oil theorist were mistaken in their timing.
- Production did not come from the expected locations.
  - PADD 2 and PADD 3 ex gulf in 2000 represented <40% of production in 2000 – now represents over 60% of total US production

US Crude Oil Quality Overtime



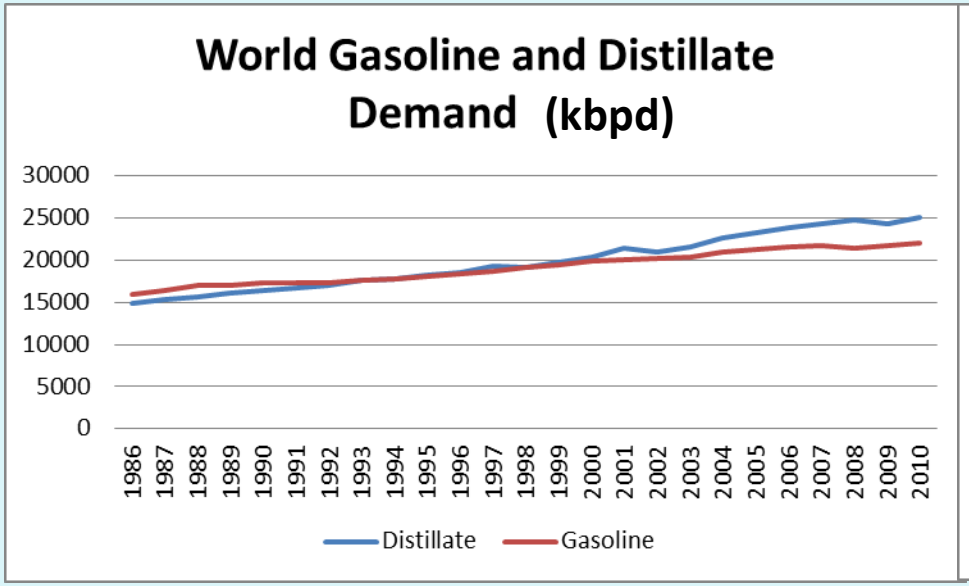
- Historically the crude oil feedstock into US refinery was expected to get heavier and sour.
  - Many US refineries invested in conversion capacity increasing cost and complexity
- Shale had a large impact stopping and reversing the trend of heavier and sour crudes.

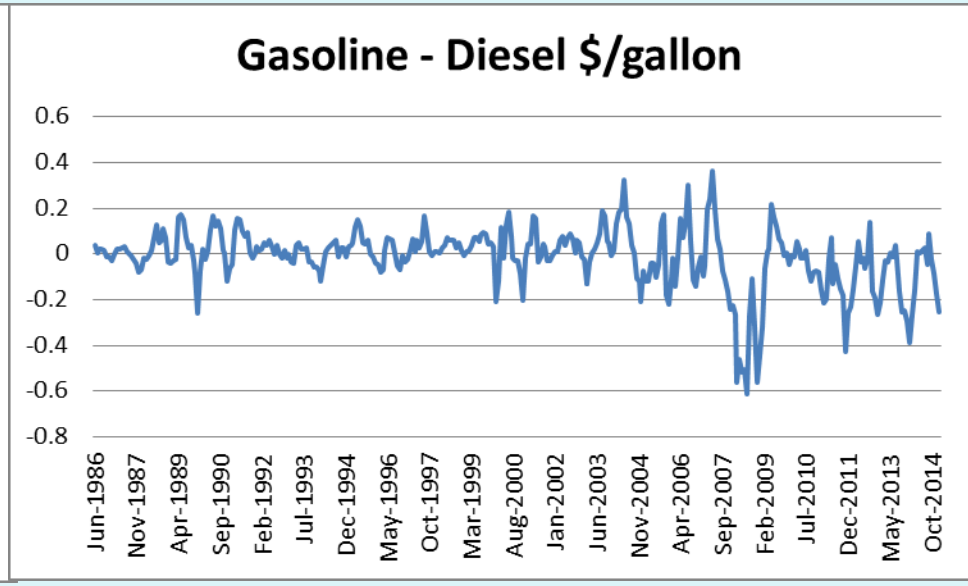
Changing Imports



- Condensate competition is global.
- Pushed out imports flowed elsewhere.

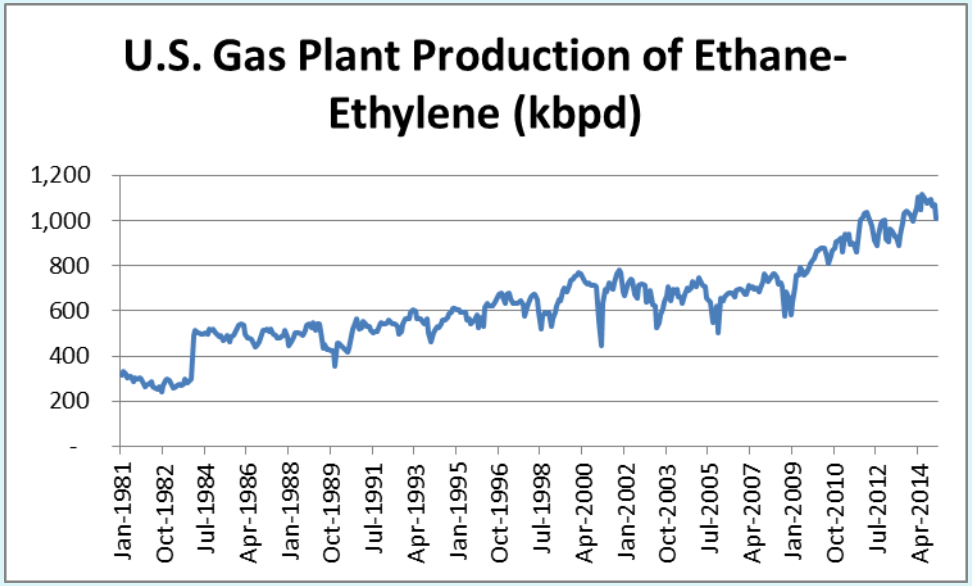
Changing Product Landscape

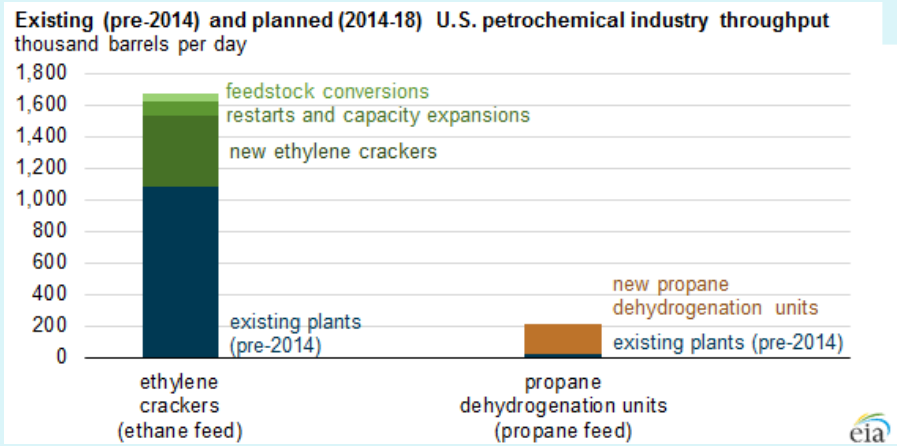


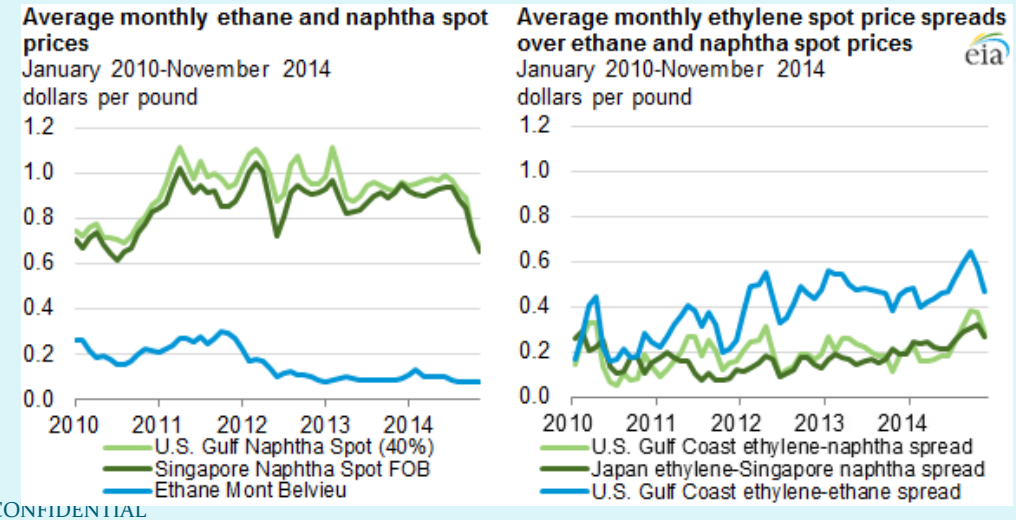


- Not only did refiners miscalculate the lightening of feedstock, but the trends for product demand.
- Distillate products have a premium over gasoline.

Ethane Change

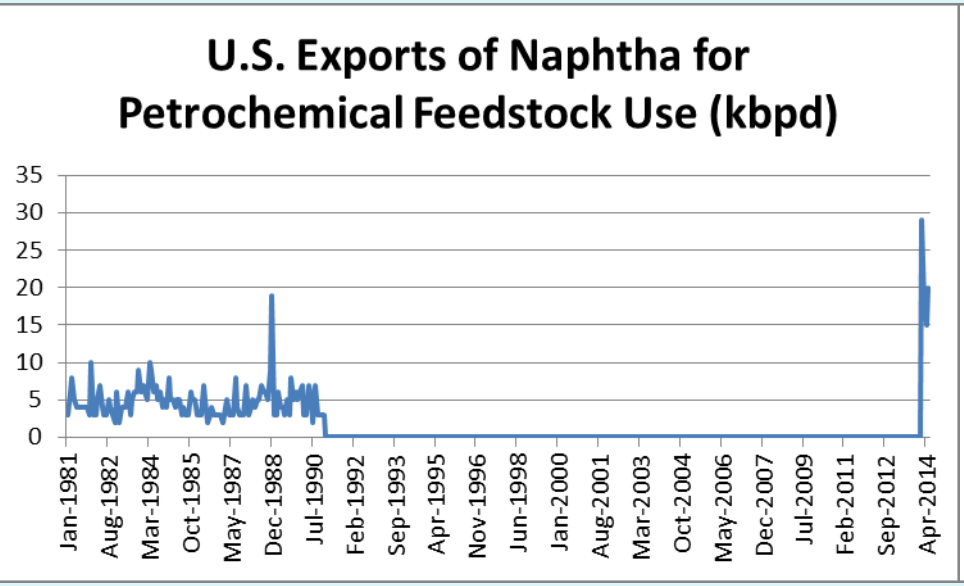


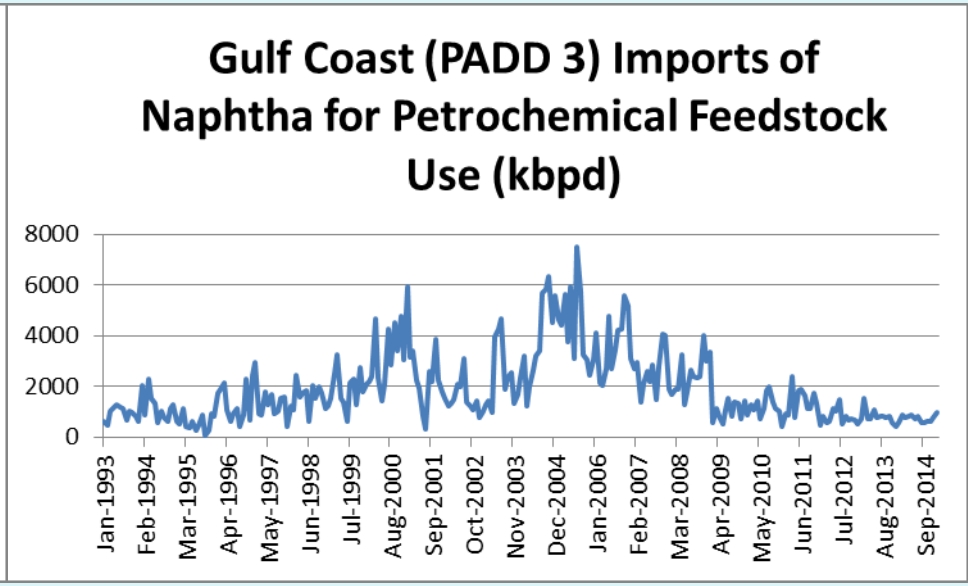




- Ethane is currently the clear winner for petrochemical.
- However much demand is coming with new ethane feed crackers. http://www.eia.gov/todayinenergy/detail.cfm?id=19771
- Export of ethane began Feb 2014 at 24kbpd now over 70 kbpd.
- Rejection levels are estimated as high as 500kbpd.

Naphtha Change

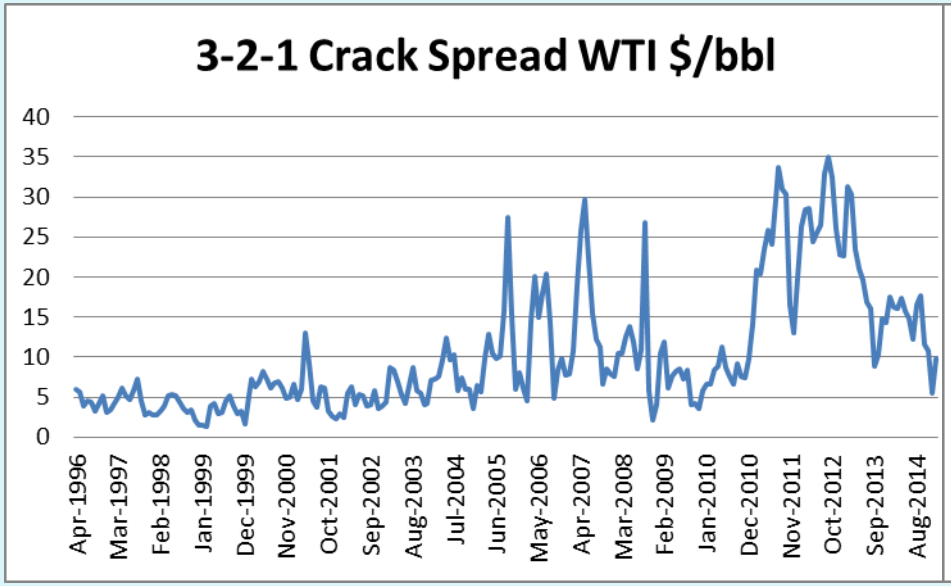


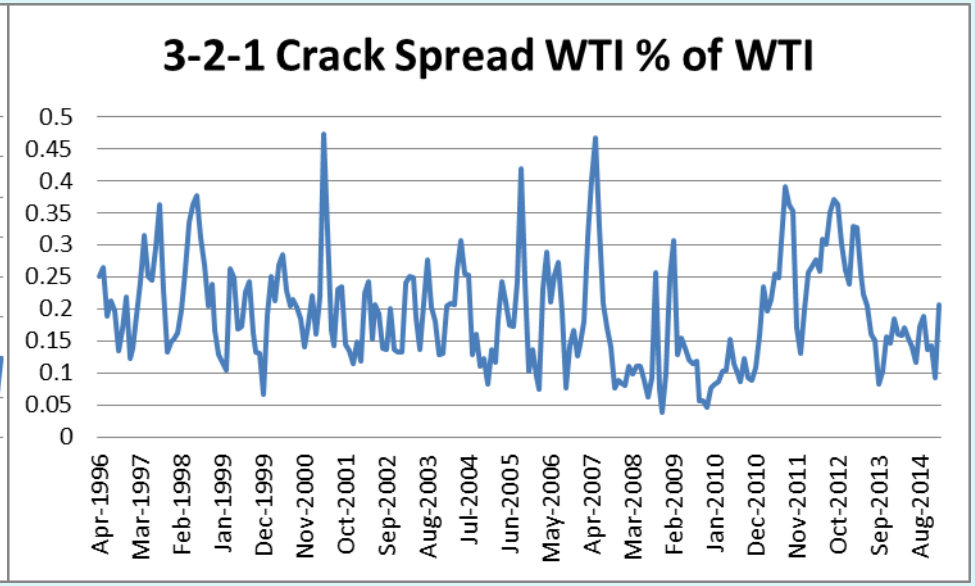


- Pressure is building for Naphtha to find a home.

Refining Economics Changes

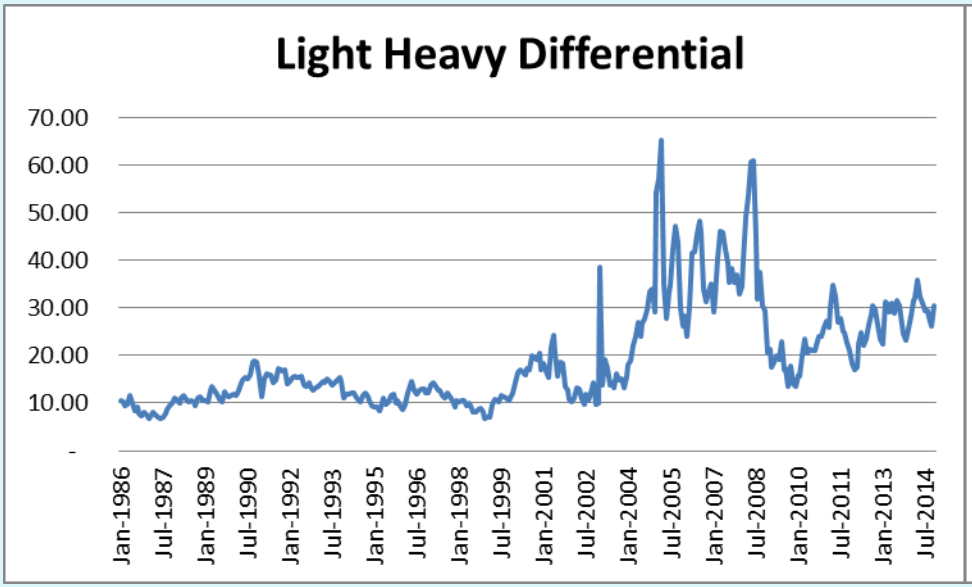
3-2-1 Crack Spread

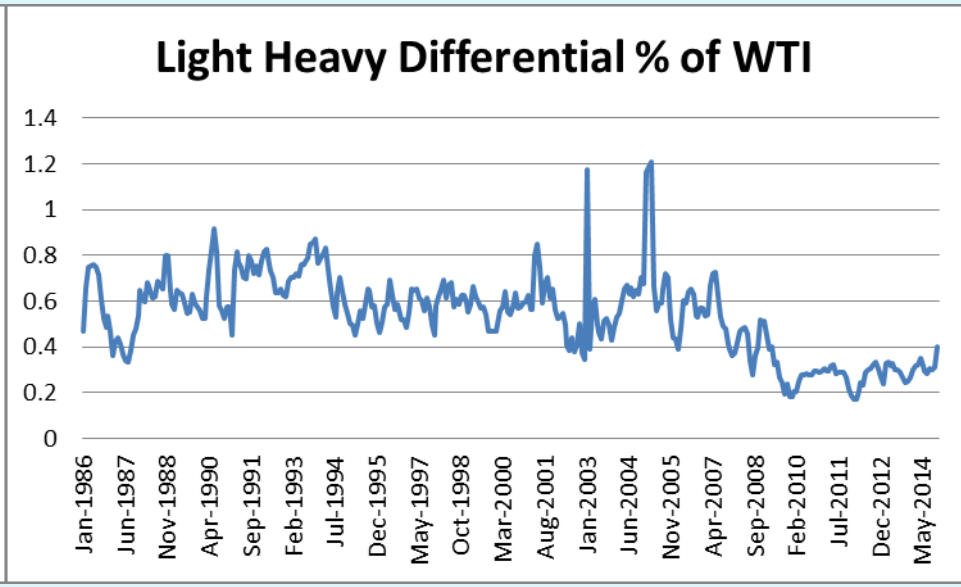




- Crack spreads on absolute terms look to be soaring till recent.
- However measured based on percent on feedstock cost it has been relatively range bounded.

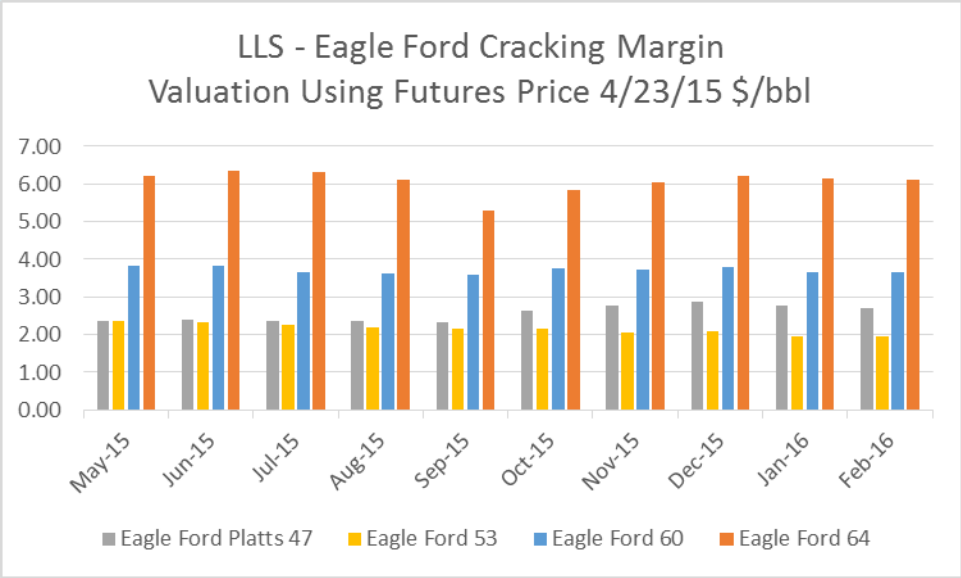
Light – Heavy Differential





- The drive for conversion capacity on an absolute basis is apparent.
- However when compared to the feedstock cost the drive becomes much smaller.

Refining Condensate

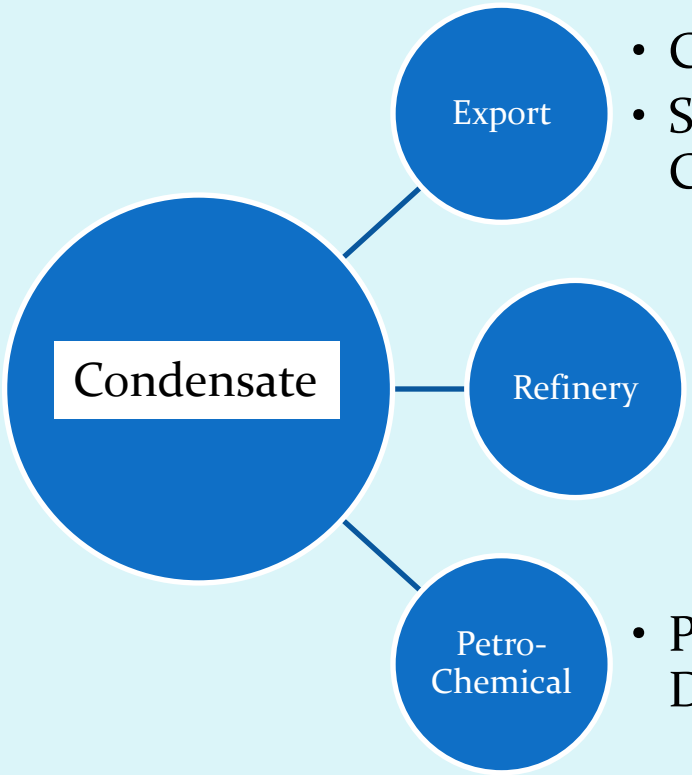


Crude valuations come from AEC Oil Market Analysis (OMA) Platform

- Condensate yields do not bode well in the current US refinery environment.
- Quality variations lead to more discounting requirements.
- US refineries built on the expectations of heavier crude oil and gasoline production.
- Condensate yields will produce more gasoline and potentially Naphtha than distillate.
- Crude oil markets know this and eventually parity will occur between the product valuations.
- Exporting will not likely solve condensate discounts.

Market Responses

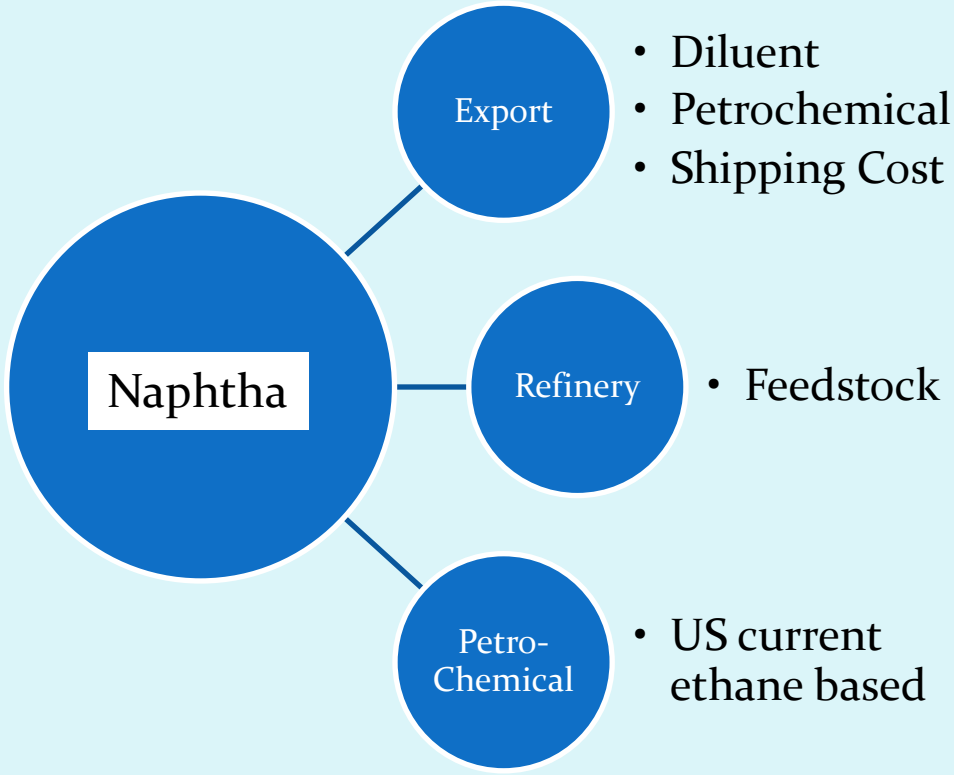
Where will all the Condensate go?



- Competition
- Shipping Cost
- Adaption or Build
- Potential Direct Feed

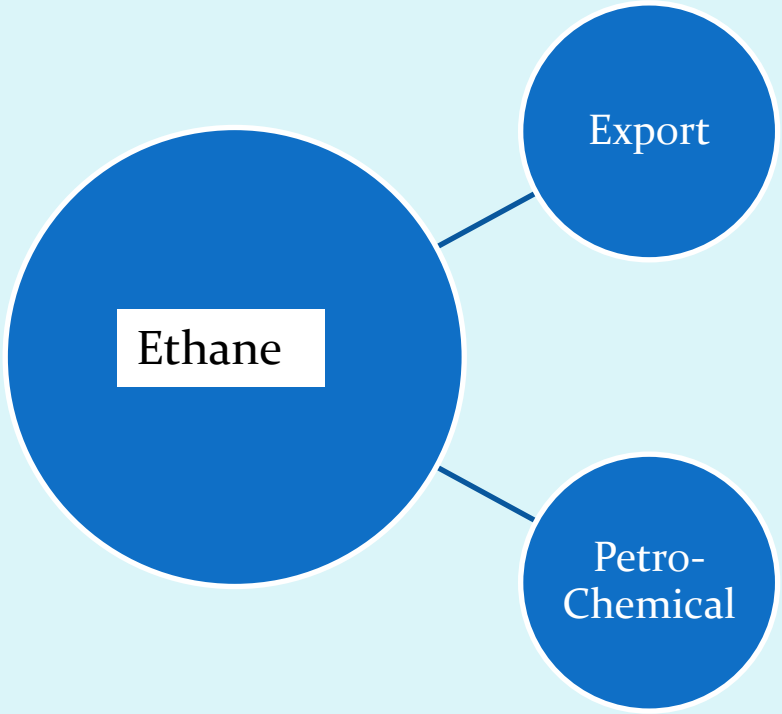
- The two major paths are for export and building condensate splitters.
- Splitters will shift the discount from condensate to Naphtha

Where will all the Naphtha go?



- Naphtha is used to make gasoline or can be directed to the petrochemical industry to make Polyethylene.
- World PE plants use Naphtha while US PE plants use ethane.
- Ethane is also under pricing pressure due to shale.

Where will all the Ethane go?

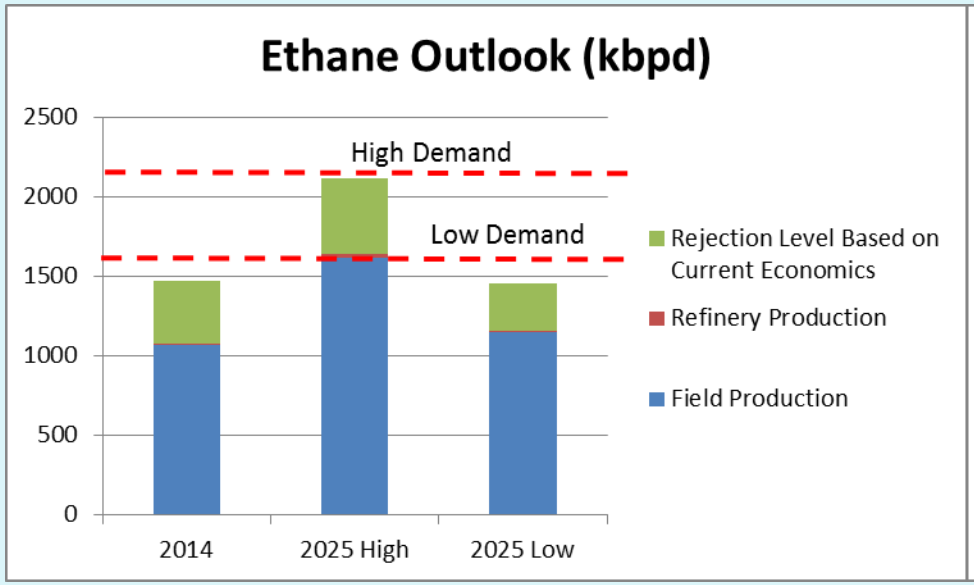


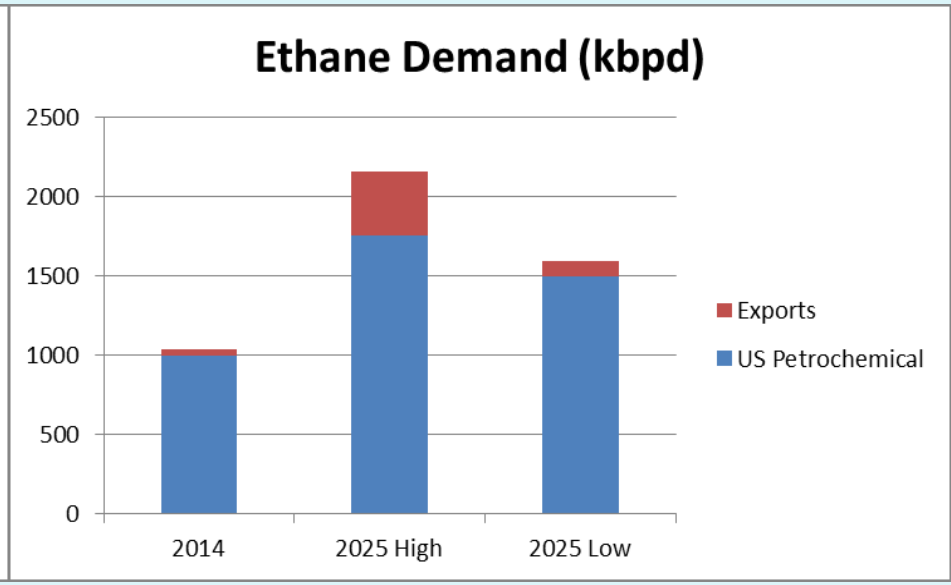
- Petrochemical
- Power?
- Shipping Cost

- US current ethane based

- Large move to dispose of ethane with large PE plants proposed and pipelines being developed to move ethane to Gulf.
- Potential to lose ethane discount?

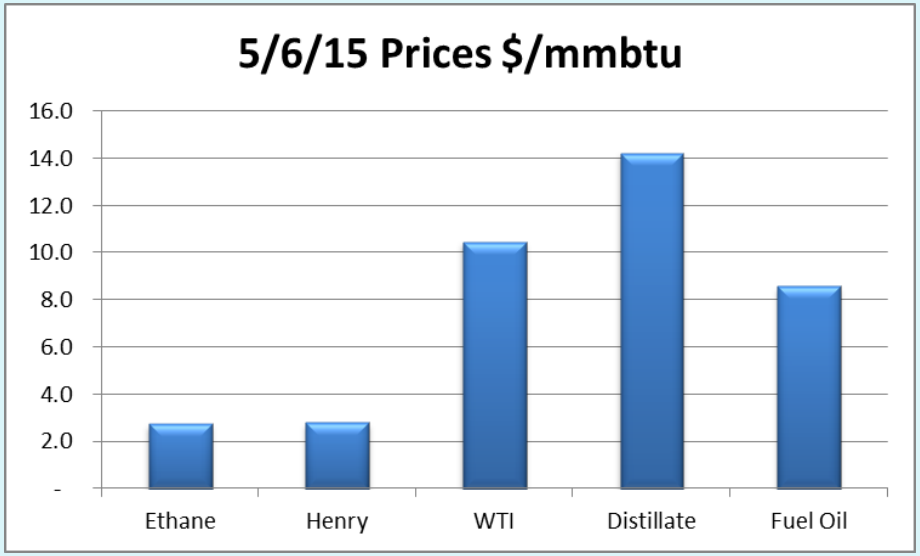
Ethane Supply/Demand





- Production gains are coming.
- Current rejection levels are very high due to economics and logistic constraints. Some of this will go away.
- Many projects announced. High demand represents 100% announced online with low case representing 75%.
- High export case contains power generation option for Caribbean and S. America island markets. 625+ kbpd potential if 100% of market generation converted to ethane. High case assumes 20%.

Ethane as a Power Plant Fuel



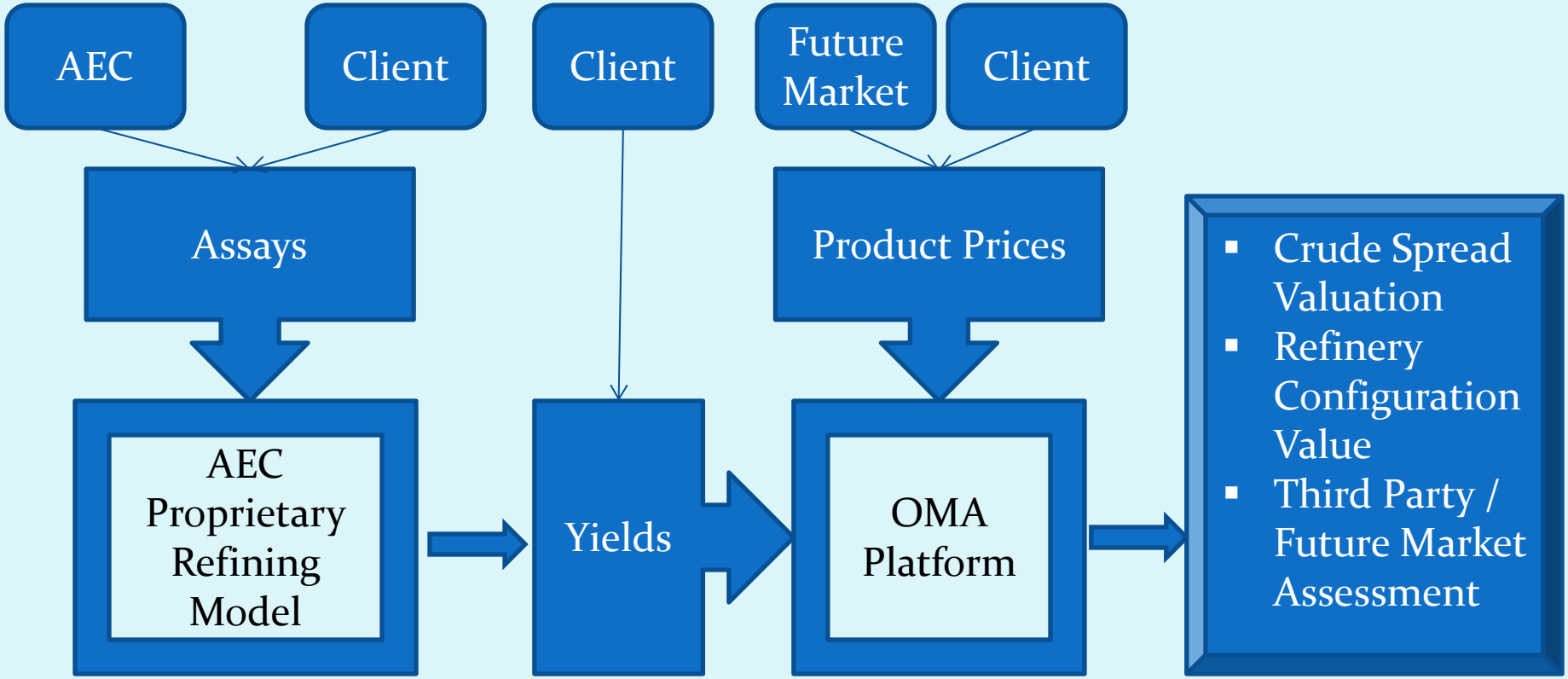
- The bridge fuel for LNG?
- Ethylene carriers are designed to carry most liquefied gas cargoes, including ethane, but do not have enough refrigerated on board to transport LNG.
- Storage of ethane will need to be underground in salt caverns or mined rock caverns, or above ground in fully refrigerated tanks. Same tanks similar to storing LNG.
- Ethane can be transported by rail or truck in specially designed cryogenic units similar to those used for LNG.
- The infrastructure built for ethane can easily be converted to LNG once a customer or country's volume grows to LNG-scale economies.
- Still relatively capital intensive for islands – but in the long run more economic sense than burning oil.

Humbling Outlook

- If we realize what we know now and what we perceive the market to be can be misleading and has shown a propensity of change, we must humble ourselves to think outside the box.
- Large condensate production and the change in refinery yield and market responses likely lead to change in Naphtha markets.
  - Diluent demand could falter along with larger seasonal gasoline demand pattern which would result in volatile Naphtha prices in the year. Discounts in winter.
- Ethane production is likely to rise 500-1000 kbd over the next decade (include potential supply from ethane rejection) and market responses likely lead to change in ethane markets.
  - Ethane demand could increase significantly as the ability and use of exporting ethane become more used and accessible.
  - Ethane cracker expansion could cause greater competition among the participants.
  - Seasonal volatility in natural gas will occur more often as natural gas is used more in the power sector. Ethane rejection variability – winter time issue.
- Ethane and Naphtha spreads will be much narrower over time and potentially see seasonal flipping in value. Flexibility brings opportunities.

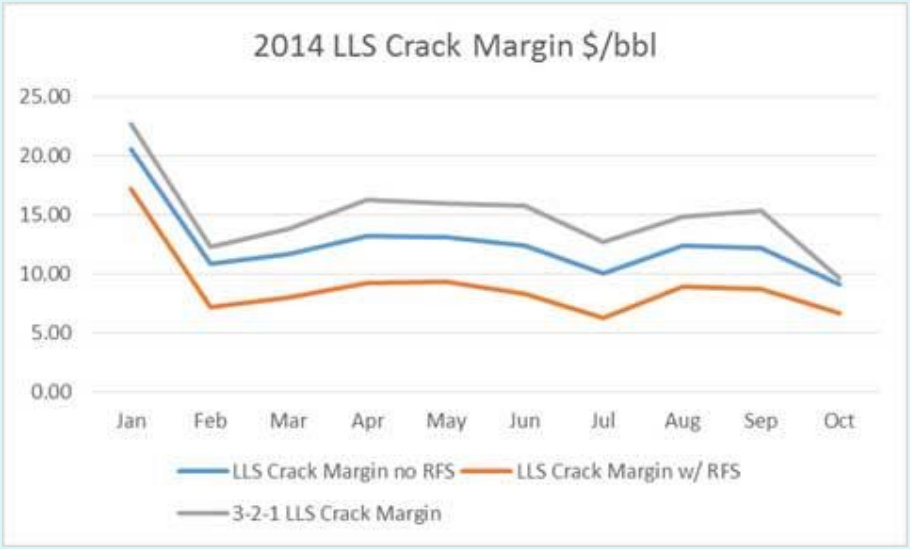
OMA

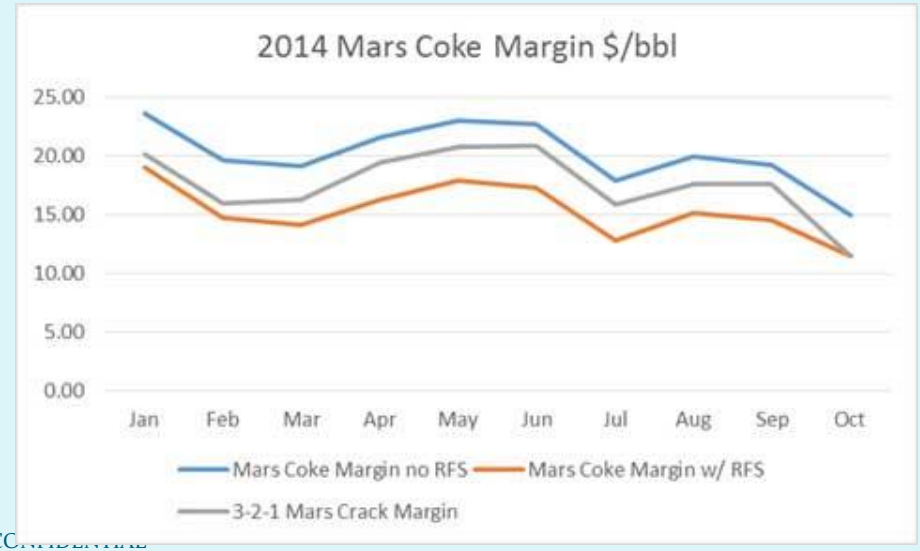
OMA



- Multiple uses depending on client needs and desire.

Calibration





USGC 12 Month Yields		
	EIA Actual	AEC OMA Model
Gasoline	41	44
Diesel	32	34
Kero/Jet	9	9
LPG	5	4
Resid	3	5
Crude Input 2014		
	EIA Actual	AEC OMA Model
API	30.2	30.5
%S	1.66	1.67

- Models have been optimized to current market performance.
- Validated by being able to reproduce 2014 results.
- 2014 crude slate includes: LLS, Mars, WTI, Eagle Ford, Olmeca, Maya, Arab Medium.

OMA Platform

- Enables superior customization
  - Yields to Product Price Inputs
- Easy intuitive drop downs enable on the fly graphing and calculations
- Designed to run daily
- Customized Daily to Weekly Reports
- Alerts
- Screening tools