Market Transformation and Trade in Oil Product

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Disclamer

None of the ideas in this presentation represents the ideas and position of the institutions and agencies which Barış Sanlı works with. Ideas should be taken as Barış Sanlı’s personal views without prejudice.

None of these slides should be used for trading or commercial purposes. The sole aim is to give a brief overview of oil trading literature

In 45 minutes – An Overview

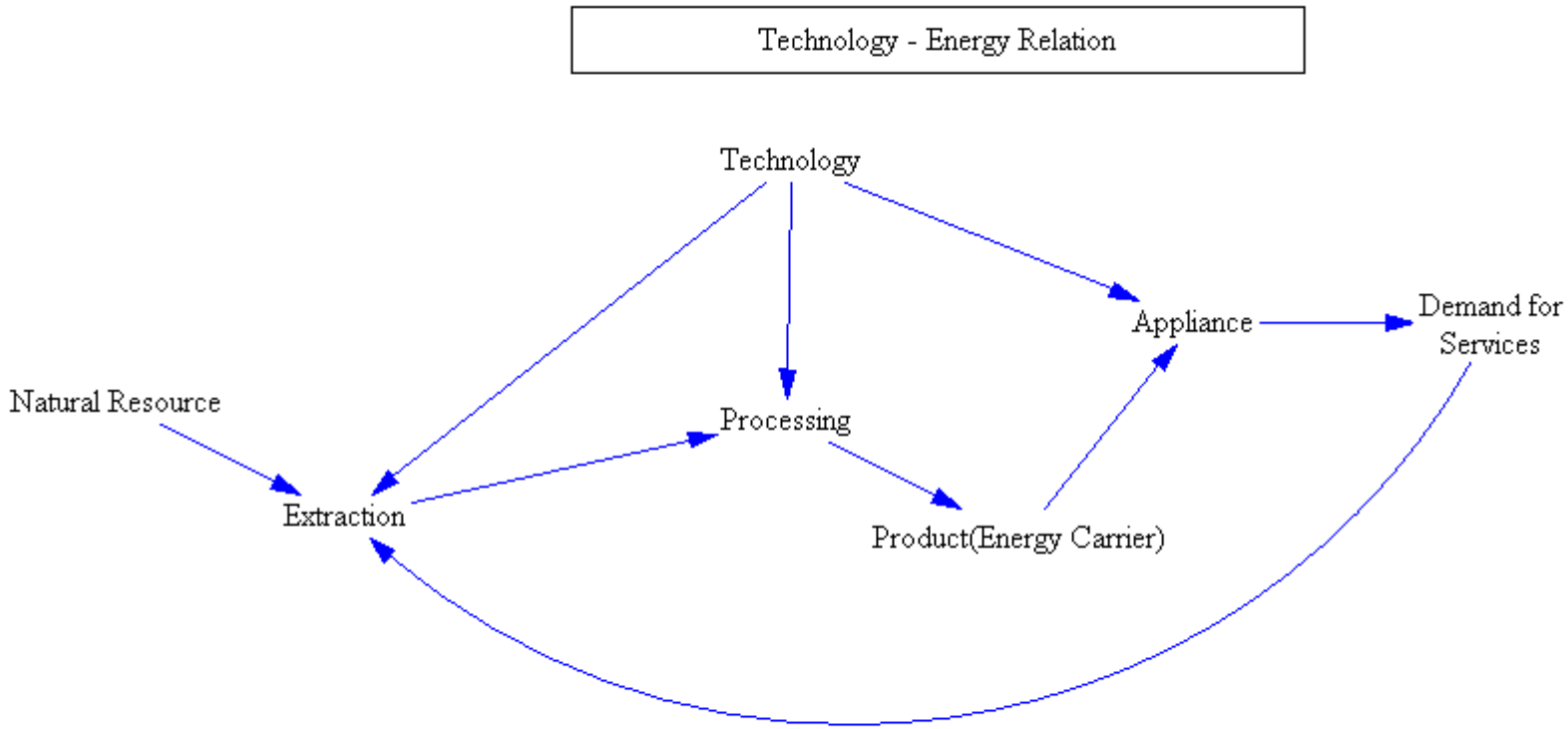
- Recommendation
  - David Long-Oil Trading Manual_ A comprehensive guide to the oil markets-Woodhead Publishing (2003)
  - Sally Clubley-Trading in oil futures and options-Woodhead Publishing (1998)
  - Morgan Downey – Oil 101 – Wooden Table Press (2009)
  - Salvatore Carollo-Understanding Oil Prices_ A Guide to What Drives the Price of Oil in Today's Markets-Wiley (2011)
  - IEA – Oil Market Report

  - Examples From : Mercatus Energy Advisors
  - Start from : https://www.mercatusenergy.com/blog/bid/86597/The-Fundamentals-of-Oil-Gas-Hedging-Futures

Inside

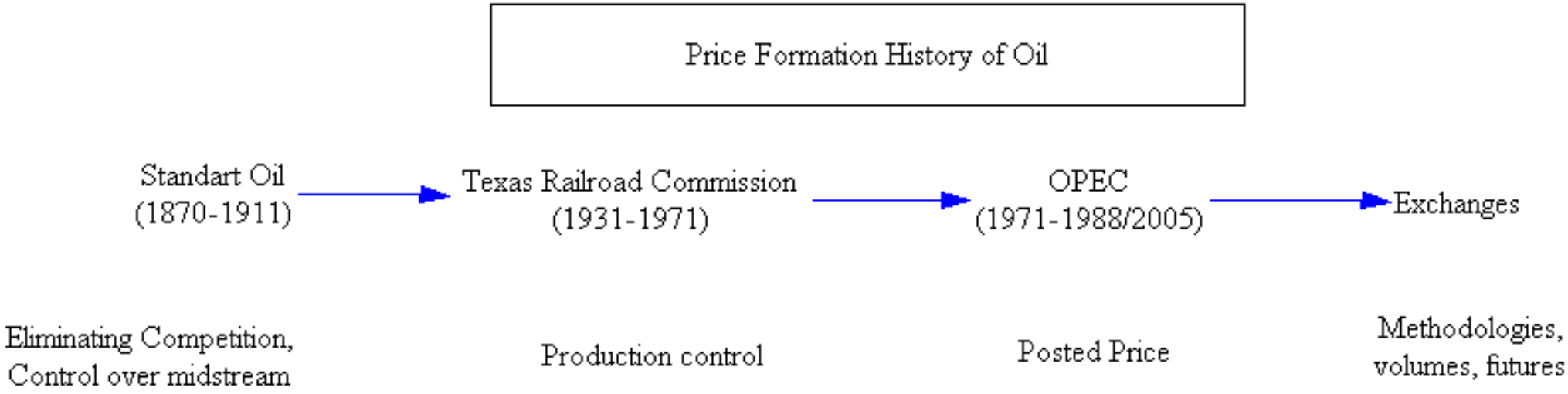
1. History of Pricing
2. Brent Era
3. Exchanges
4. A Game Theoretic World?
5. Products (Refining)
6. Seasonality
7. Oil Market Report
8. Why Trade?
9. Some Concepts of Oil Trade
10. Forward, Futures, Spreads, Options
11. Scenarios

Energy Technology Relation



History of Pricing

Price Formation History



Rockefeller First refinery 1865
Ida Tarbell (1902-1904)
Sherman AntiTrust (1890)
Split 1911

Rationing

Official Posted Price
Netback pricing
Target Price

Brent
Futures

Standard Oil

Methods & Expansion

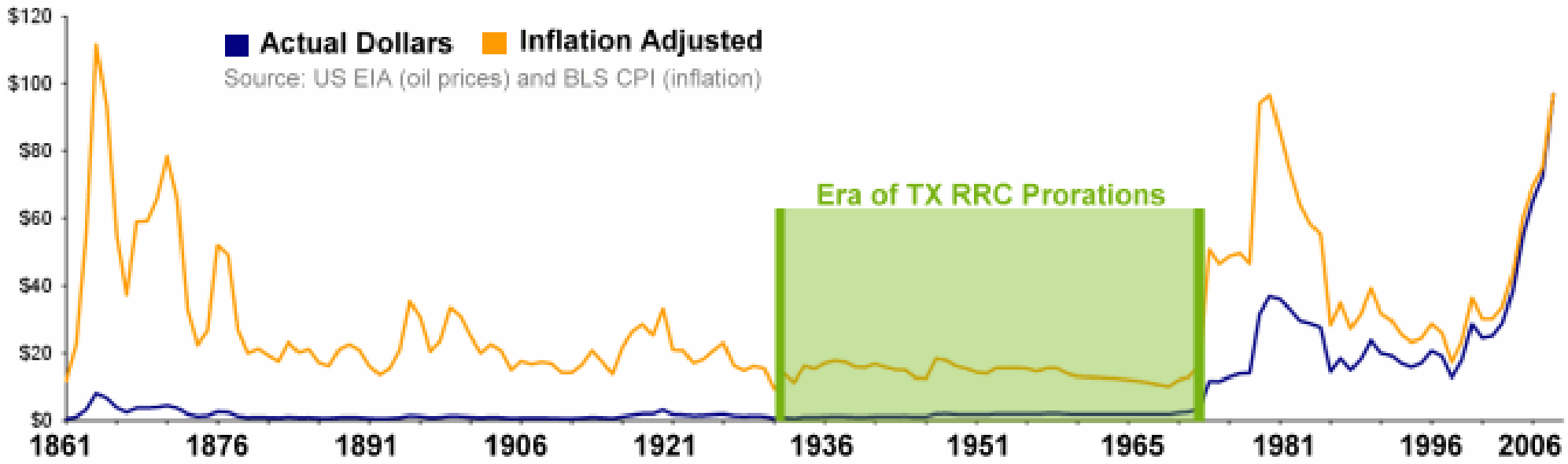
- Undercutting prices
- Railroad rebates
- Corporate espionage and violence
- Technical innovation

Financial panic 1873 – controls refineries in PA and NY

1878 – 90% oil refined

http://are.berkeley.edu/~sberto/StandardOil.pdf

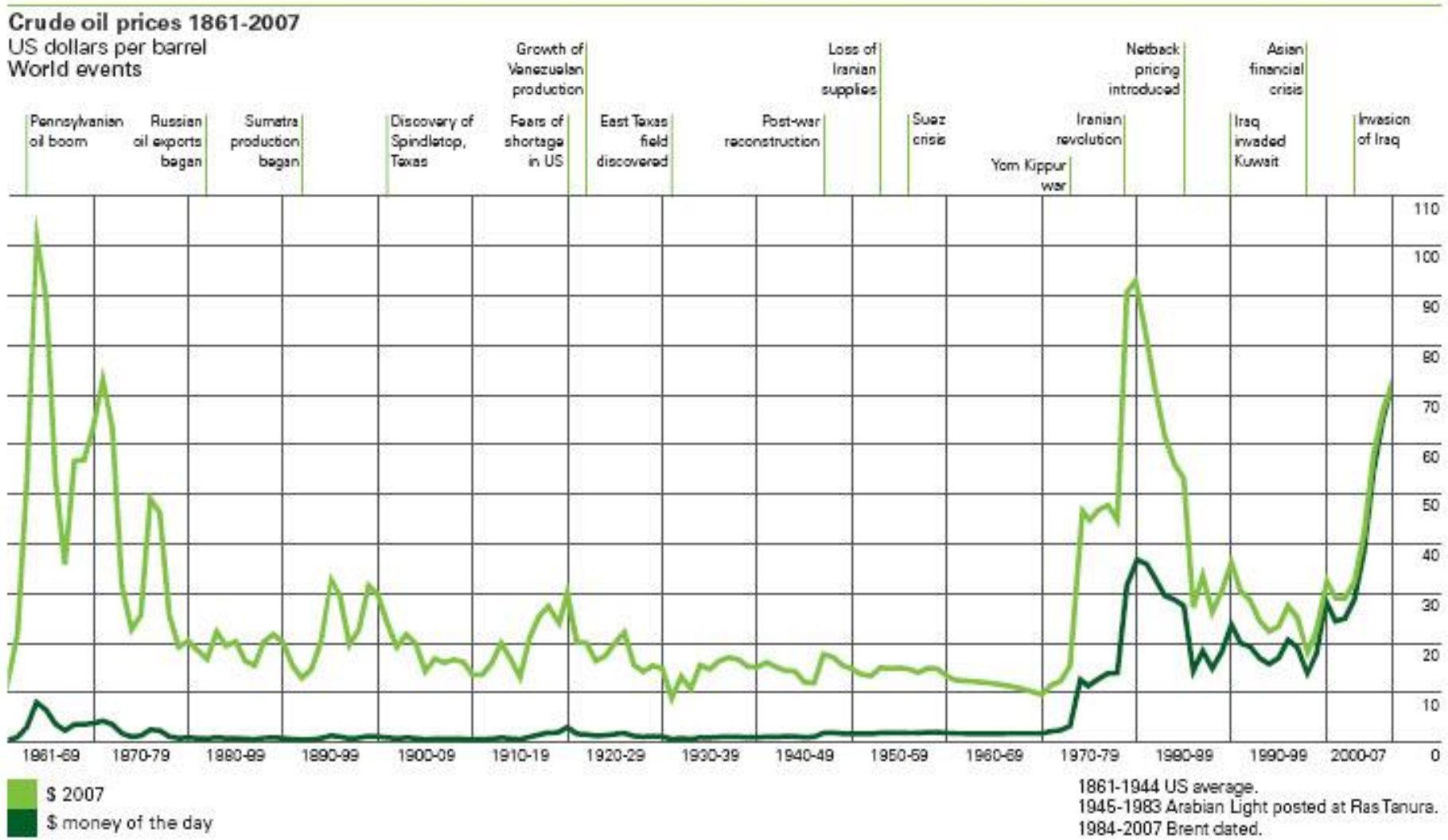
TRC



Production Prorationing

http://oilpro.com/q/1602/opec-playing-hardball-time-tx-railroad-commission-to-reassert-its

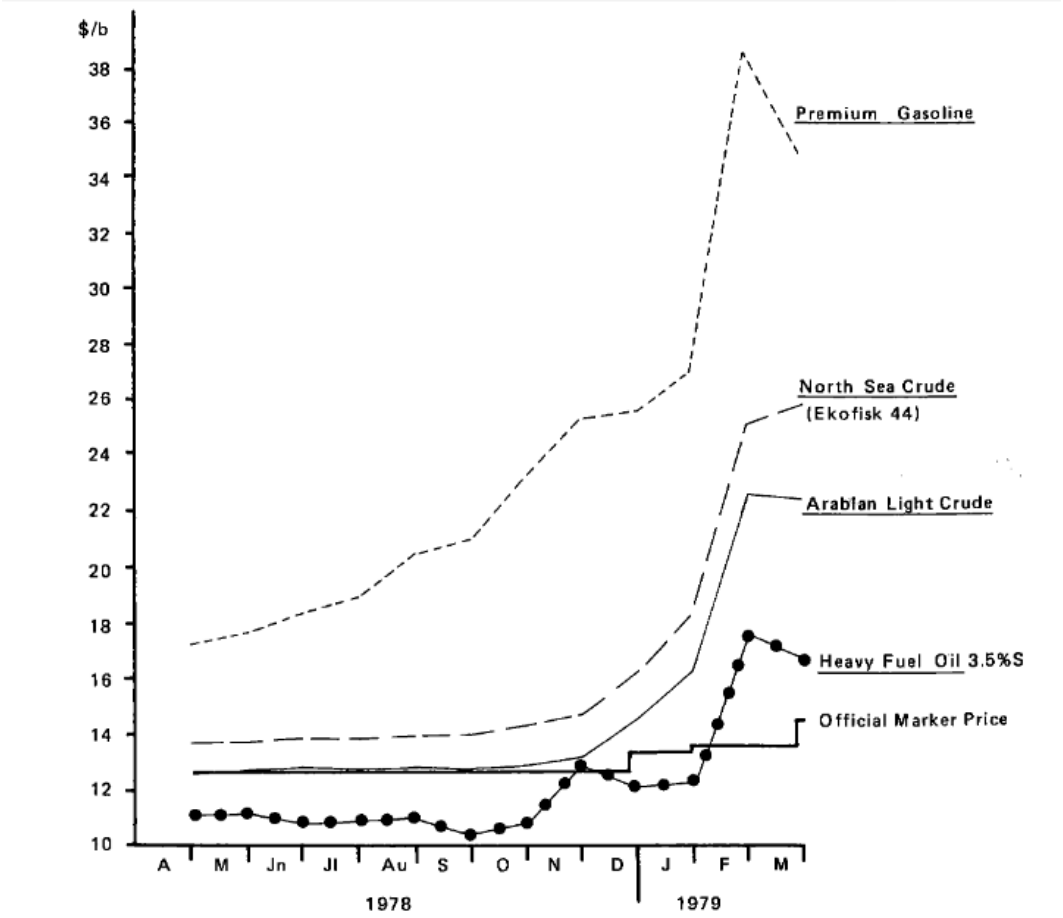
OPEC Era


Crude oil prices 1861-2007
US dollars per barrel
World events
Pennsylvanian oil boom
Russian oil exports began
Sumatra production began
Discovery of Spindletop, Texas
Growth of Venezuelan production
Fears of shortage in US
East Texas field discovered
Post-war reconstruction
Loss of Iranian supplies
Suez crisis
Yom Kippur war
Iranian revolution
Netback pricing introduced
Iraq invaded Kuwait
Asian financial crisis
Invasion of Iraq
110
100
90
80
70
60
50
40
30
20
10
0
1861-69
1870-79
1880-89
1890-99
1900-09
1910-19
1920-29
1930-39
1940-49
1950-59
1960-69
1970-79
1980-89
1990-99
2000-07
$ 2007
$ money of the day
1861-1944 US average.
1945-1983 Arabian Light posted at Ras Tanura.
1984-2007 Brent dated.

Netback System

a. Revenue obtained from sale of finished products	100
b. Costs incurred for transport of crude	5
c. Costs incurred for refining crude	5
d. Finance and other charges	4
e. Guaranteed margin for customer	10
Price to pay for crude ($P = a - b - c - d - e$)	76

April 1978- March 1979



https://www.oxfordenergy.org/wpcms/wp-content/uploads/2010/11/WPM4-WhoMakestheOilPriceAnAnalysisofOilPriceMovements1978-82-SRoberts-1984.pdf

Understanding OPEC Era

Figure 3

SPOT CRUDE AND PRODUCT PRICES
1979 to 1982

https://www.oxfordenergy.org/wpcms/wp-content/uploads/2010/11/WPM4-WhoMakestheOilPriceAnAnalysisofOilPriceMovements1978-82-SRoberts-1984.pdf

KSA

Saudi Arabian policies to achieve these objectives are :

1. Resisting attempts by other producers to raise the price, 1975, 1977, 1979 and beyond.
2. Selling at official set prices and using volume control to ascertain such periods.
3. Increasing output to keep spot prices lower (1977 and 1979-1981) and reducing it to maintain stable oil prices (1975, 1982-1985).
4. Maintaining its market share at reasonable levels despite an increase in non-OPEC production (1994-1997).

Period	Saudi Arabia Selling Oil Price (P^{SA})	Market Oil Price (P^{M})
Jan. 1974 - Jul. 1985	Official Price of OPEC Arabian Light API 34^{0}	Spot Price Arabian Light API 34^{0}

http://www.seec.surrey.ac.uk/research/SEEDS/SEEDS93.pdf

Brent Era

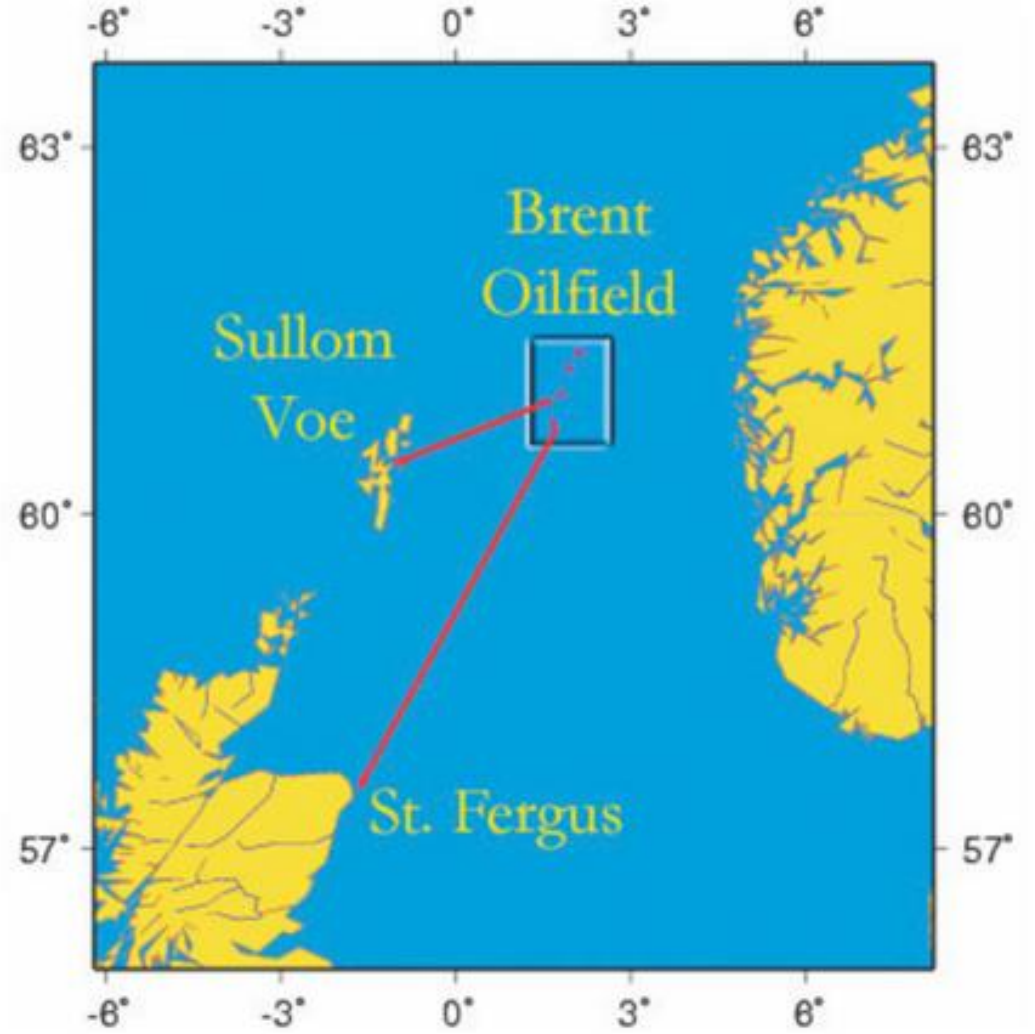
Suicide of OPEC ? (From Salvatore Carollo)

- Lack of agreement on production control
- December 1988 OPEC, guided by Saudi Arabia
  - Abandon OSP
  - Adopting Brent

> The truth was that since all the producing nations in the OPEC and non-OPEC world used the same benchmark, actually they were all part of the same non-existent cartel. But since this ghostly cartel had no agreement for regulating supply, there was no way to discipline or control the prices. The market had become absolutely free, just as Mrs Thatcher and the City of London had so much desired.

Understanding Oil Prices, Salvatore Carollo

Brent Era



Discovery July 1971
First oil tanker 13 December 1976

ICE Crude & Refined Products

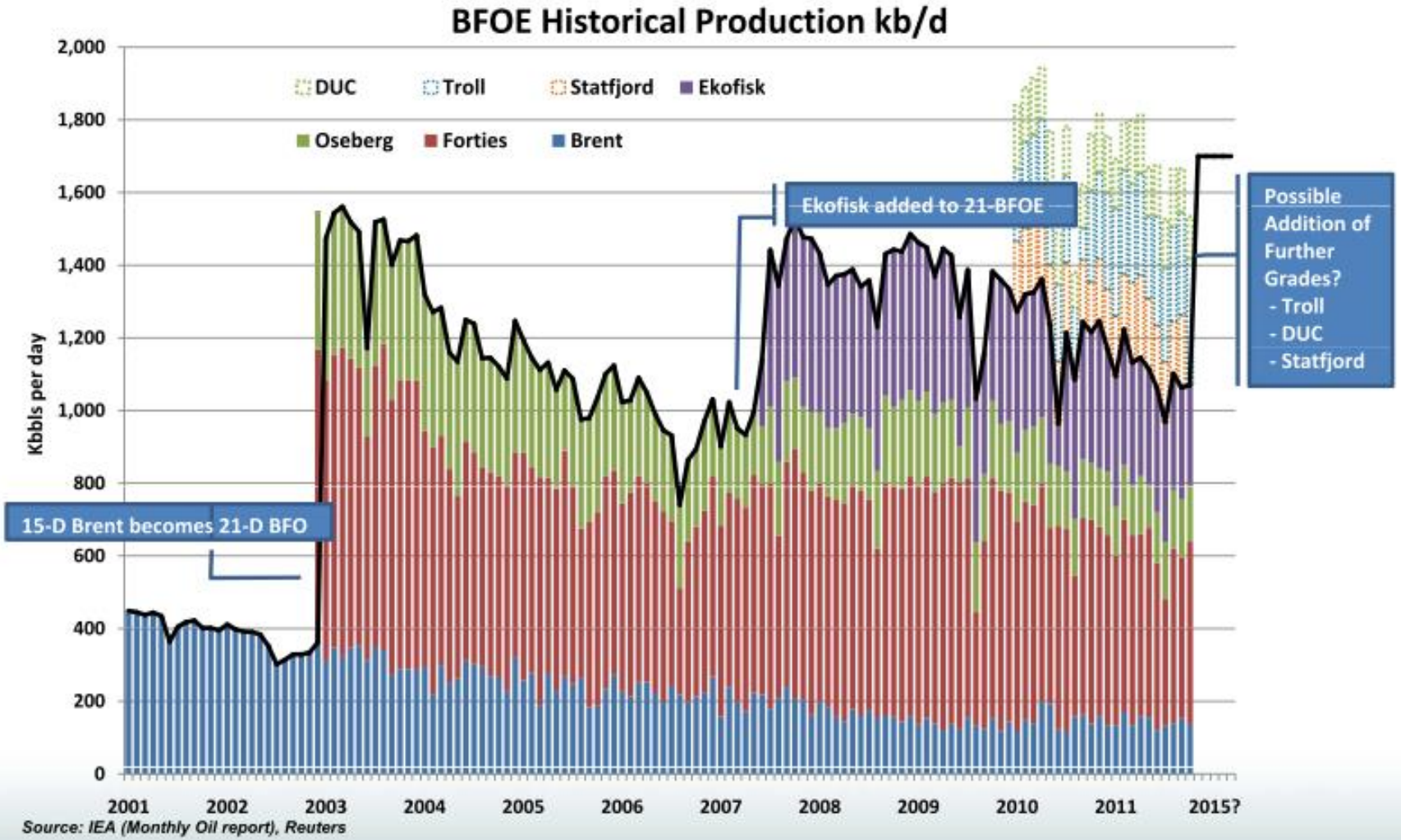
Futures

- 1983 – IPE (International Petroleum Exchange) first attempt
- WTI not a benchmark for Europe (1984/1985)
- May 1985 Crude oil price index – (Nov 85 - > cash settlement)
- 1988 Brent contract settled in cash

Brent-ology

- Brent : an oil field
- Brent Blend: blend of North Sea fields
- Dated Brent: physical Brent crude with loading dates
- 15(later 21) day BFO,BFOE(forward Brent): forward cargo 500,000 bbls
- IPE Brent : Cash settled contract for 1000 bbls

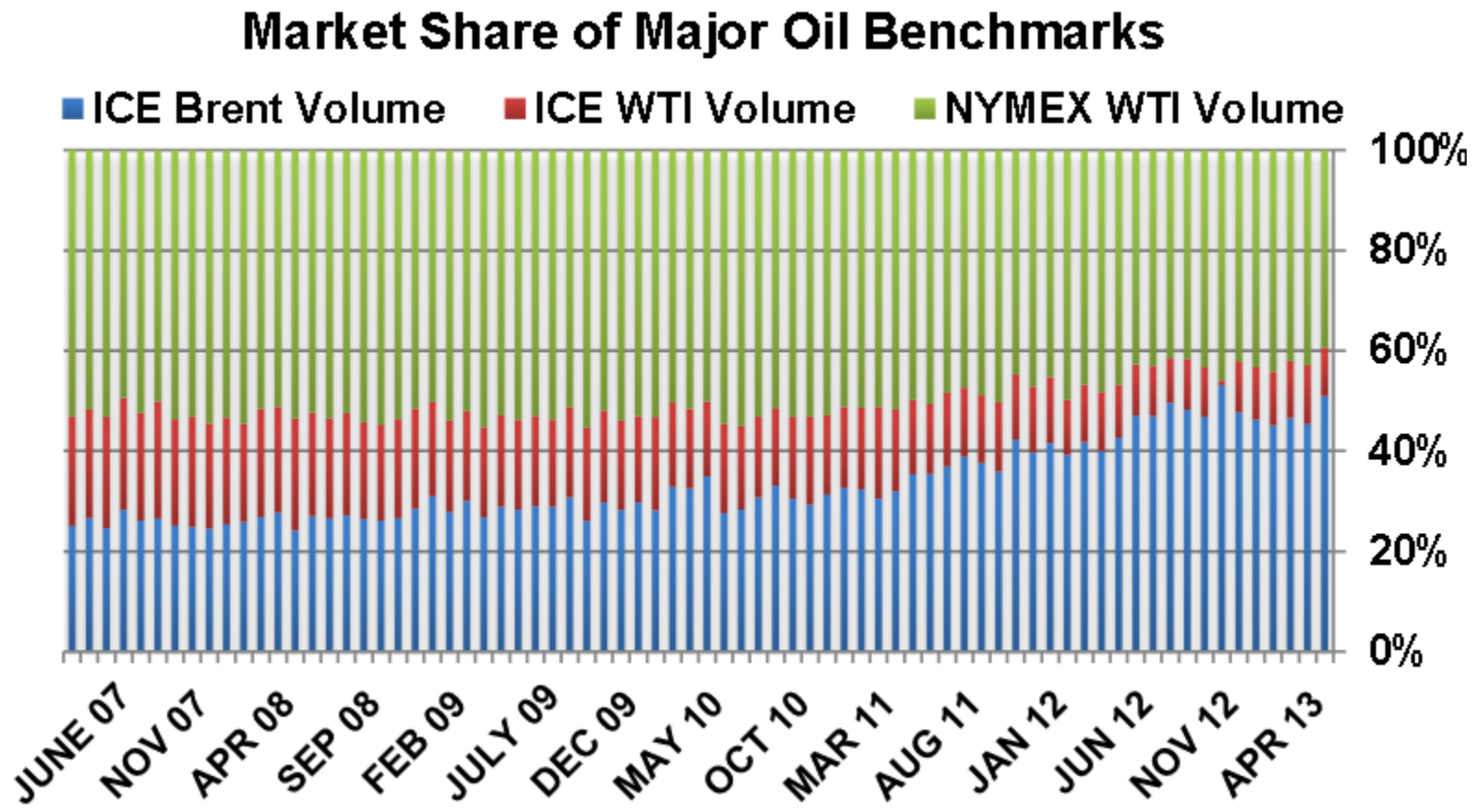
BFOE Historical Production



Early age

- 1950s very very small
- 1960s-1970s nearly all refining capacity controlled by majors
- Independent refiners
- Independents buying crude on spot market, selling back to market
- 1980s, oil majors not interested in spot markets
- BP in 1983 - > buying more than 50% from spot

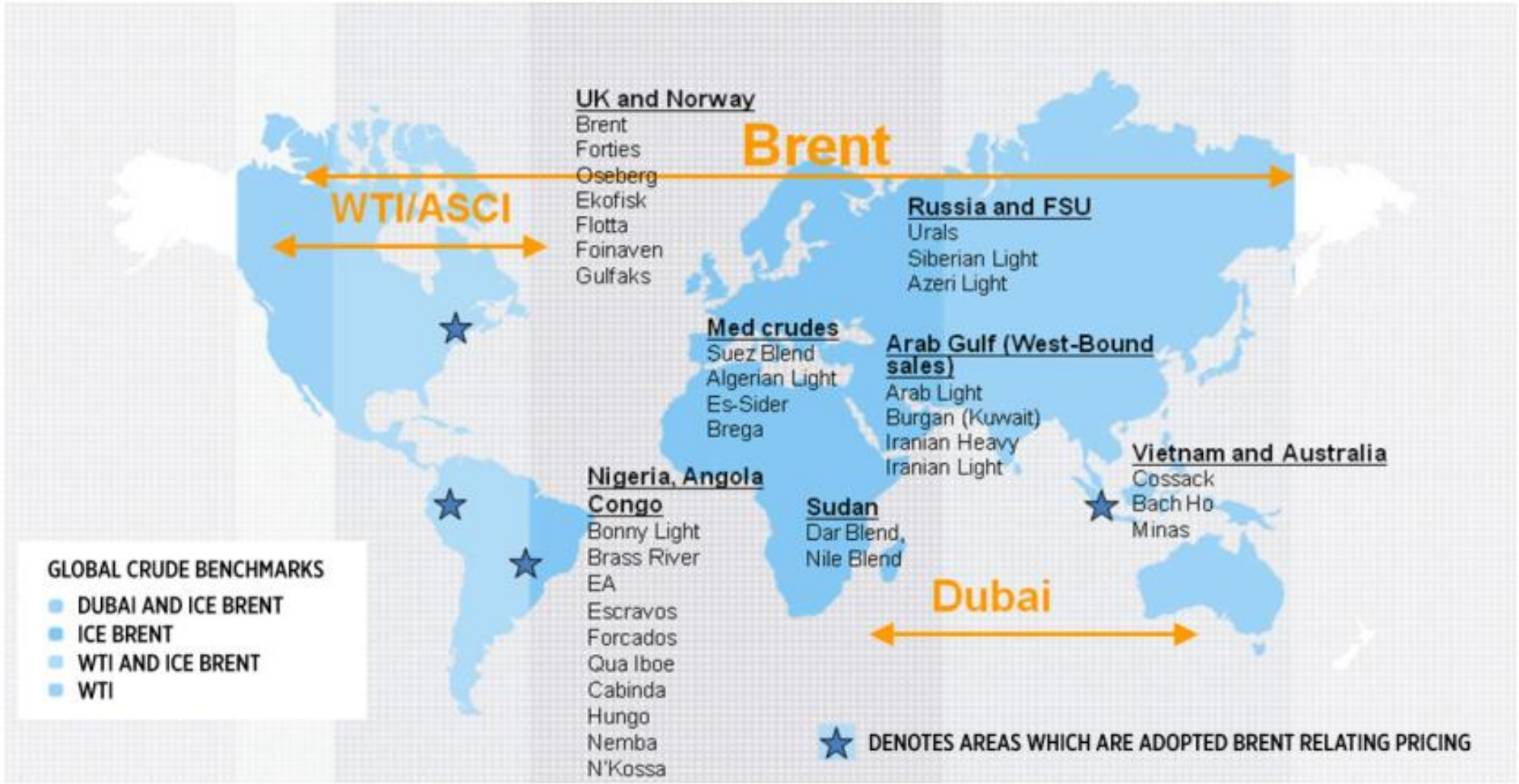
Before Shale Revolution



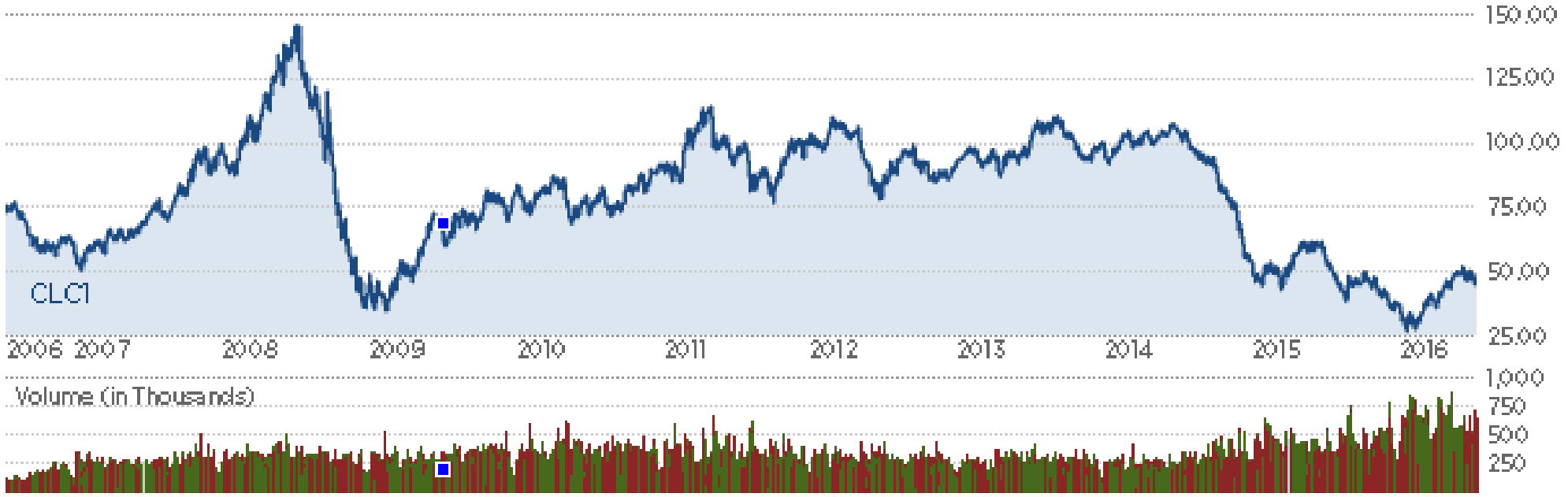
http://www.platts.com/im.platts.content/productsservices/conferenceandevents/2013/pc366/presentations/mike_davis_ice_future_enterprises.pdf

Exchanges

The ICE Perspective -



Commoditization



http://apps.cnbc.com/view.asp?uid=stocks/charts&symbol=CLc1&tearoff=1

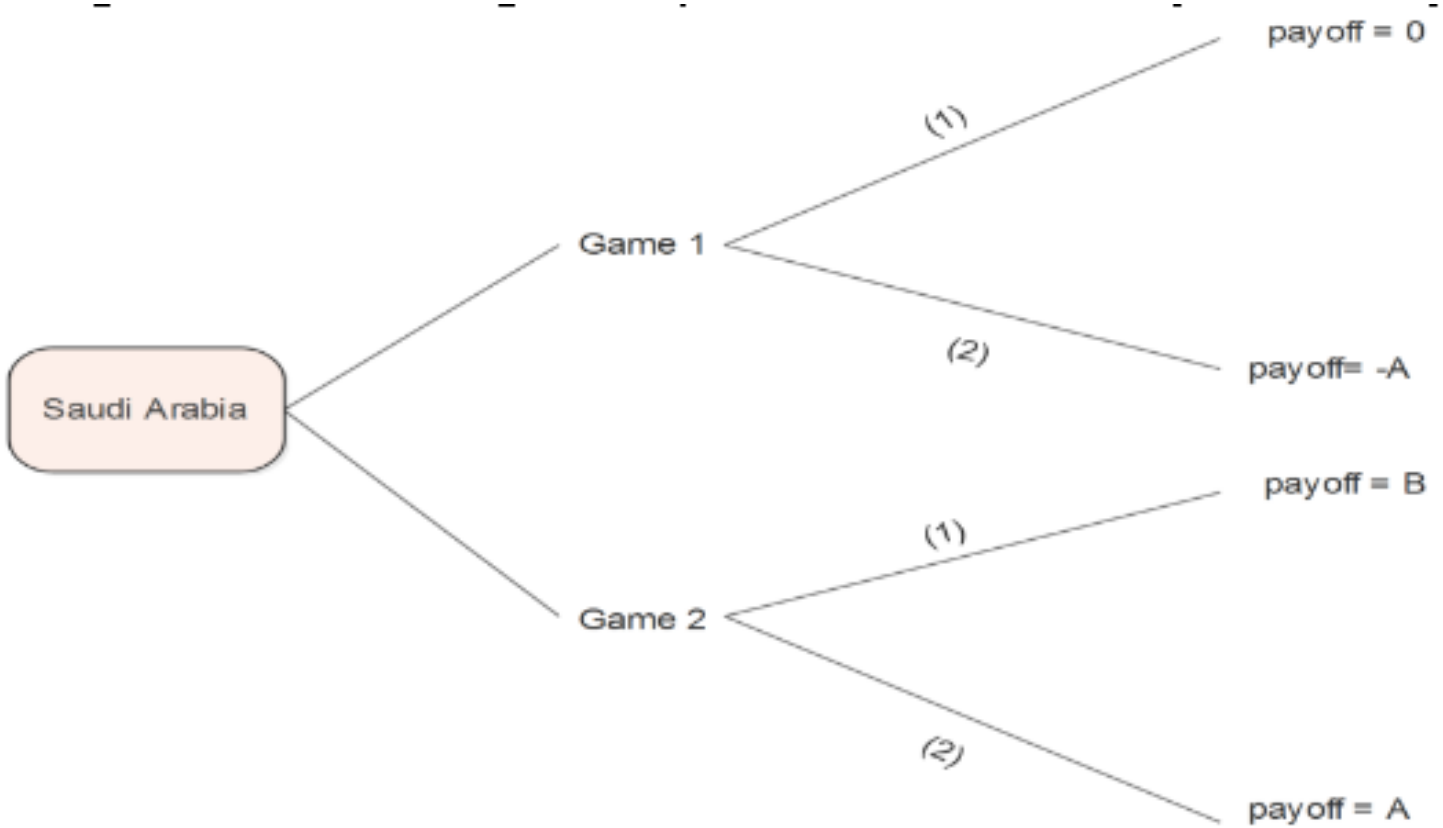
A Game Theoretic World?

New World – KSA – Game Theoretic Approach

	Elastic US supply (game 1)	
	Other-OPEC members cut output	Other-OPEC members do not change output
SA cuts output	-C, -C	-A, 0
SA does not change output	0, -A	0, 0

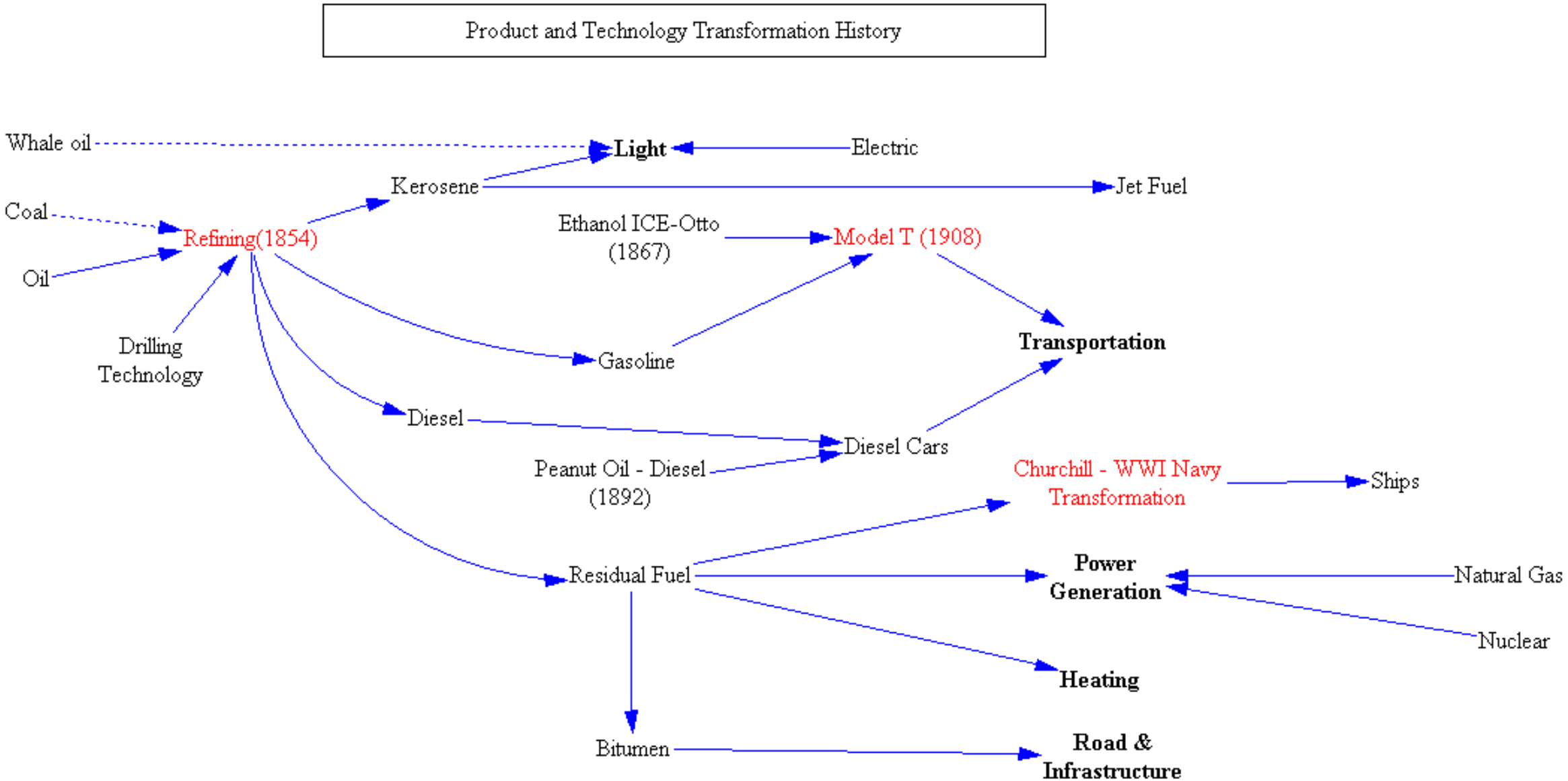
	Inelastic US supply (game 2)	
	Other-OPEC members cut output	Other-OPEC members do not change output
SA cuts output	A, A	C, B
SA does not change output	B, C	0, 0

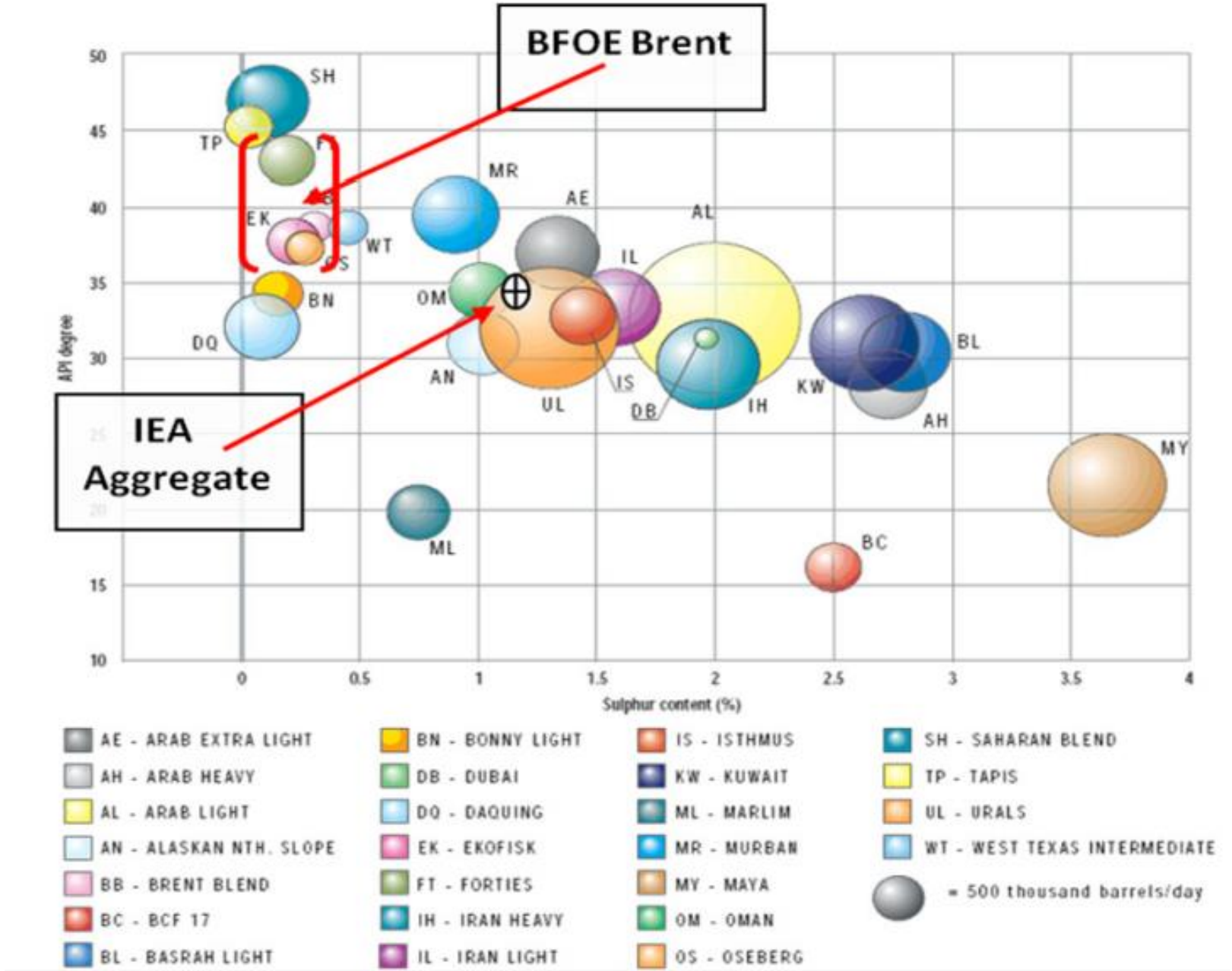
Oil Game


Saudi Arabia
Game 1
Game 2
(1)
(2)
(1)
(2)
payoff = 0
payoff= -A
payoff = B
payoff = A

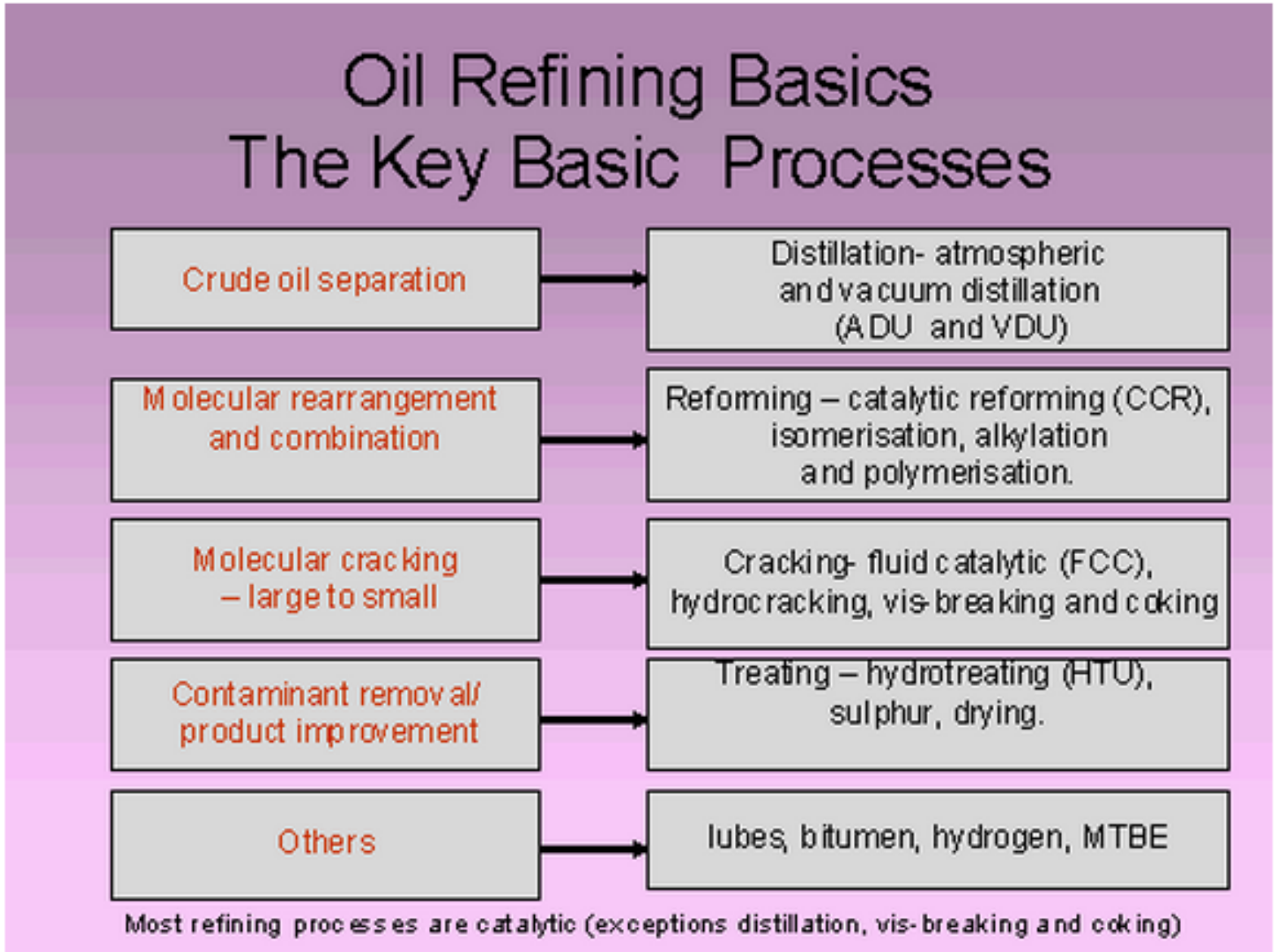
Products

History, Refining


Product and Technology Transformation History
Whale oil
Light
Electric
Kerosene
Jet Fuel
Coal
Refining(1854)
Ethanol ICE-Otto
(1867)
Model T (1908)
Oil
Drilling
Technology
Gasoline
Transportation
Diesel
Diesel Cars
Peanut Oil - Diesel
(1892)
Churchill - WWI Navy
Transformation
Ships
Residual Fuel
Power
Generation
Natural Gas
Nuclear
Heating
Bitumen
Road &
Infrastructure


BFOE Brent
IEA Aggregate
API degree
Sulphur content (%)
50
45
40
35
30
25
20
15
10
0
0.5
1
1.5
2
2.5
3
3.5
4
SH
TP
FT
MR
AE
AL
EK
WT
OS
IL
OM
BN
DQ
AN
UL
IS
DB
IH
KW
BL
AH
MY
ML
BC
AE - ARAB EXTRA LIGHT
AH - ARAB HEAVY
AL - ARAB LIGHT
AN - ALASKAN NTH. SLOPE
BB - BRENT BLEND
BC - BCF 17
BL - BASRAH LIGHT
BN - BONNY LIGHT
DB - DUBAI
DQ - DAQUING
EK - EKOFISK
FT - FORTIES
IH - IRAN HEAVY
IL - IRAN LIGHT
IS - ISTHMUS
KW - KUWAIT
ML - MARLIM
MR - MURBAN
MY - MAYA
OM - OMAN
OS - OSEBERG
SH - SAHARAN BLEND
TP - TAPIS
UL - URALS
WT - WEST TEXAS INTERMEDIATE
= 500 thousand barrels/day

Ref: ENI



http://www.gasandoil.com/news/2011/03/global-refining-capacity-at-clouse

Oil 101

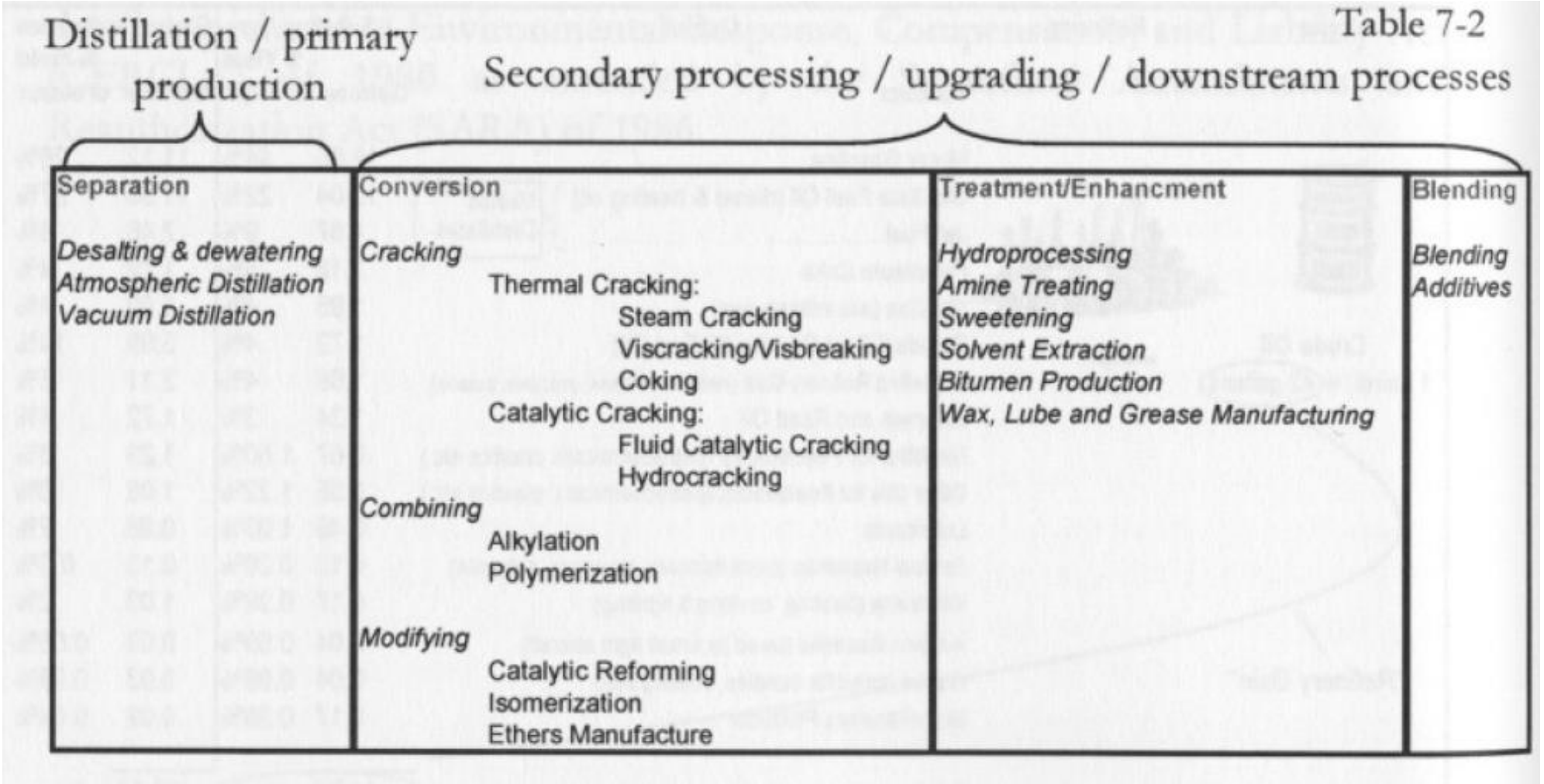


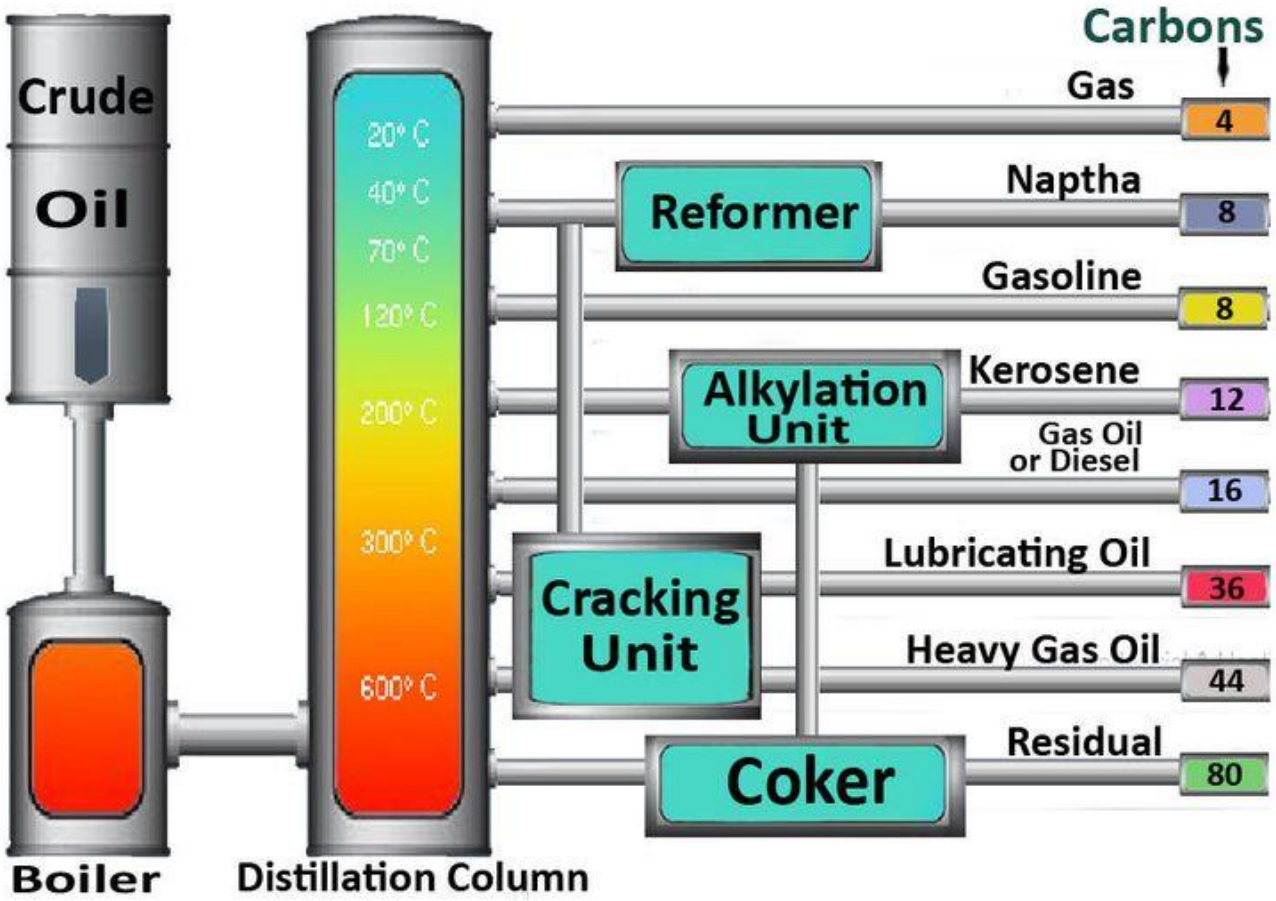
Table 7-2

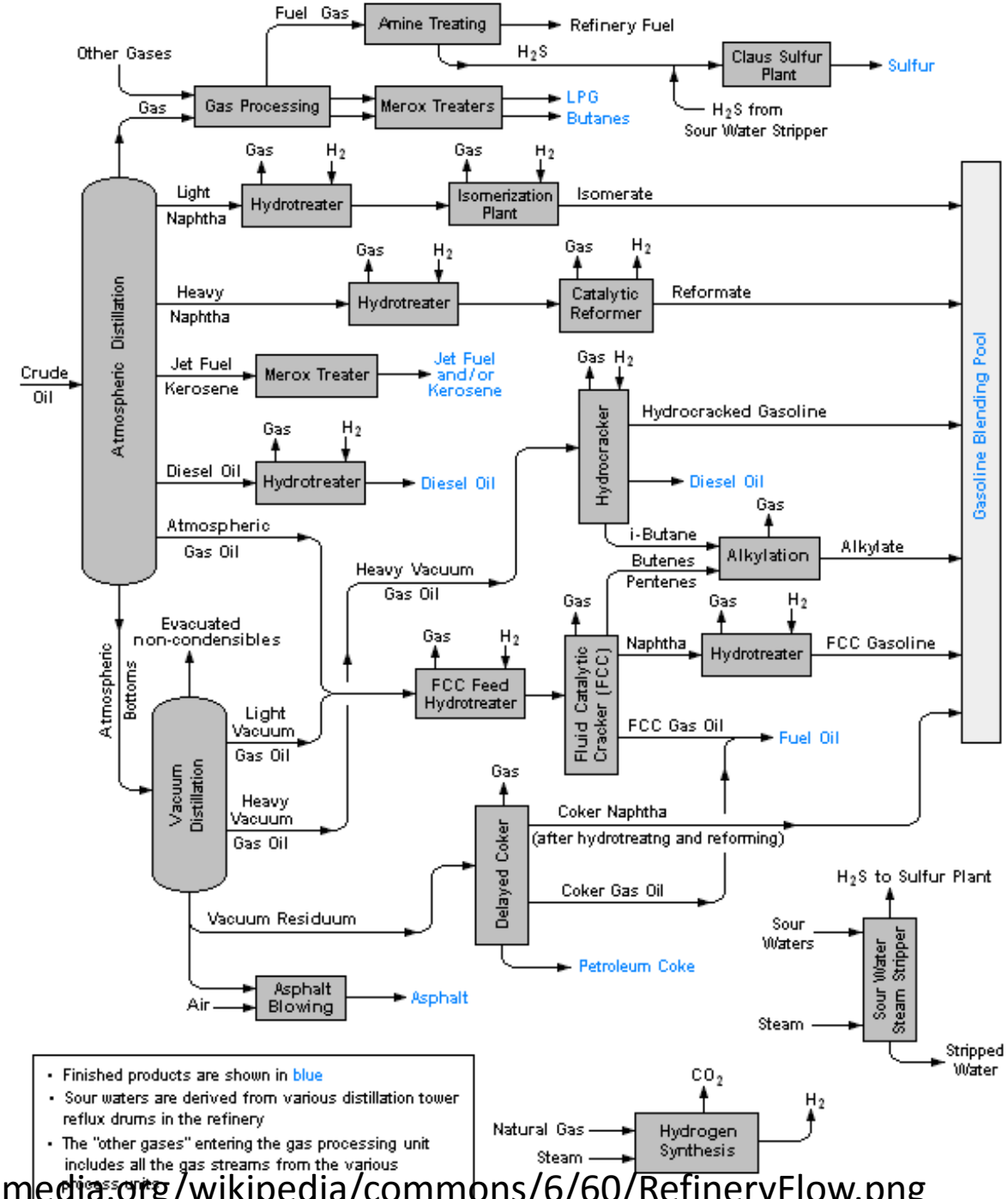
Distillation / primary production

Secondary processing / upgrading / downstream processes

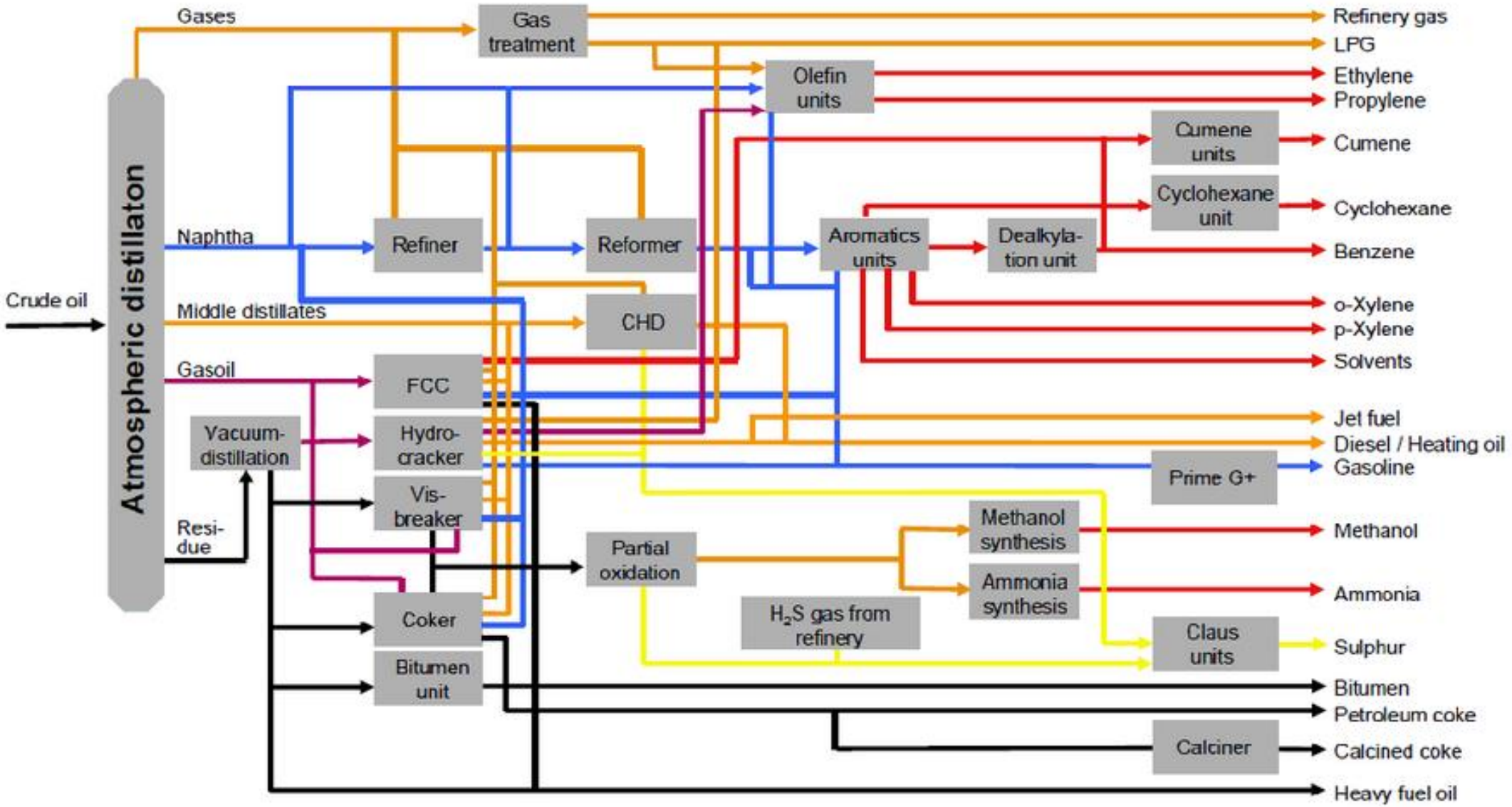
Separation	Conversion	Treatment/Enhancment	Blending
Desalting & dewatering	*Cracking*	*Hydroprocessing*	*Blending*
Atmospheric Distillation	Thermal Cracking:	*Amine Treating*	*Additives*
Vacuum Distillation	Steam Cracking	*Sweetening*	
	Viscracking/Visbreaking	*Solvent Extraction*	
	Coking	*Bitumen Production*	
	Catalytic Cracking:	*Wax, Lube and Grease Manufacturing*	
	Fluid Catalytic Cracking		
	Hydrocracking		
	Combining		
	Alkylation		
	Polymerization		
	Modifying		
	Catalytic Reforming		
	Isomerization		
	Ethers Manufacture		

Refinery


Crude
Oil
Boiler
20° C
40° C
70° C
120° C
200° C
300° C
600° C
Distillation Column
Carbons
Gas
4
Reformer
Naptha
8
Gasoline
8
Alkylation Unit
Kerosene
12
Gas Oil or Diesel
16
Cracking Unit
Lubricating Oil
36
Heavy Gas Oil
44
Coker
Residual
80

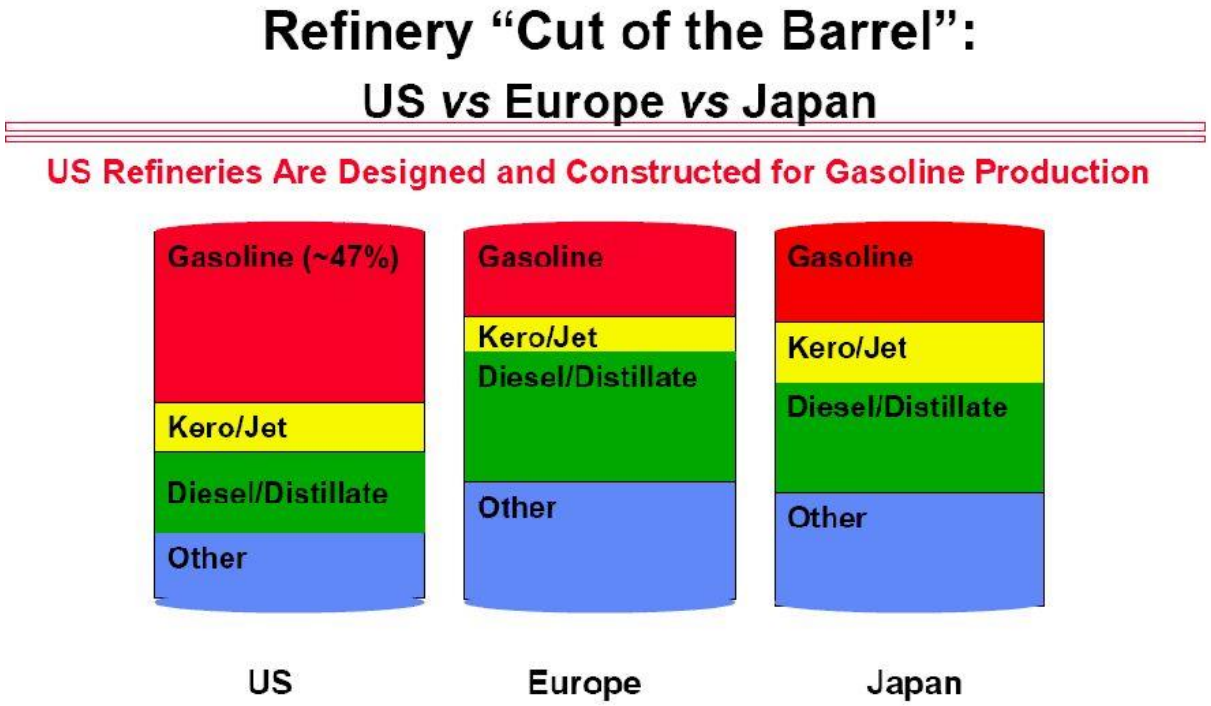


https://upload.wikimedia.org/wikipedia/commons/6/60/RefineryFlow.png



- http://www.gasandoil.com/news/2011/03/resolveuid/dfe2e5d3f6ae9302059c39ec8357f238

Different Countries – Different Settings

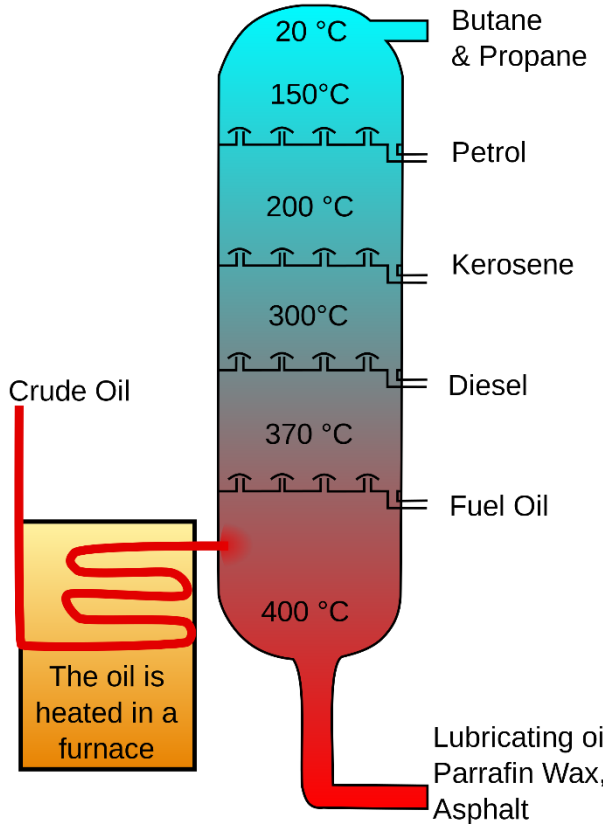


http://www1.eere.energy.gov/vehiclesandfuels/pdfs/deer_2007/session7/deer07_williams.pdf

Yields

Mediterranean Yields

Volume % Yield	HS Es Sider	HS Urals	HC + VB Es Sider	HC + VB Urals
LPG	2.37%	4.41%	3.96%	5.75%
Gasoline	19.27%	13.06%	23.56%	17.97%
Naphtha	0.00%	0.00%	0.00%	0.00%
Kerosene	7.37%	7.60%	13.67%	14.04%
Diesel	31.90%	30.10%	40.74%	42.80%
HSFO	0.00%	41.85%	0.00%	16.34%
LSFO	35.74%	0.00%	15.01%	0.00%



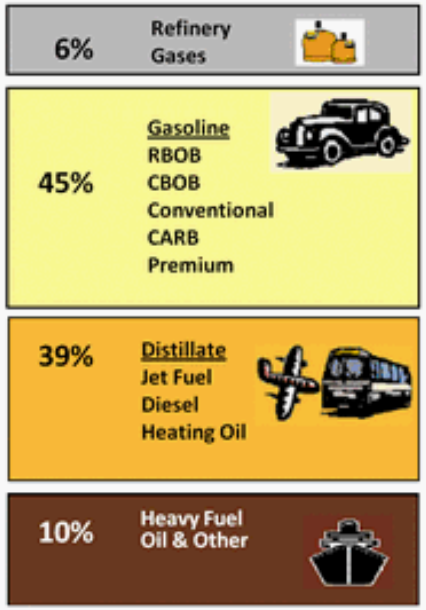
https://upload.wikimedia.org/wikipedia/commons/thumb/6/6e/Crude_Oil_Distillation-en.svg/2000px-Crude_Oil_Distillation-en.svg.png

IEA. (September 2012) IEA REfinery Margins,MEthodology Notes. Retrieved 10 Jul 2016, from https://www.iea.org/media/omrreports/Refining_Margin_Supplement_OMRAUG_12SEP2012.pdf

What's in a Barrel of Crude Oil?

Crude Oil Types	Characteristics	Inherent Yields
Light Sweet (e.g. WTI, LLS, Brent)	> 34 API Gravity < 0.7 % Sulfur 35% Demand Most Expensive	3% 32% 30% 35%
Medium Sour (e.g. Mars, Arab Light, Arab Medium, Urals)	24 to 34 API Gravity > 0.7 % Sulfur 50% Demand Less Expensive	2% 24% 26% 48%
Heavy Sour (e.g. Maya, Cerro Negro, Cold Lake, Western Canadian Select)	< 24 API Gravity > 0.7 % Sulfur 15% Demand Least Expensive	1% 15% 21% 63%

2013 U.S. Refinery Production

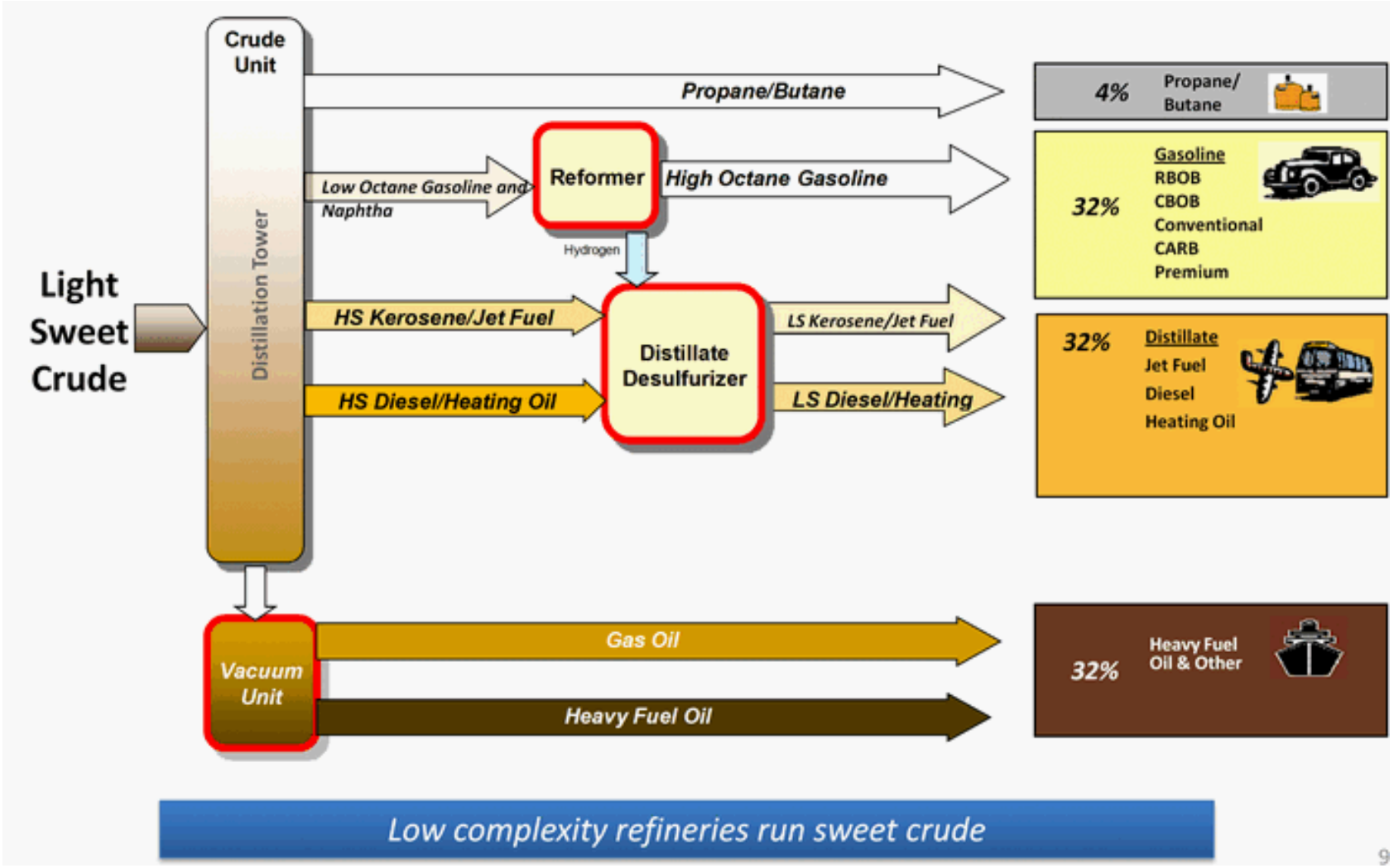


Source: EIA refinery yield through November 2013

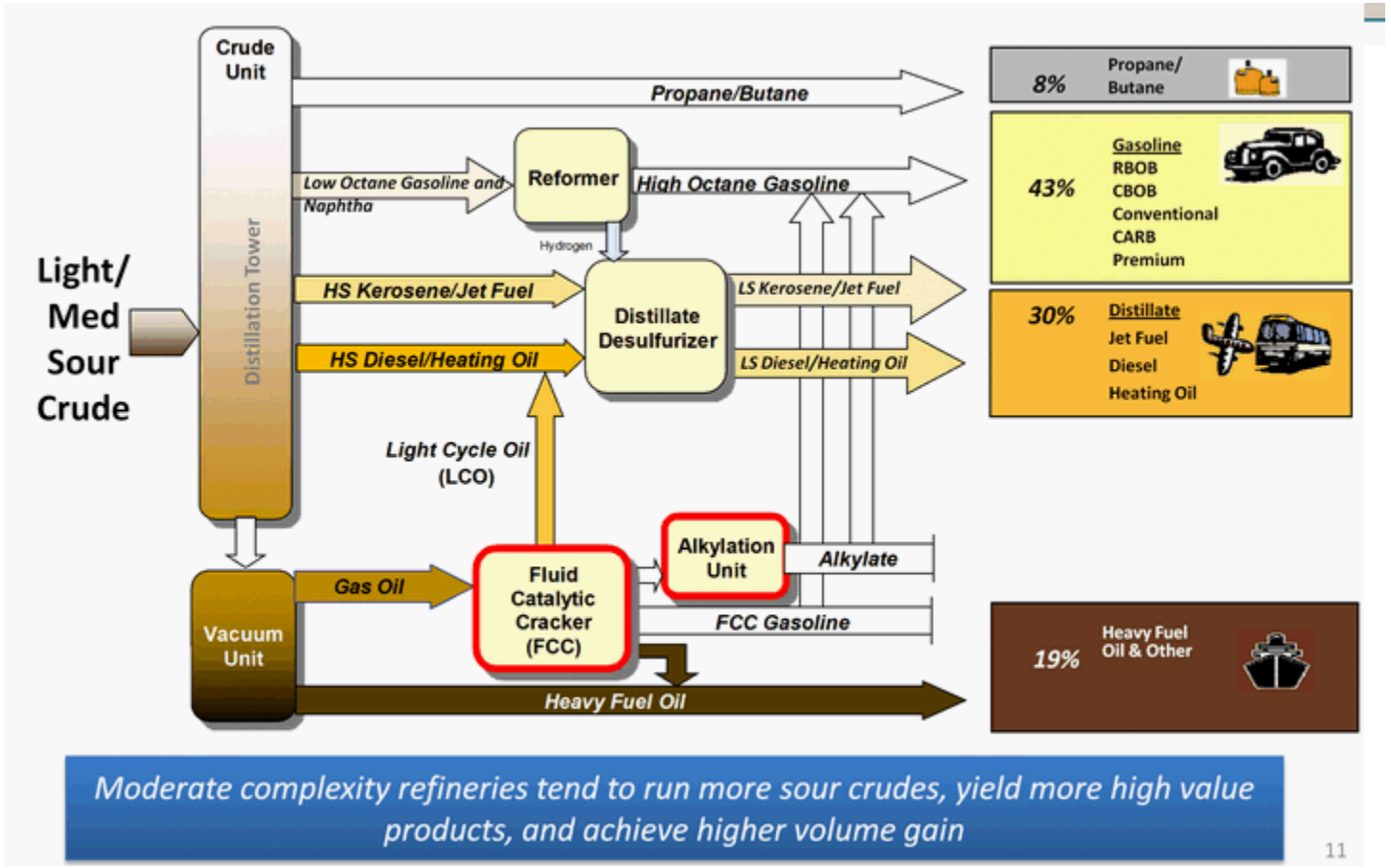
Refineries upgrade crude oil into higher value gasoline and distillates

https://www.sec.gov/Archives/edgar/data/1035002/000119312514065039/d680806dex9901.htm

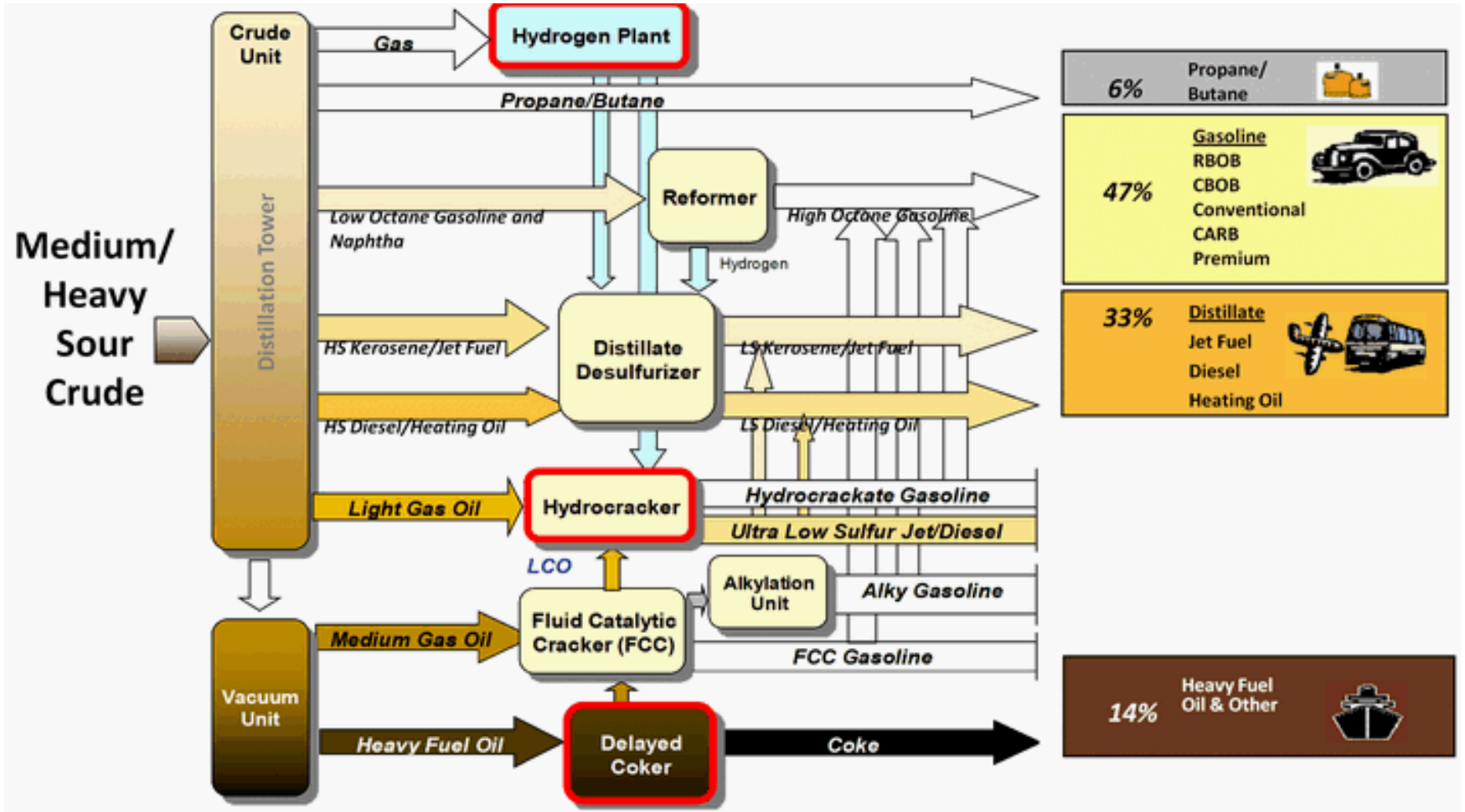
Toppling/HydroSkimming refinery



Catalytic Cracking

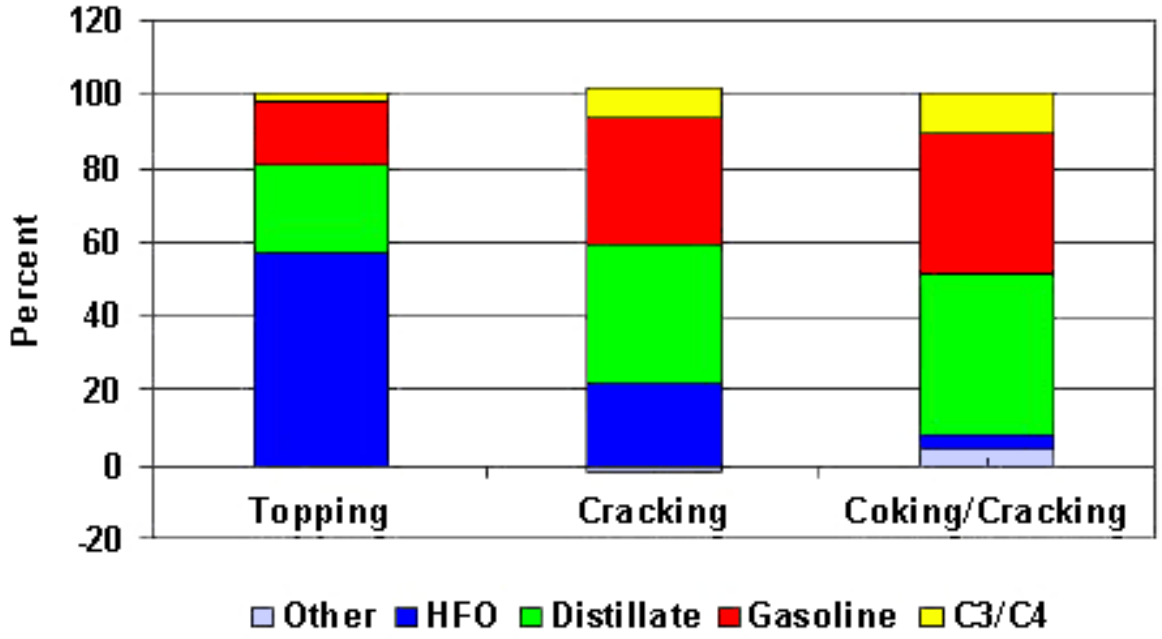


Complex Refineries



High complexity refineries can run heavier, more sour crudes while achieving the highest light product yields and volume gain

Canada – Yields vs Technology



Unit Type	Base Unit Size kbd	Nelson Factor	Nelson Complexity
CDU	100	1	1
VDU	60	2	1.2
FCC	50	6	3
Hydrocracker	30	6	1.8
Delayed Coker	20	6	1.2
Cat Reformer	30	5	1.5
Alkylation	10	10	1
Lubes	1	60	0.6
		Total	11.3

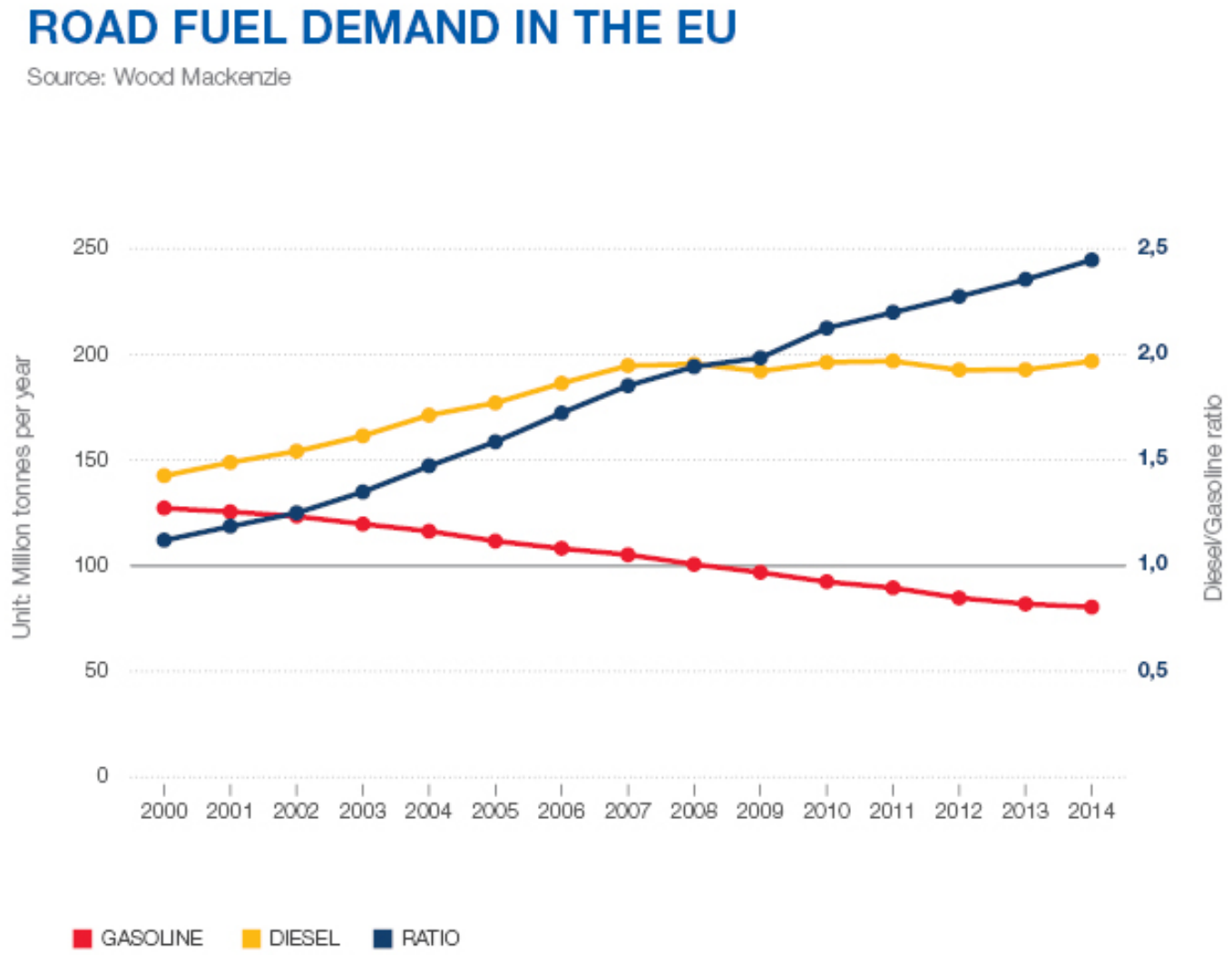
Natural Resources Canada. (2016) Refinery Economics. Retrieved 10 Jul 2016, from http://www.nrcan.gc.ca/energy/crude-petroleum/4561

Global Refining Capacity

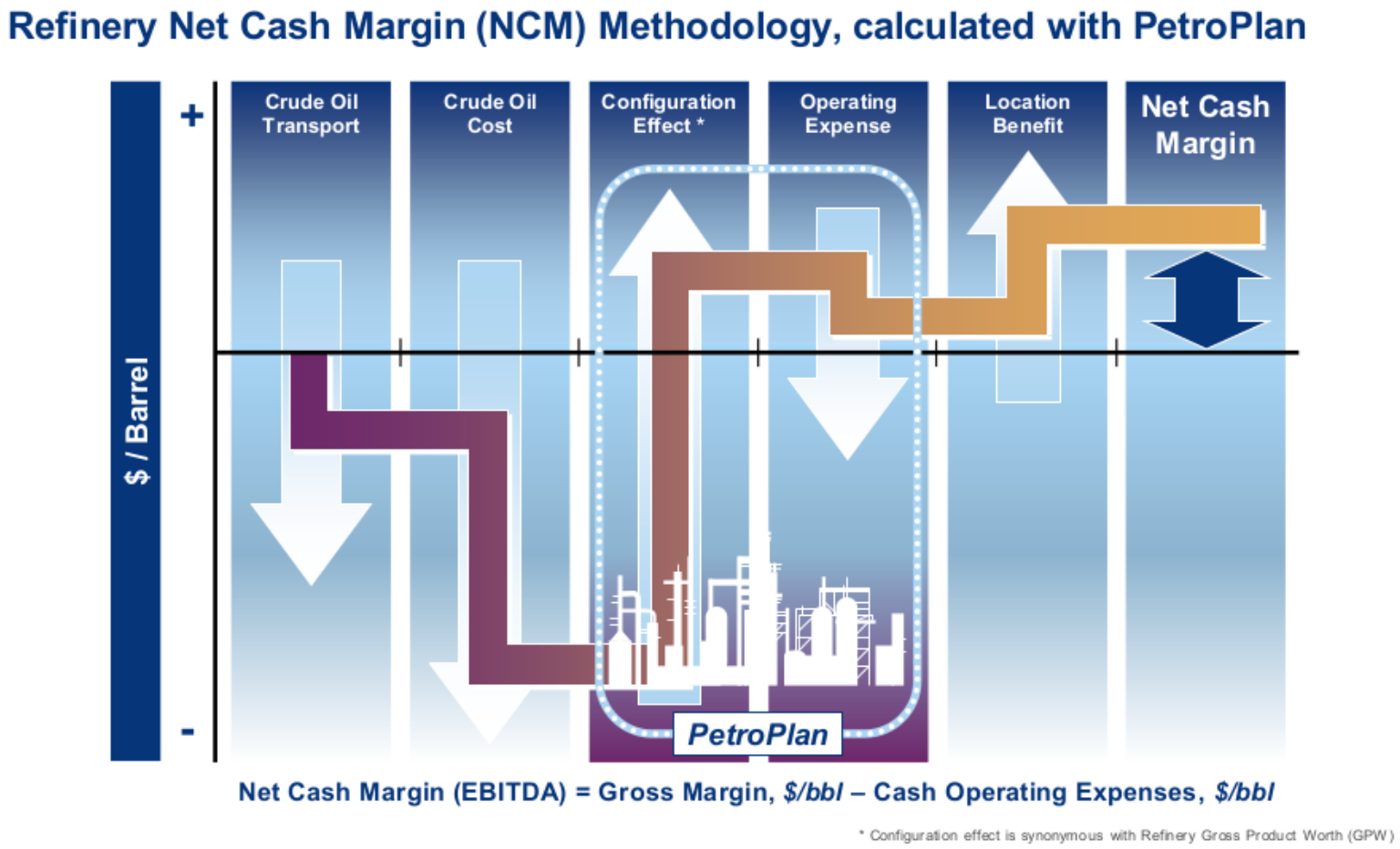
		USA	Europe	Japan	Korea	India	China	Units
CDU	2010	17.87	13.8	4.73	2.72	4	9.46	mb/d
VDU	2010	9.68	5.65	1.76	0.476	0.81	0.5	mb/d
Catalytic Reforming	2010	3.54	1.16	0.83	0.27	0.05	0.588	mb/d
Hydrocracking	2010	1.67	1.21	0.18	0.305	0.165	1.32	mb/d
FCC	2010	5.71	2.25	0.98	0.21	0.5	1.556	mb/d
Coking	2010	2.47	0.36	0.12	0.02	0.169	1.144	mb/d
CDU	2011						10.67	mb/d
	2012						11.5	mb/d
	2013						13.92	mb/d
	2014+						17	mb/d
Ethylene Cap	2009	27.55	24.7	7.26	5.63	2.51	14.18	mta
	2013						19.43	mta

Table 3: Source. OGJ, P&G, C1 Energy and own research March 2011.
http://www.gasandoil.com/news/2011/03/global-refining-capacity-at-clouse

Europe


ROAD FUEL DEMAND IN THE EU
Source: Wood Mackenzie
Unit: Million tonnes per year
250
200
150
100
50
0
2,5
2,0
1,5
1,0
0,5
Diesel/Gasoline ratio
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014
GASOLINE
DIESEL
RATIO

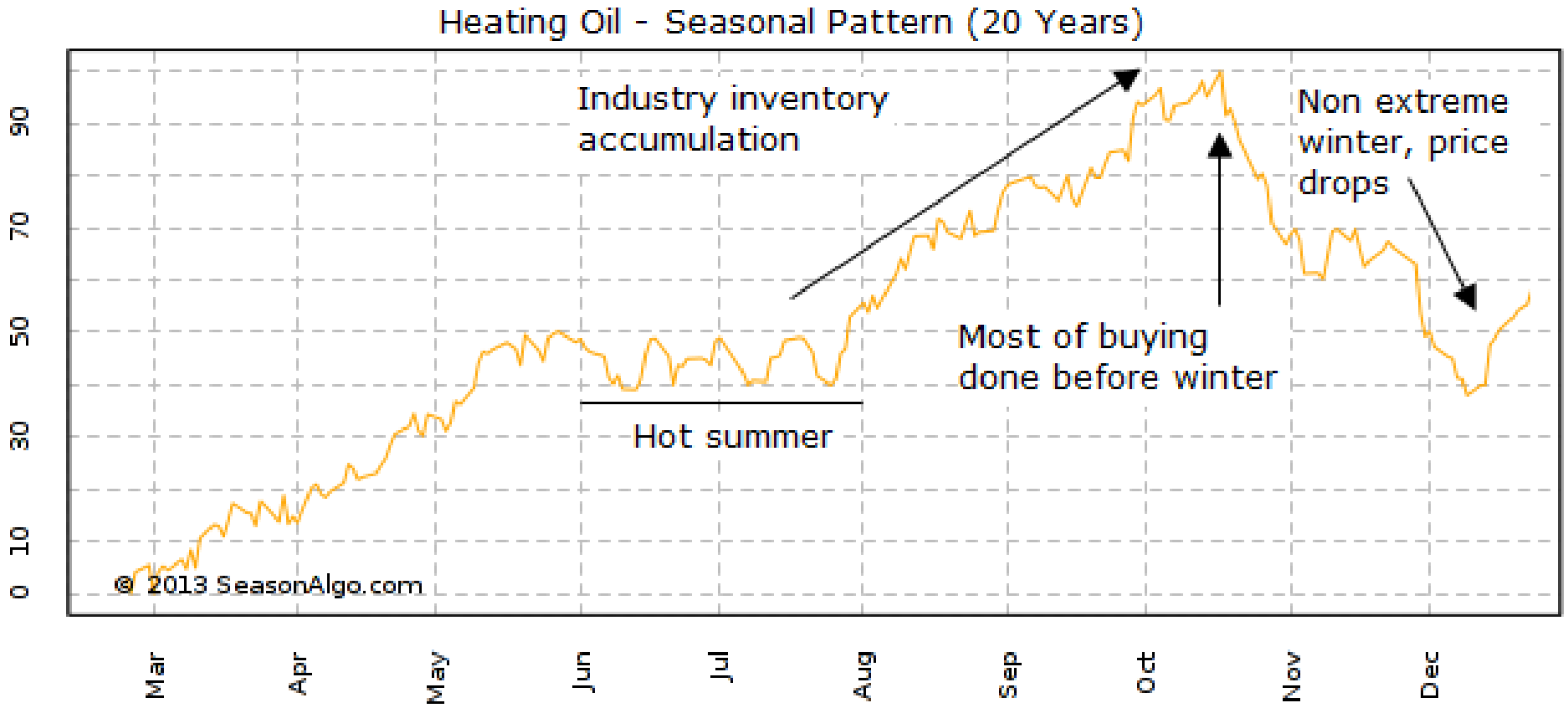
Refinergy Net Cash Margin



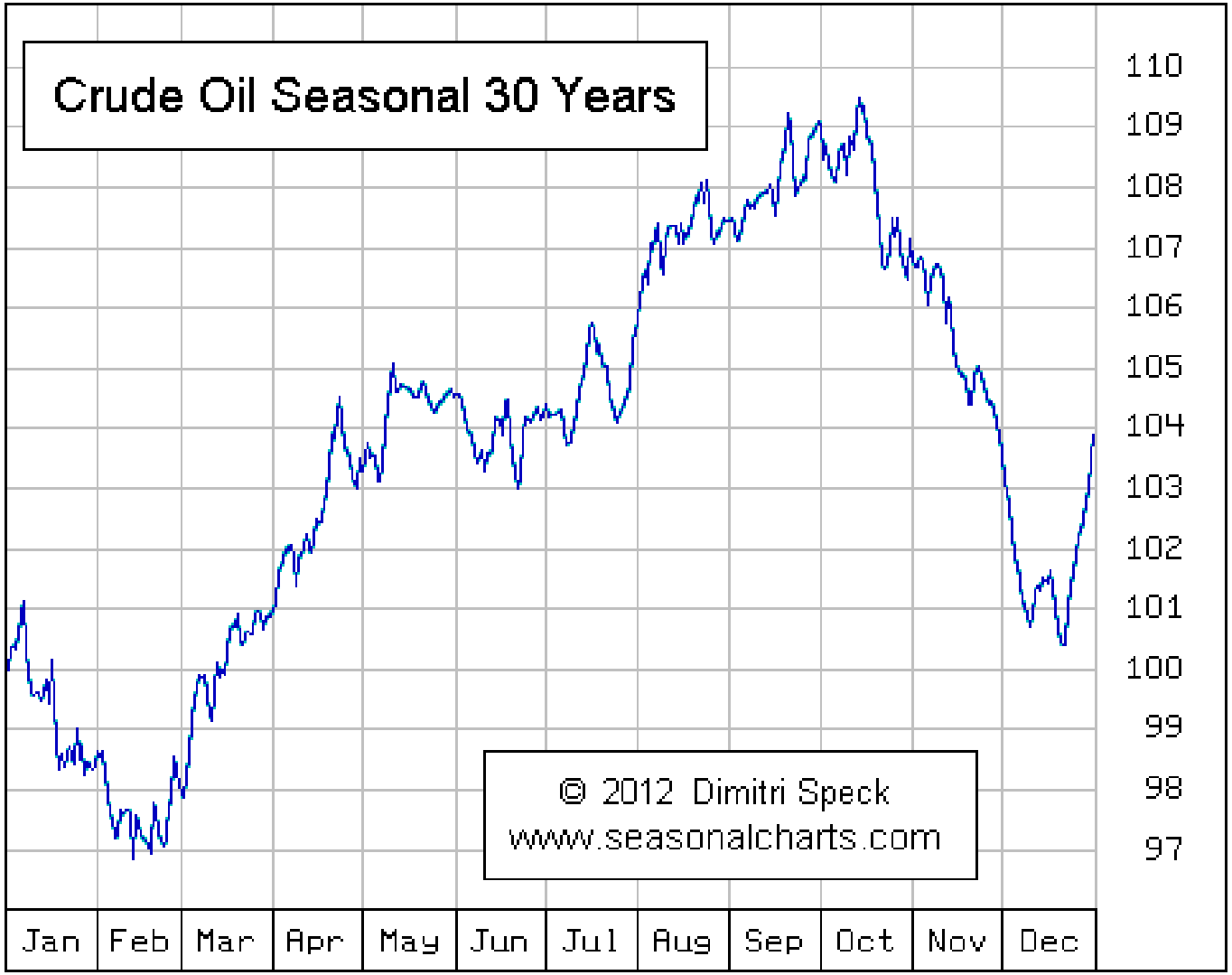
http://www.woodmac.com/content/portal/energy/highlights/wk2__13/Jubail_Insight.pdf

Seasonality

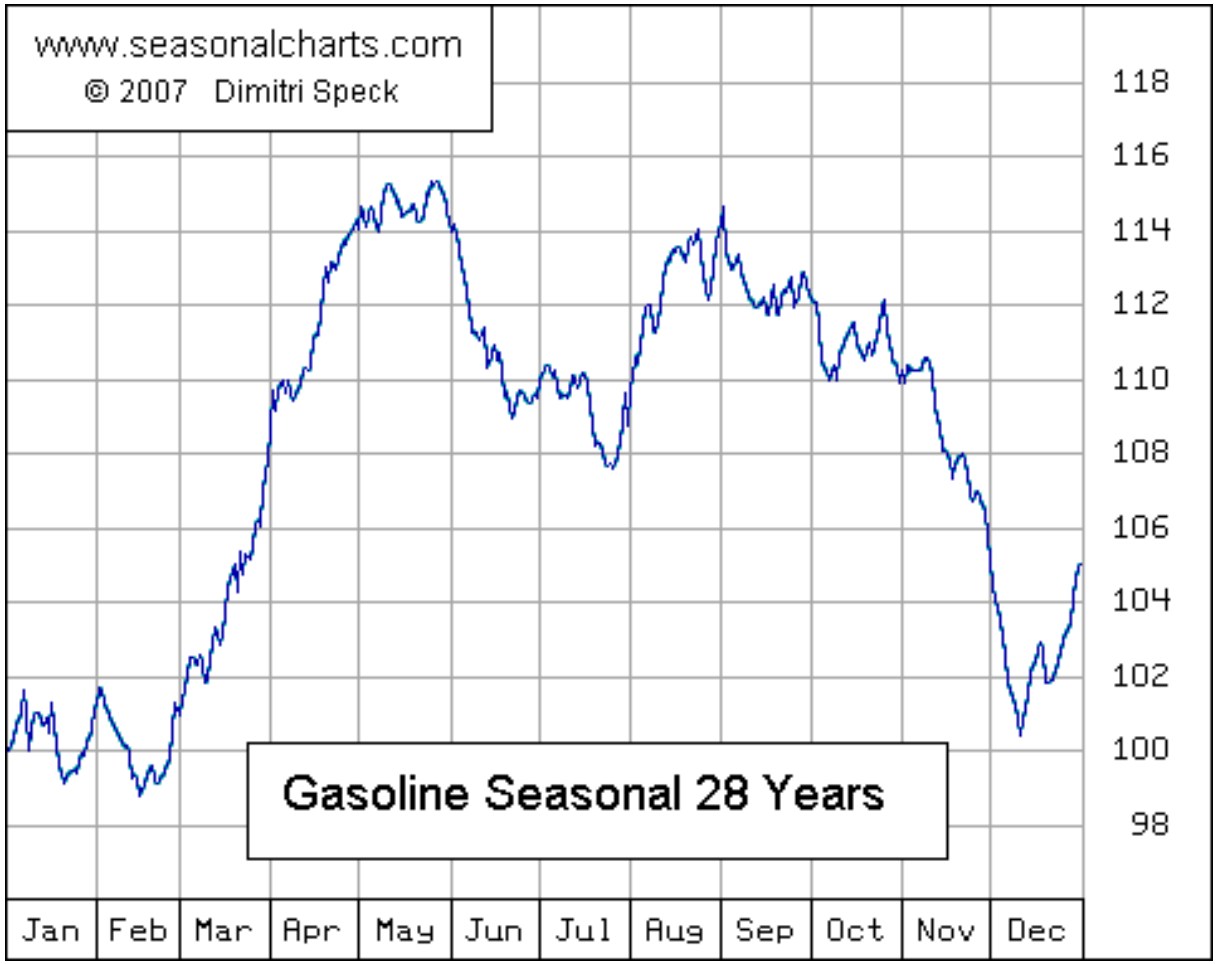
Seasonality



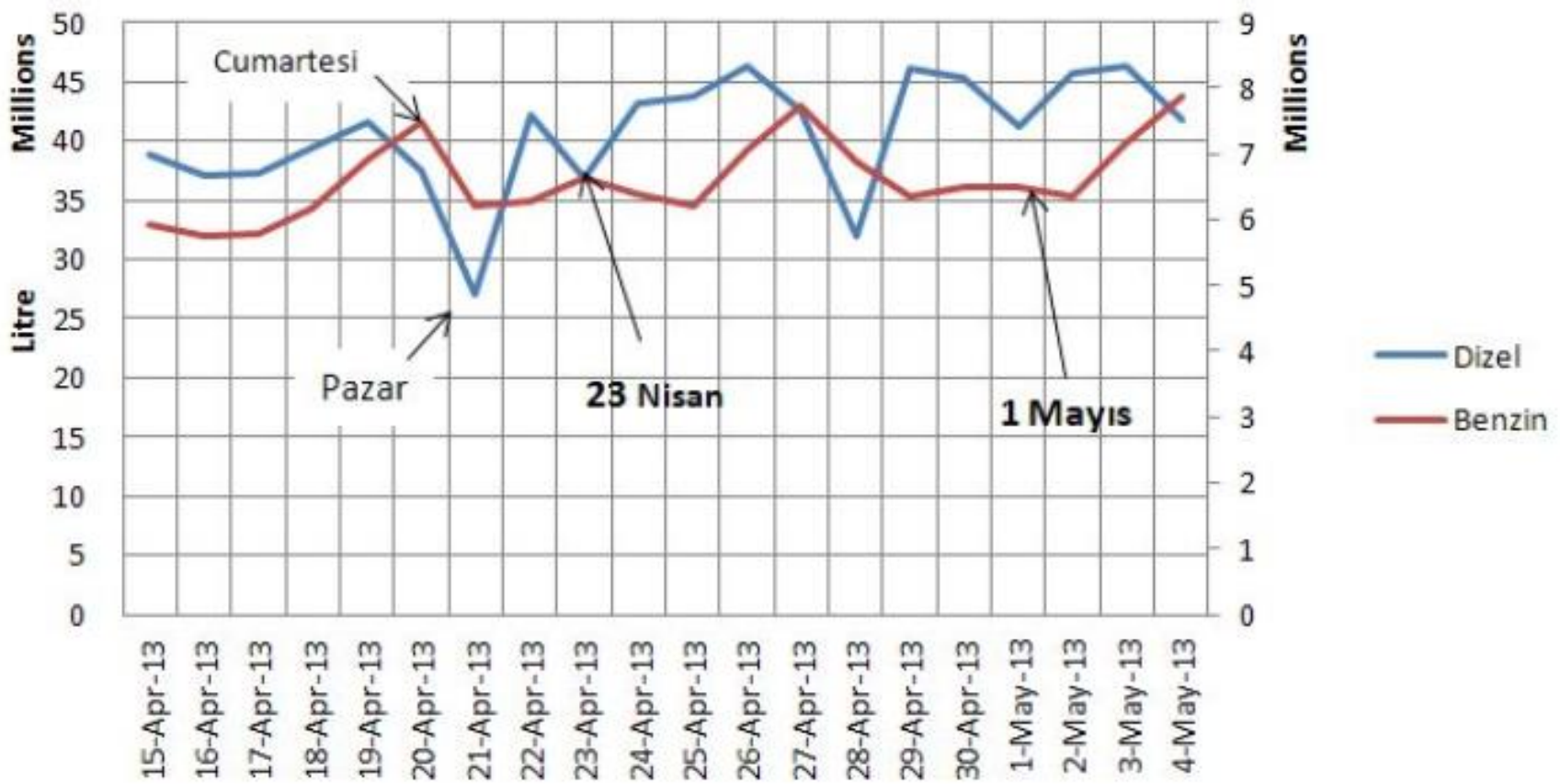
Seasonality



Seasonality

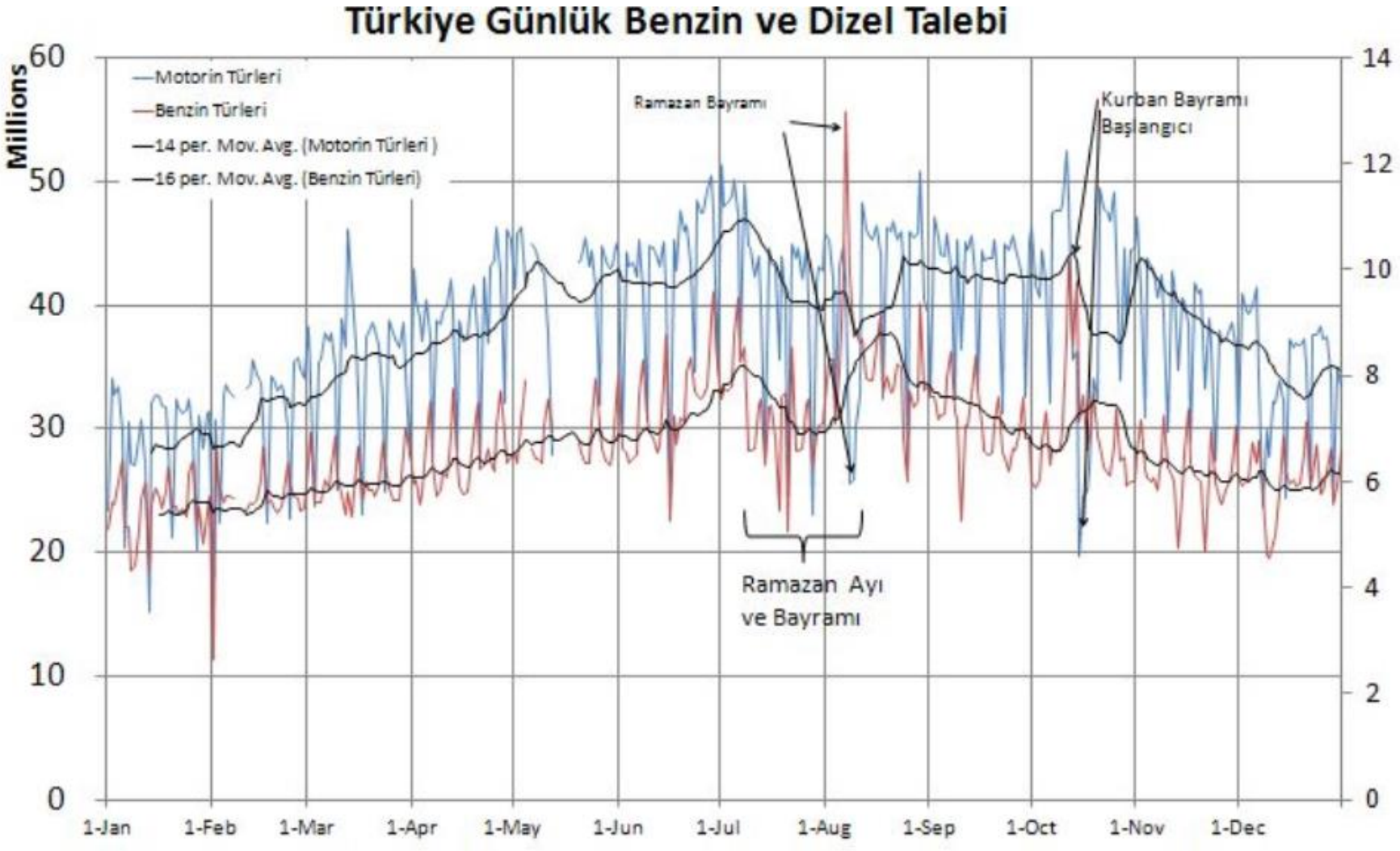


Turkey



http://www.barissanli.com/calismalar/2014/bsanli-akaryakit-dinamikleri-subat2014.pdf

Turkey - 2013



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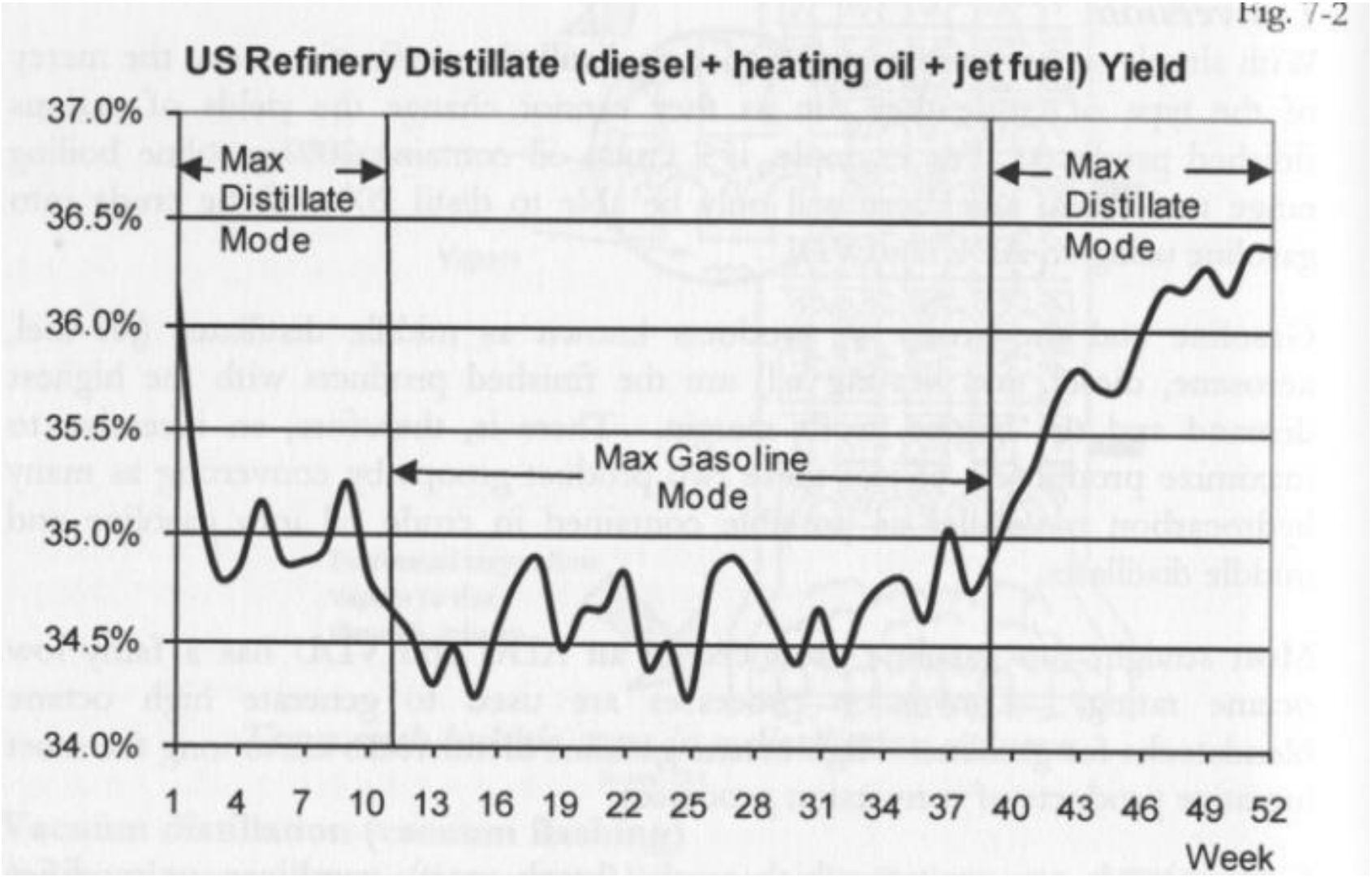
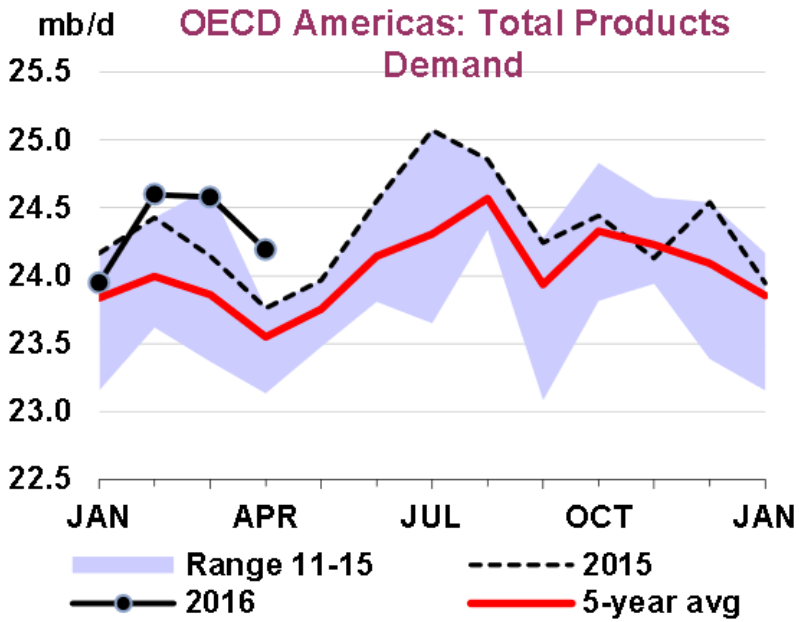
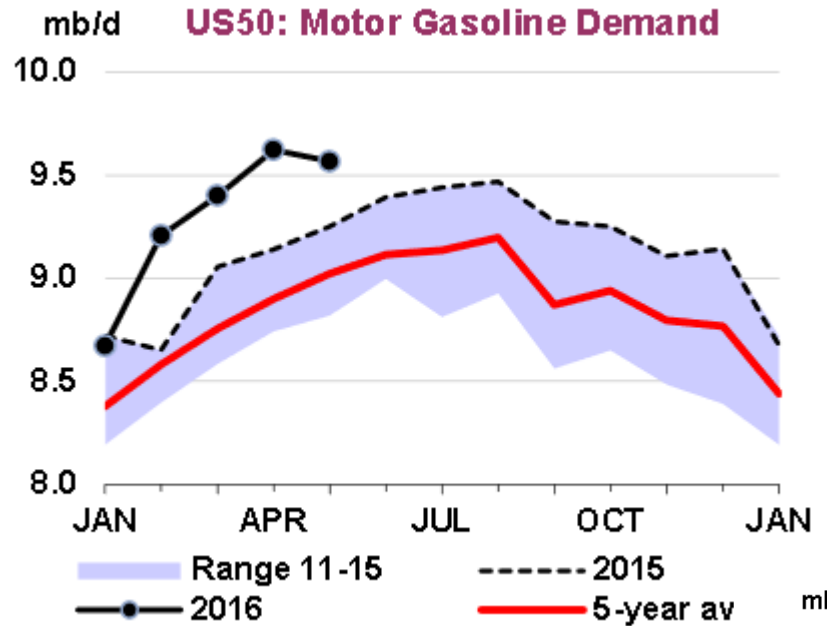
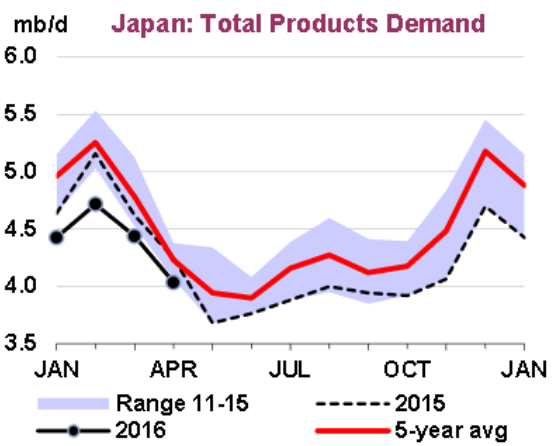
Refinery Seasonality

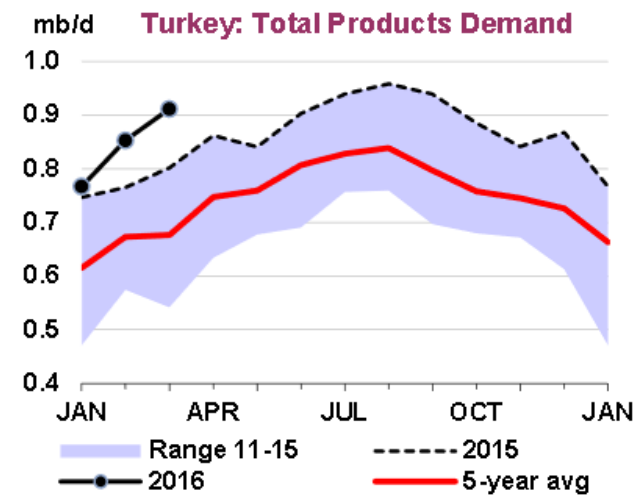


Total Products Demand - OMR



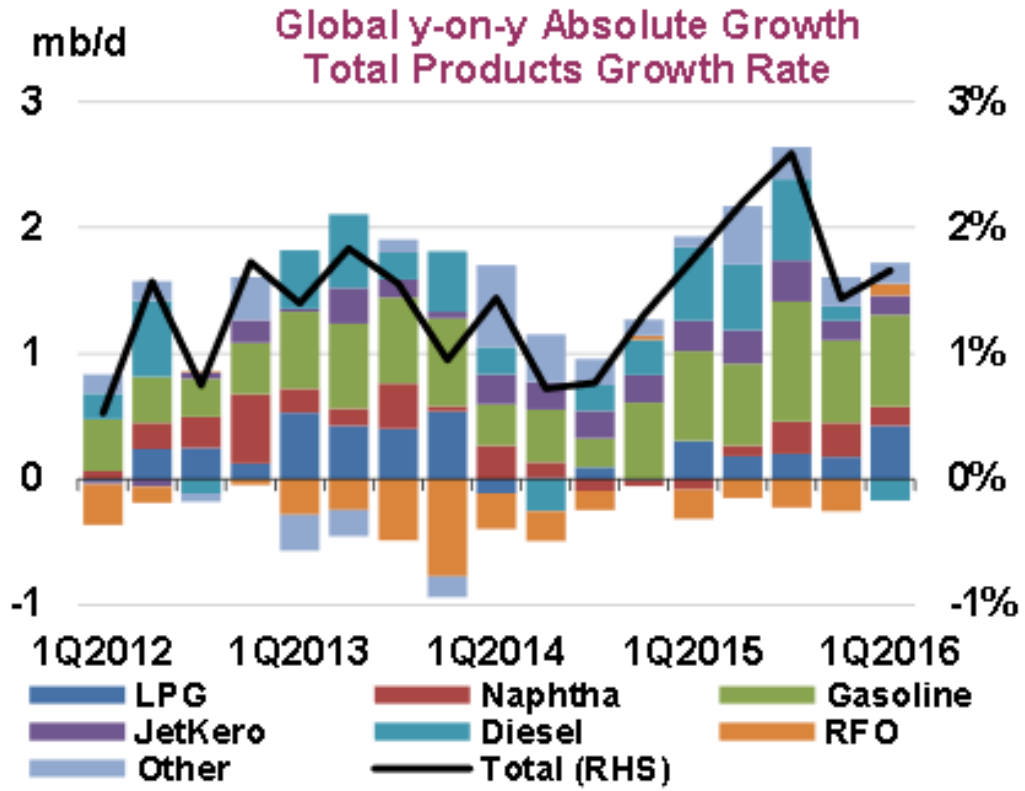


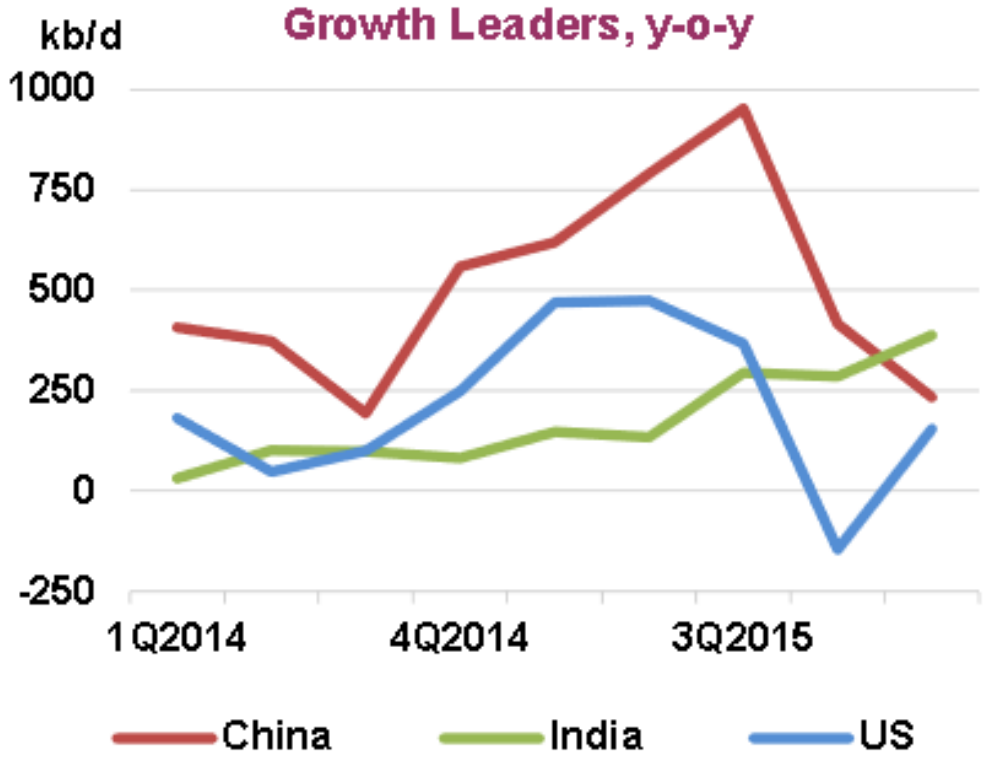




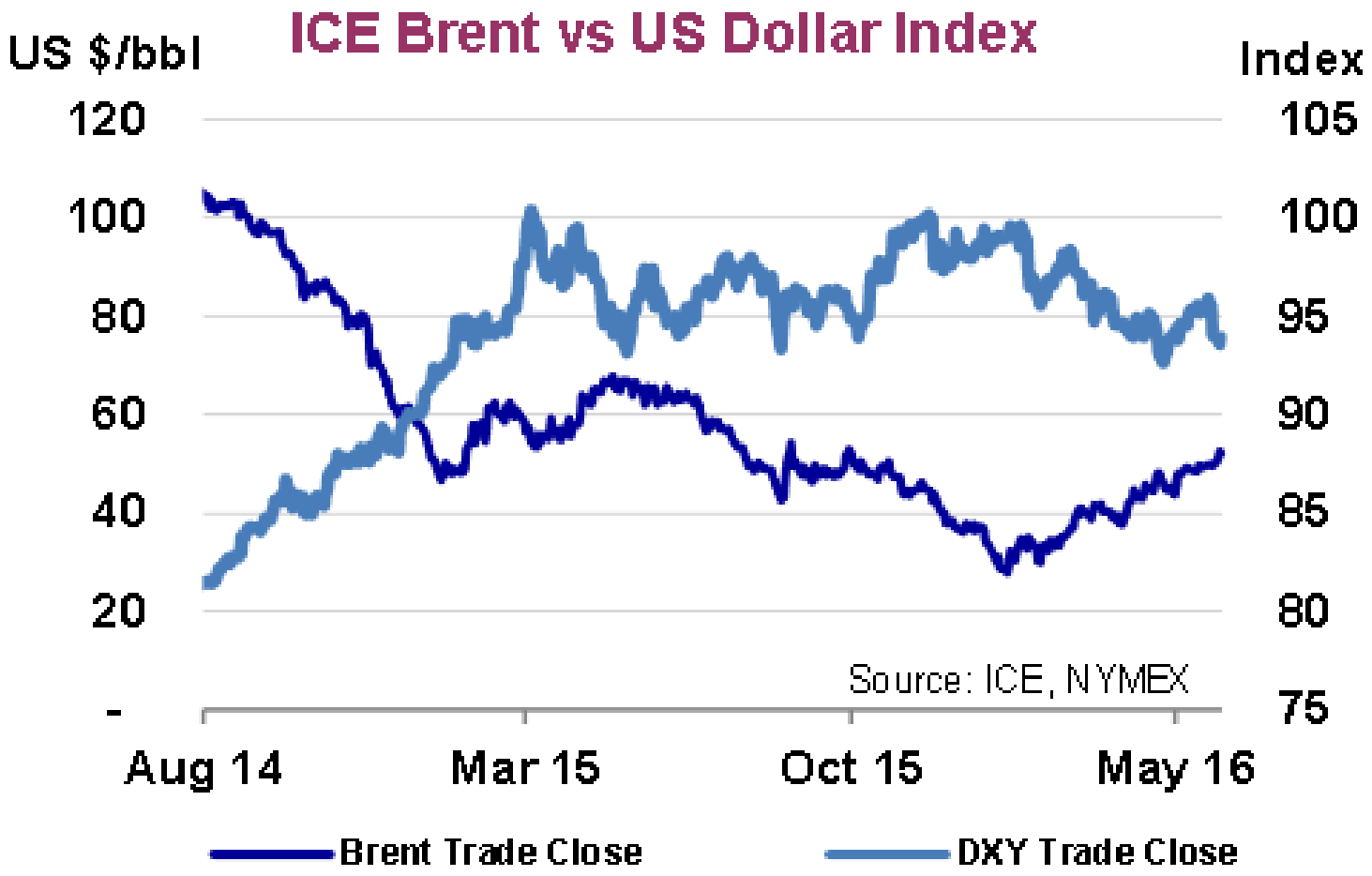
Oil Market Report

https://www.iea.org/media/omrreports/fullissues/2016-06-14.pdf

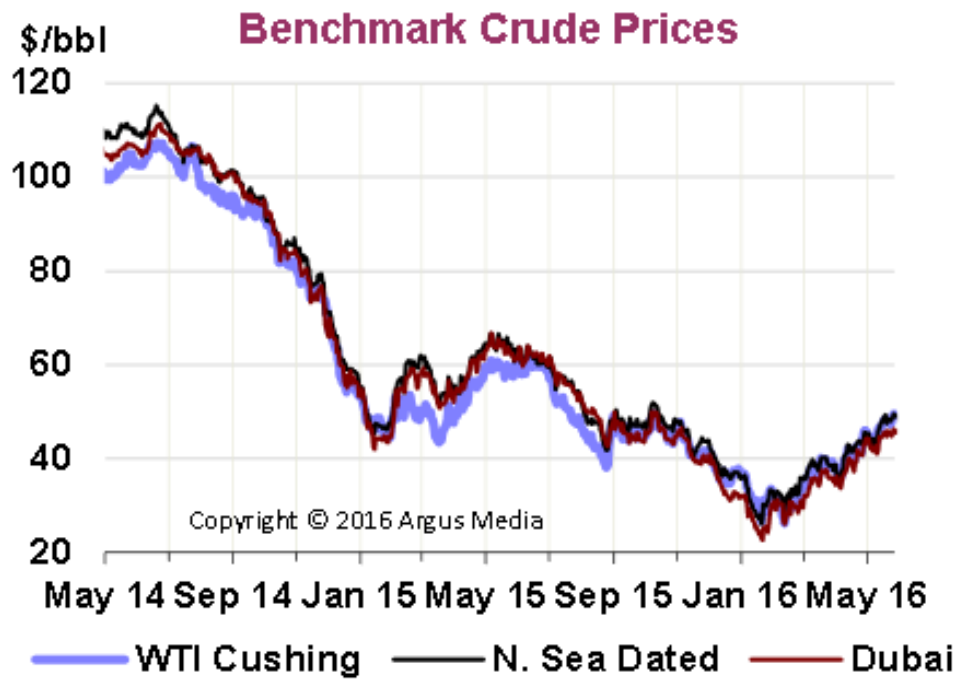

Global y-on-y Absolute Growth
Total Products Growth Rate
mb/d
3
2
1
0
-1
3%
2%
1%
0%
-1%
1Q2012
1Q2013
1Q2014
1Q2015
1Q2016
LPG
Naphtha
Gasoline
JetKero
Diesel
RFO
Other
Total (RHS)

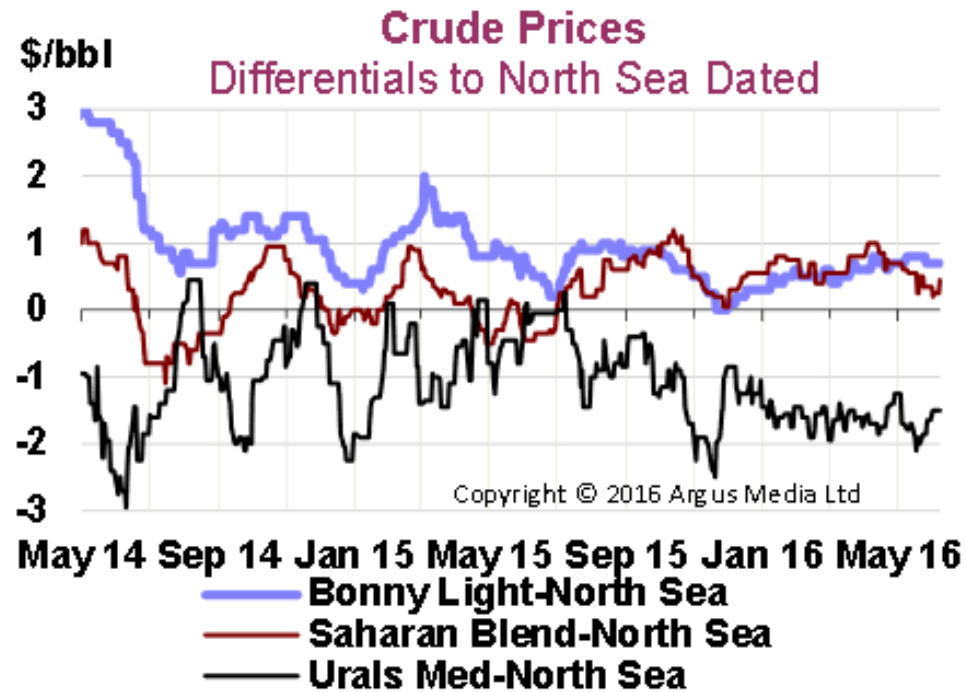

Growth Leaders, y-o-y
kb/d
1000
750
500
250
0
-250
1Q2014
4Q2014
3Q2015
China
India
US

Price

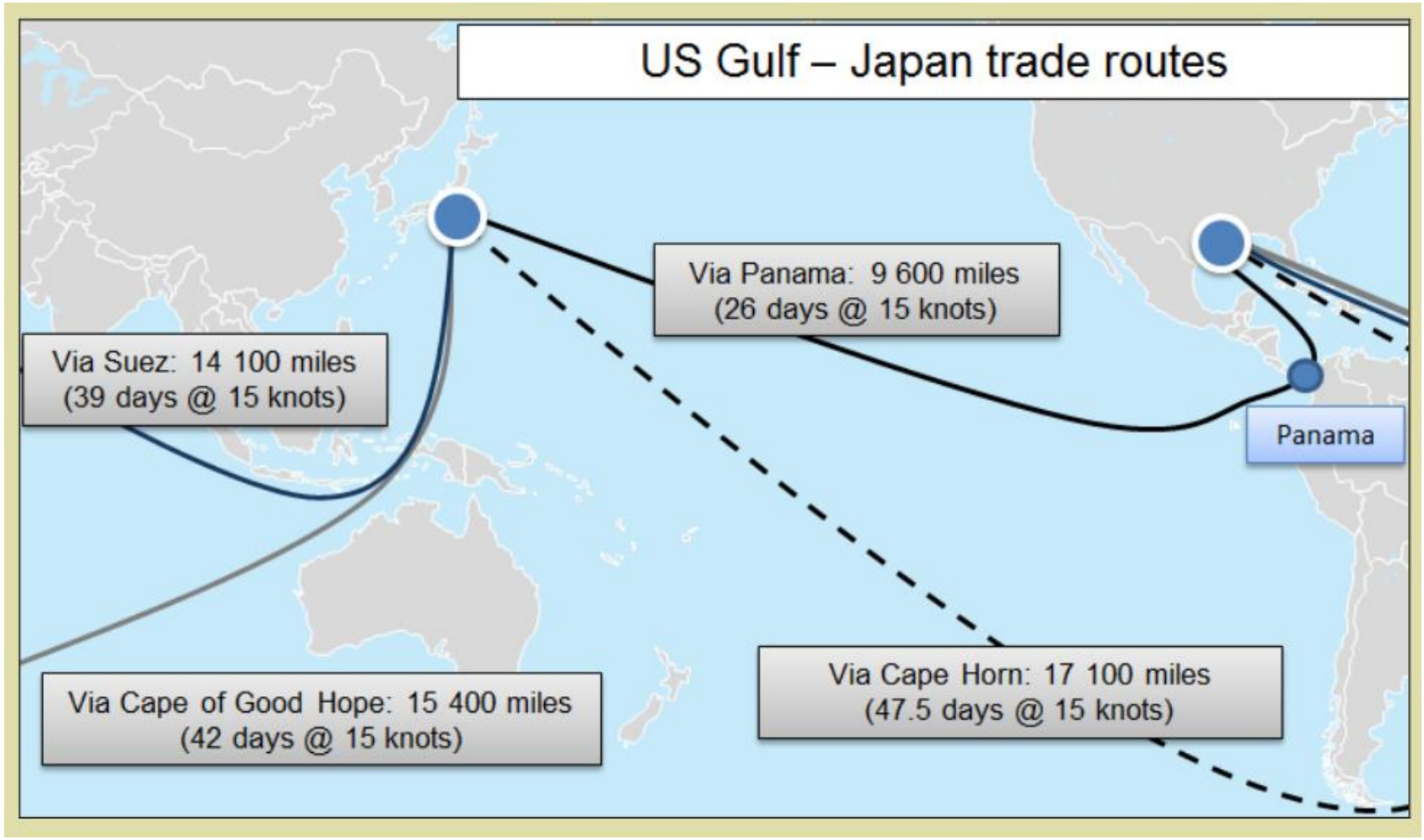

ICE Brent vs US Dollar Index
US $/bbl
Index
120
100
80
60
40
20
-
105
100
95
90
85
80
75
Source: ICE, NYMEX
Aug 14
Mar 15
Oct 15
May 16
Brent Trade Close
DXY Trade Close

Crude Prices





Panama

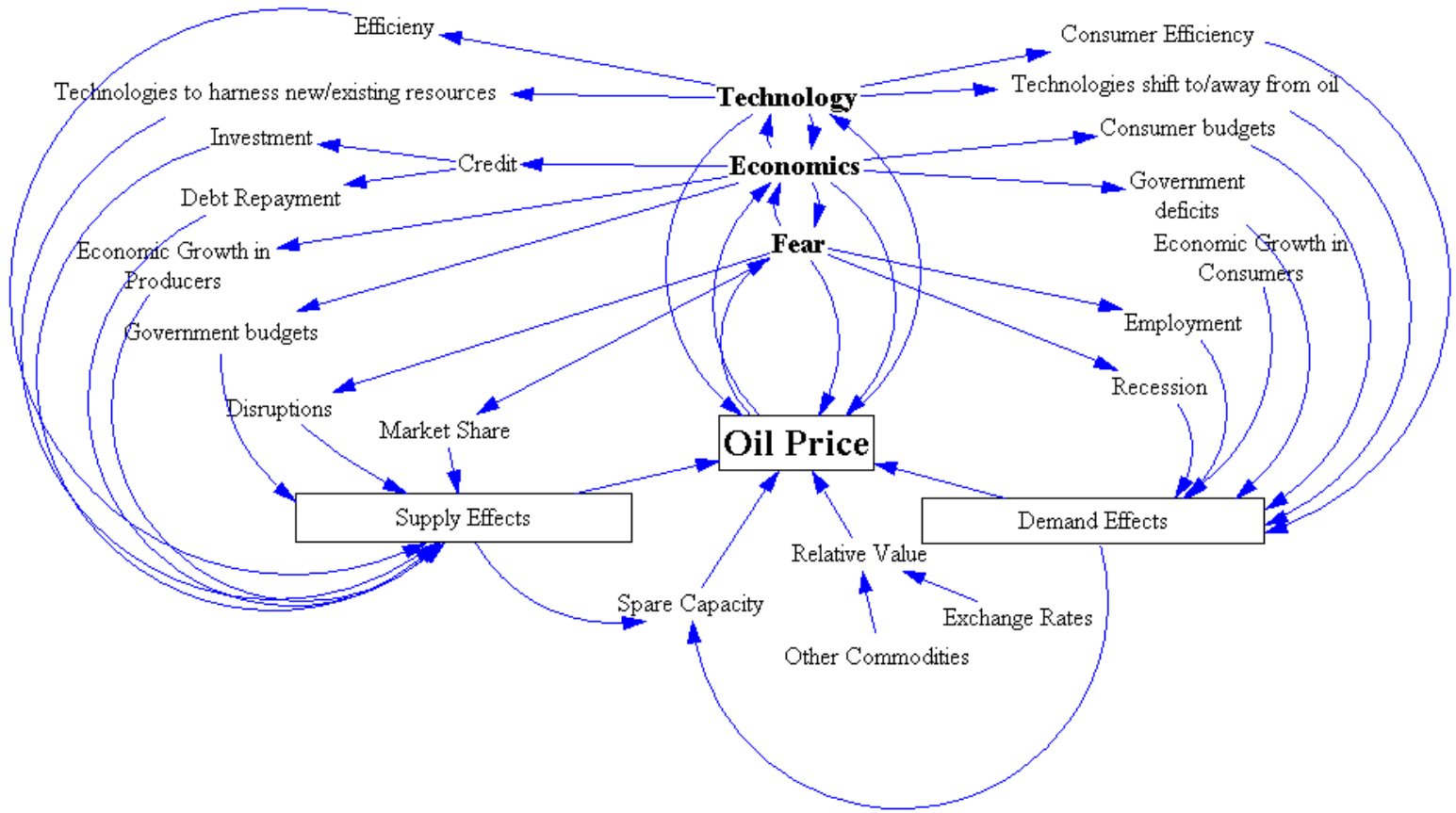

US Gulf – Japan trade routes
Via Panama: 9 600 miles
(26 days @ 15 knots)
Via Suez: 14 100 miles
(39 days @ 15 knots)
Panama
Via Cape of Good Hope: 15 400 miles
(42 days @ 15 knots)
Via Cape Horn: 17 100 miles
(47.5 days @ 15 knots)

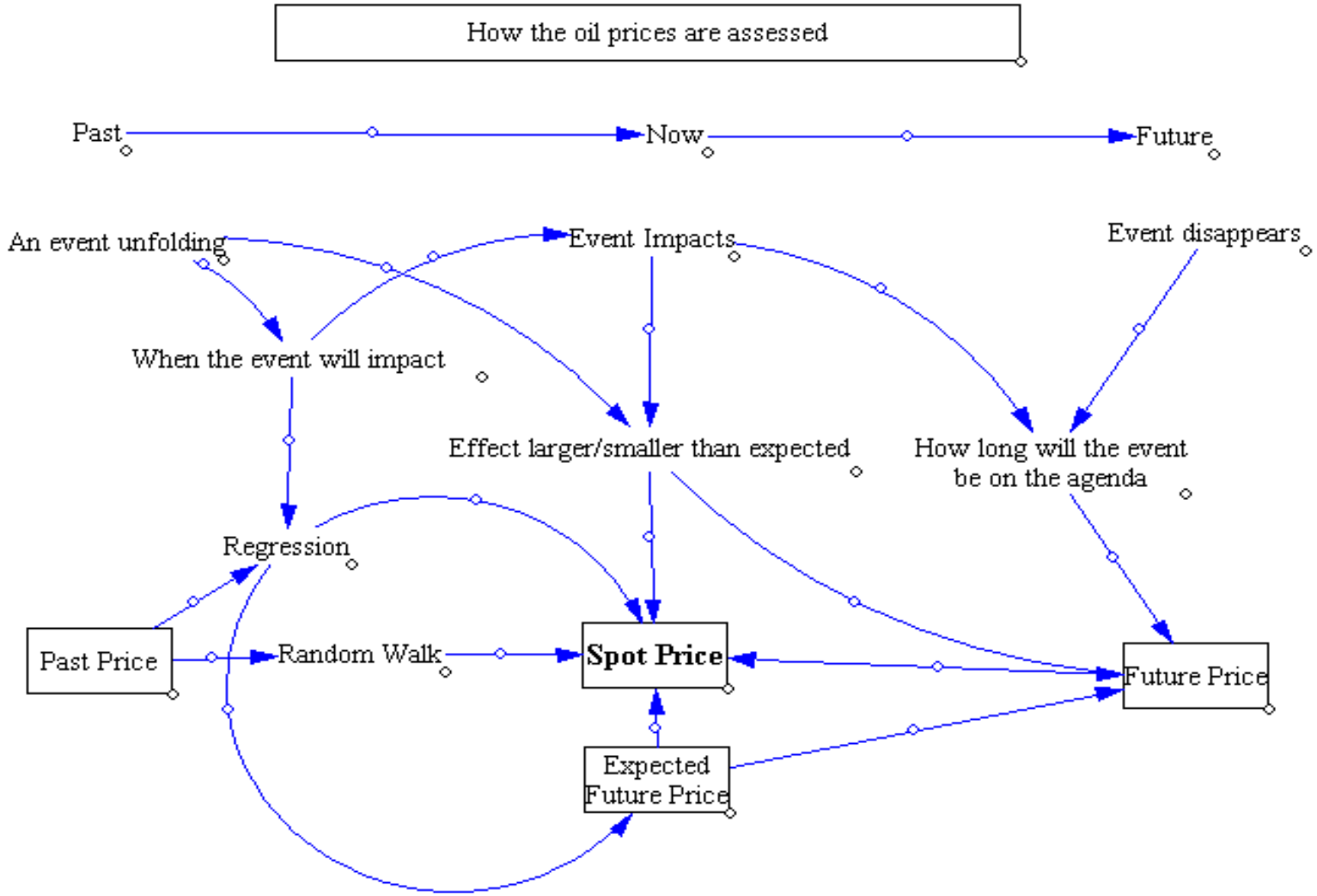
IEA/KBC Global Indicator Refining Margins

	Monthly Average				Change	Average for week ending:				
	Feb 16	Mar 16	Apr 16	May 16	May 16-Apr 16	13 May	20 May	27 May	03 Jun	10 Jun
NW Europe										
Brent (Cracking)	3.66	2.80	4.37	4.05	-0.32	3.43	3.49	4.78	5.54	4.46
Urals (Cracking)	5.15	4.24	5.48	5.28	-0.20	4.67	4.87	5.87	6.57	5.42
Brent (Hydroskimming)	-0.76	-2.05	-1.40	-1.45	-0.05	-1.73	-2.11	-1.03	-0.14	-0.85
Urals (Hydroskimming)	-0.11	-1.47	-1.24	-1.14	0.09	-1.35	-1.64	-1.00	-0.07	-0.85
Mediterranean										
Es Sider (Cracking)	5.49	4.31	5.66	5.66	0.00	4.97	5.32	6.26	6.86	6.02
Urals (Cracking)	5.35	4.34	4.95	5.38	0.43	4.82	5.20	5.92	6.40	5.60
Es Sider (Hydroskimming)	1.69	-0.24	1.01	1.02	0.01	0.62	0.57	1.41	1.99	1.34
Urals (Hydroskimming)	0.49	-1.38	-0.99	-0.58	0.40	-0.71	-0.96	-0.45	0.20	-0.38
US Gulf Coast										
50/50 HLS/LLS (Cracking)	3.93	5.02	7.65	6.64	-1.01	5.65	6.98	7.84	8.08	6.51
Mars (Cracking)	3.13	3.78	5.41	4.30	-1.11	3.88	4.34	4.96	5.19	3.84
ASCI (Cracking)	2.89	3.33	5.00	3.79	-1.21	3.35	3.83	4.48	4.64	3.33
50/50 HLS/LLS (Coking)	5.77	7.37	10.19	9.11	-1.07	8.02	9.45	10.44	10.66	8.86
50/50 Maya/Mars (Coking)	8.11	10.58	12.53	10.75	-1.78	9.93	10.93	11.68	11.44	9.56
ASCI (Coking)	8.32	9.81	11.83	10.50	-1.33	9.57	10.71	11.61	11.70	9.95
US Midcon										
WTI (Cracking)	4.15	9.19	12.05	12.95	0.90	12.34	13.93	13.91	14.65	17.81
30/70 WCS/Bakken (Cracking)	2.39	6.99	10.26	10.48	0.22	10.14	10.83	10.90	11.58	14.54
Bakken (Cracking)	3.14	9.01	12.72	13.44	0.72	12.76	13.88	14.28	14.71	17.98
WTI (Coking)	5.91	11.73	14.85	15.84	0.99	15.16	16.85	16.91	17.68	21.00
30/70 WCS/Bakken (Coking)	5.76	11.39	14.96	15.24	0.28	14.69	15.73	15.89	16.60	19.69
Bakken (Coking)	3.91	10.18	14.01	14.76	0.74	14.05	15.22	15.65	16.09	19.45
Singapore										
Dubai (Hydroskimming)	0.93	-0.16	-1.51	-1.83	-0.32	-1.99	-2.04	-1.45	-1.95	-2.21
Tapis (Hydroskimming)	1.51	0.89	0.27	0.96	0.69	1.09	0.62	1.02	1.71	0.91
Dubai (Hydrocracking)	5.52	5.16	3.90	3.72	-0.17	3.24	3.67	4.52	3.98	3.42
Tapis (Hydrocracking)	5.16	5.26	4.51	5.18	0.67	5.11	4.93	5.48	6.03	4.92

Why Trade?

Price-3D




How the oil prices are assessed
Past
Now
Future
An event unfolding
Event Impacts
Event disappears
When the event will impact
Effect larger/smaller than expected
How long will the event be on the agenda
Regression
Past Price
Random Walk
Spot Price
Future Price
Expected Future Price

E&P

North American E&P Peer Groups: Percentage of production hedged and implied weighted-average prices, full-year 2016 & 2017										
	2016					2017				
Company	Weighted-average percentage of oil production hedged	Weighted-average implied price, $/bbl	Weighted-average percentage of gas production hedged	Weighted-average implied price, $/mcf	Weighted-average percentage of total production hedged	Weighted-average percentage of oil production hedged	Weighted-average implied price, $/bbl	Weighted-average percentage of gas production hedged	Weighted-average implied price, $/mcf	Weighted-average percentage of total production hedged
Small US E&P Peer Group	61%	$61.94	61%	$3.27	56%	17%	$50.77	41%	$3.17	27%
Midsize US E&P Peer Group	53%	$57.94	39%	$2.98	41%	21%	$51.47	12%	$3.16	15%
Large US E&P Peer Group	6%	$55.62	22%	$3.27	13%	0%	$60.55	8%	$3.71	4%
Total US E&P Universe:	**19%**	**$58.31**	**28%**	**$3.21**	**21%**	**5%**	**$51.43**	**14%**	**$3.47**	**8%**
Canadian E&P Peer Group	30%	$77.47	27%	$3.82	27%	7%	$70.31	14%	$3.87	11%
Total NA E&P Universe:	**19%**	--	**28%**	--	**22%**	**5%**	--	**12%**	--	**8%**

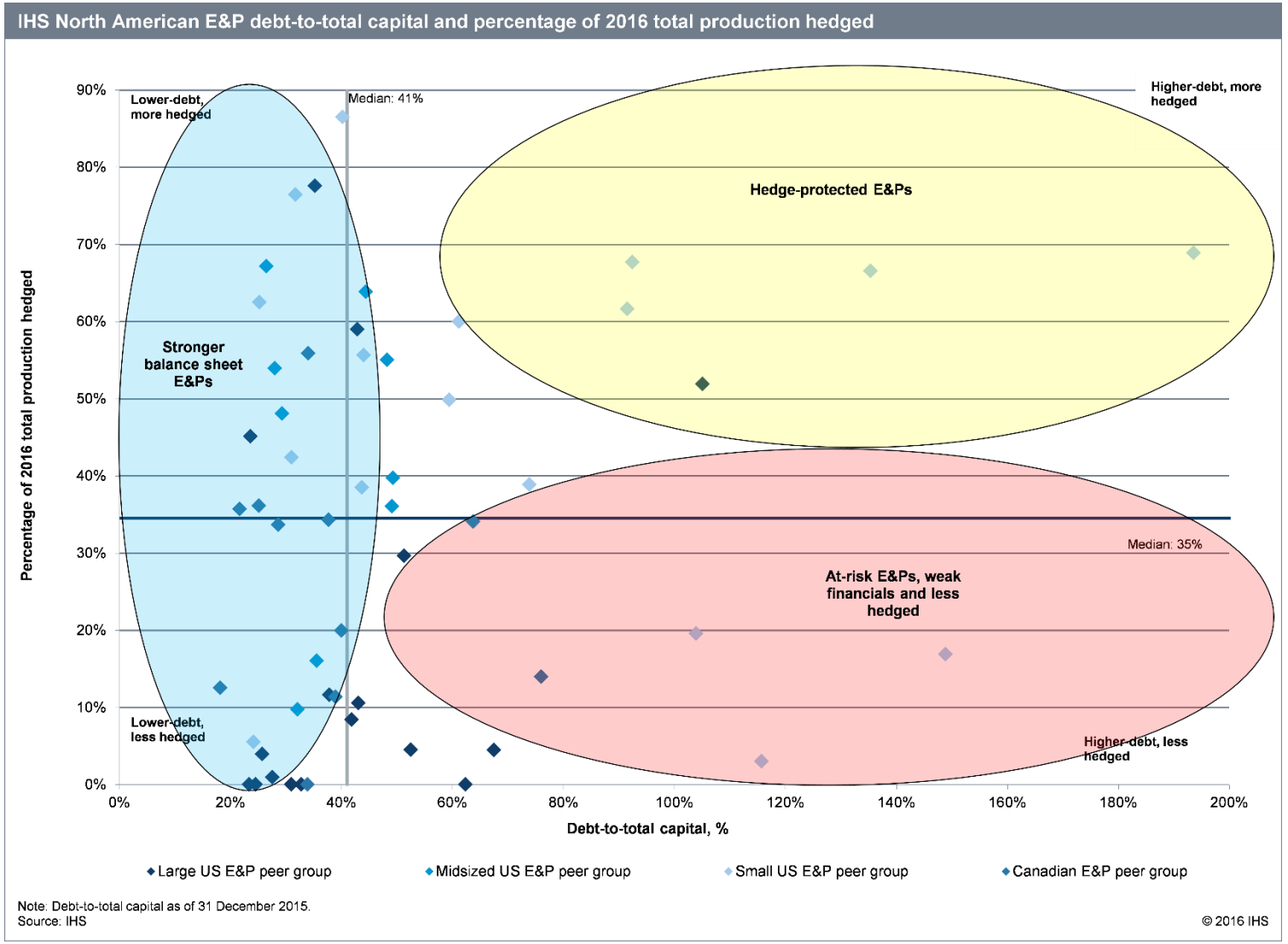
Implied hedged prices assume $40 per barrel market oil price and $2/Mcf market natural gas price.

Note: Canadian peer group prices are in Canadian dollars.

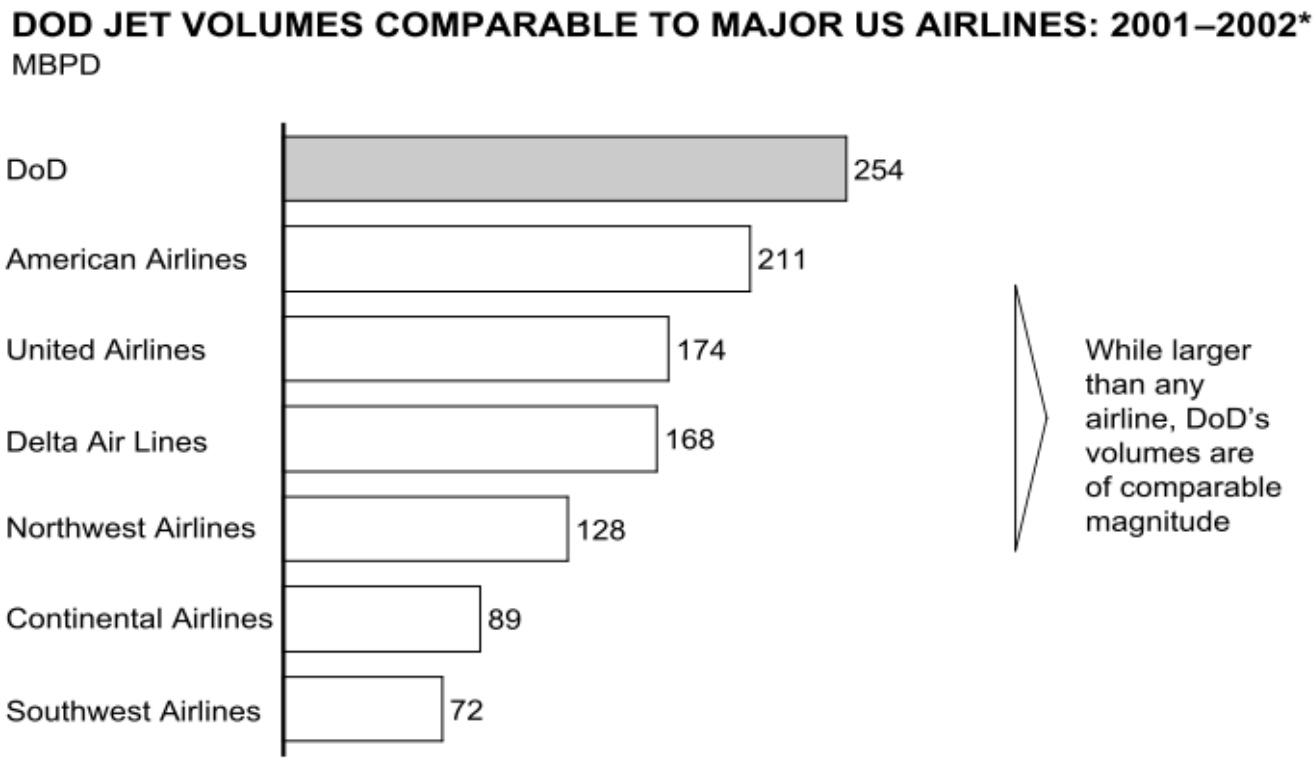
Source: IHS, company filings, investor presentations.

http://blog.ihs.com/north-american-eps-hedging-drops-off-in-2016,-exposing-group-to-reality-of-low-price-environment

Affecting Shale Production



2004 US DoD

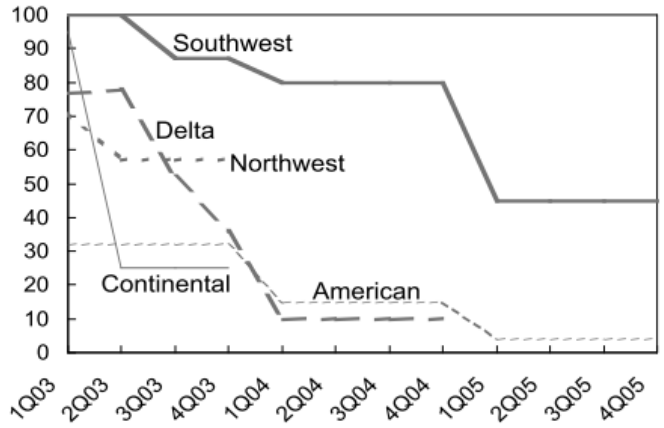


Source: McKinsey and Company

How airlines hedge?

HEDGING STRATEGIES VARY ACROSS MAJOR AIRLINES

Hedges by degree and tenor, as of 12/02
Percent



Key elements of hedging programs

Southwest
- Uses calls, collars, and swaps
- Hedges in crude and heating oil

Delta
- Uses primarily crude and heating-oil derivatives

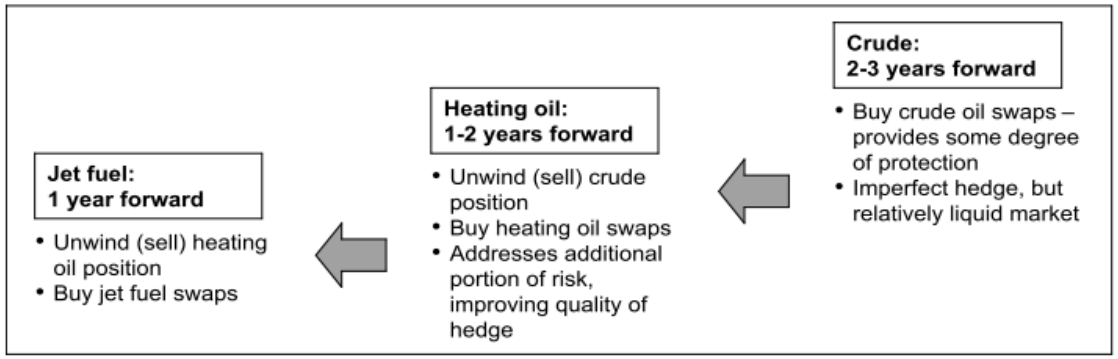
Northwest
- Uses futures contracts traded on regulated exchanges, OTC swaps

Continental
- Uses petroleum call options for short-term protection
- Also uses swaps and jet fuel purchase commitments

American
- Uses options and swaps on crude and heating oil

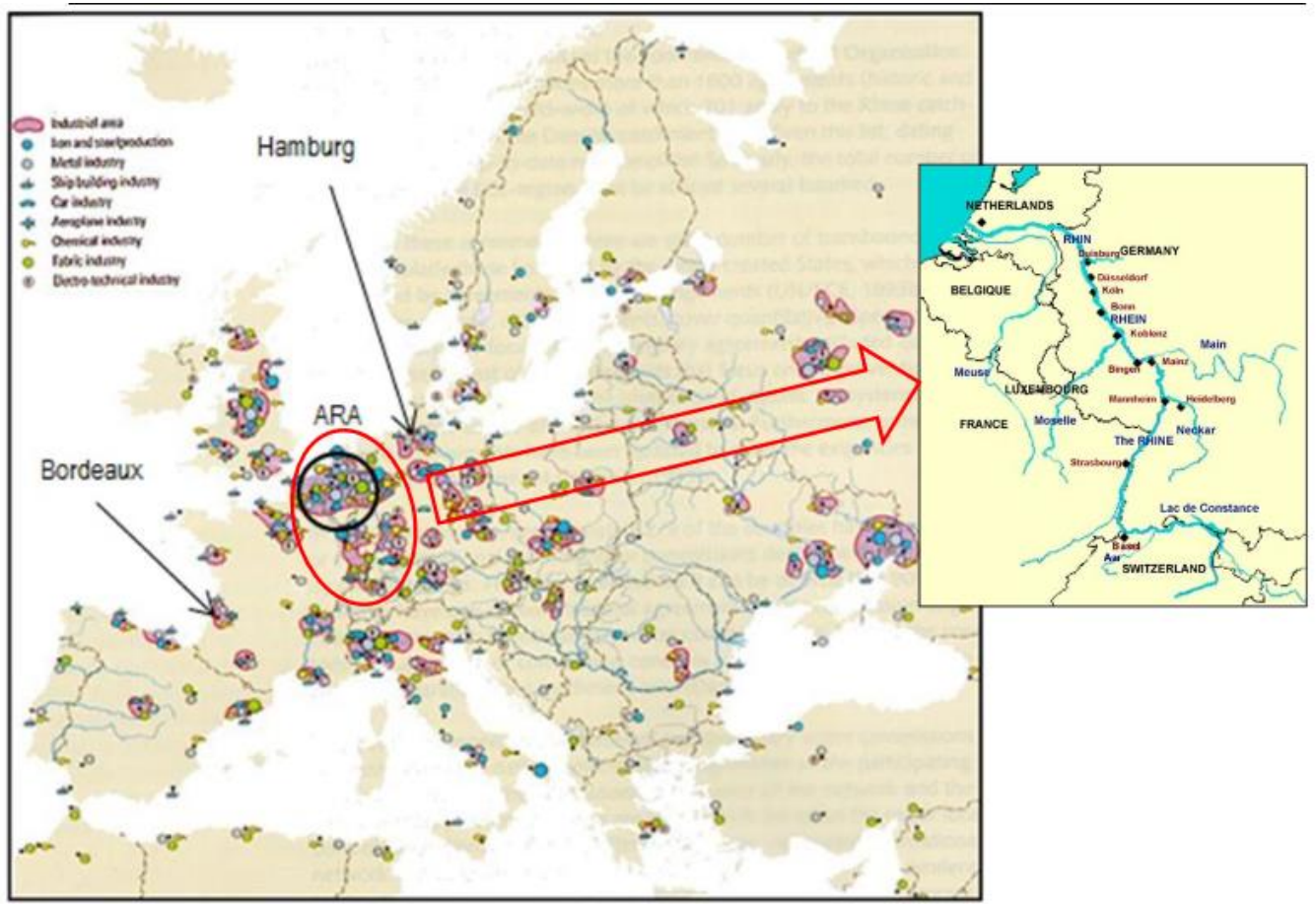
Source: Companies' 10-Ks, 10-Qs

AIRLINES TYPICALLY USE ROLLING HEDGES

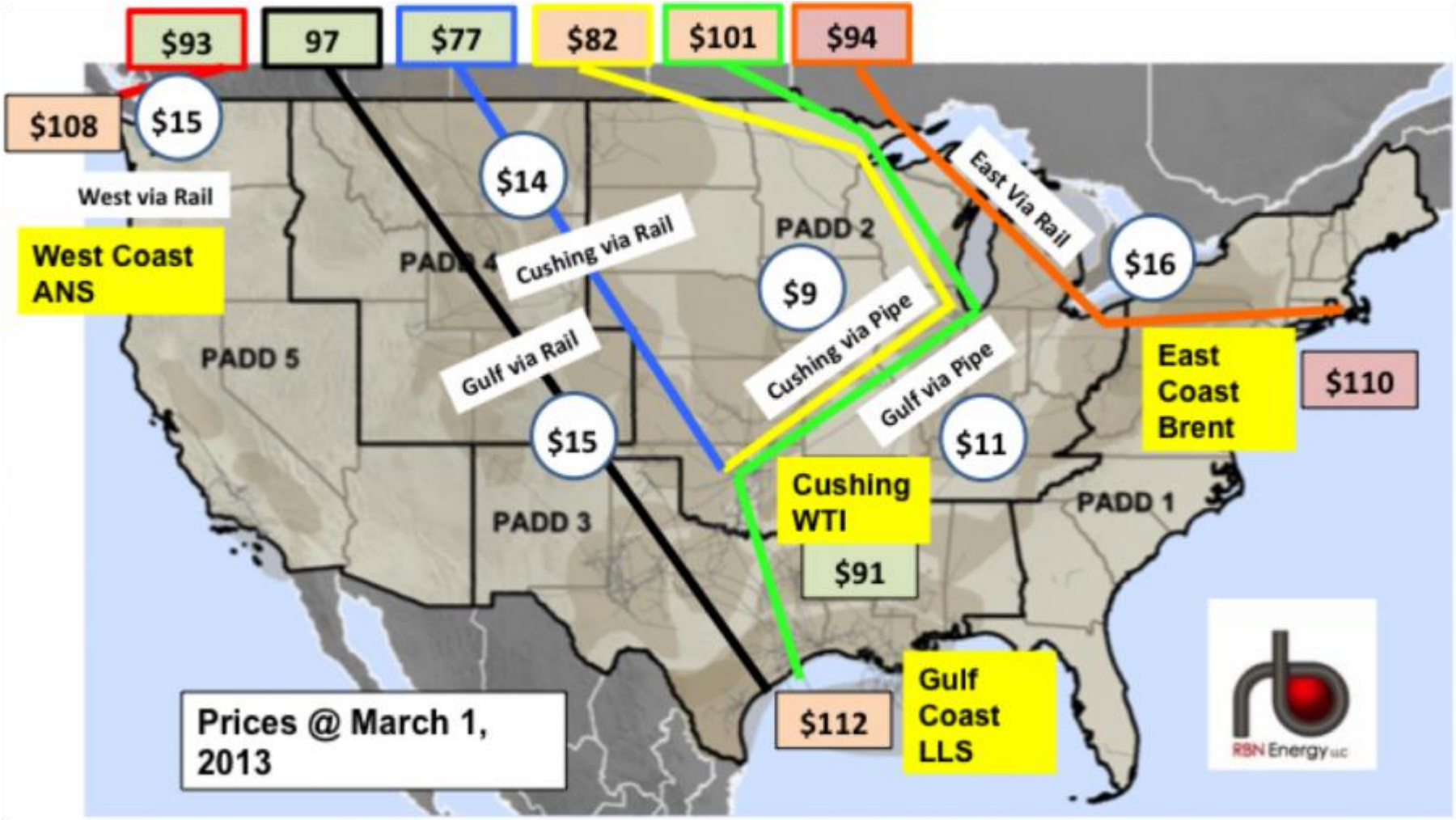


Some Concepts of Oil Trade

Europe


Industrial area
Iron and steelproduction
Metal industry
Ship building industry
Car industry
Aeroplane industry
Chemical industry
Fabric industry
Electro-technical industry
Hamburg
ARA
Bordeaux
NETHERLANDS
RHIN
Duisburg
GERMANY
Düsseldorf
Köln
BELGIQUE
Bonn
RHEIN
Koblenz
Main
Meuse
Bingen
Mainz
LUXEMBOURG
Mannheim
Heidelberg
FRANCE
Moselle
Neckar
The RHINE
Strasbourg
Lac de Constance
Basel
Aar
SWITZERLAND

US



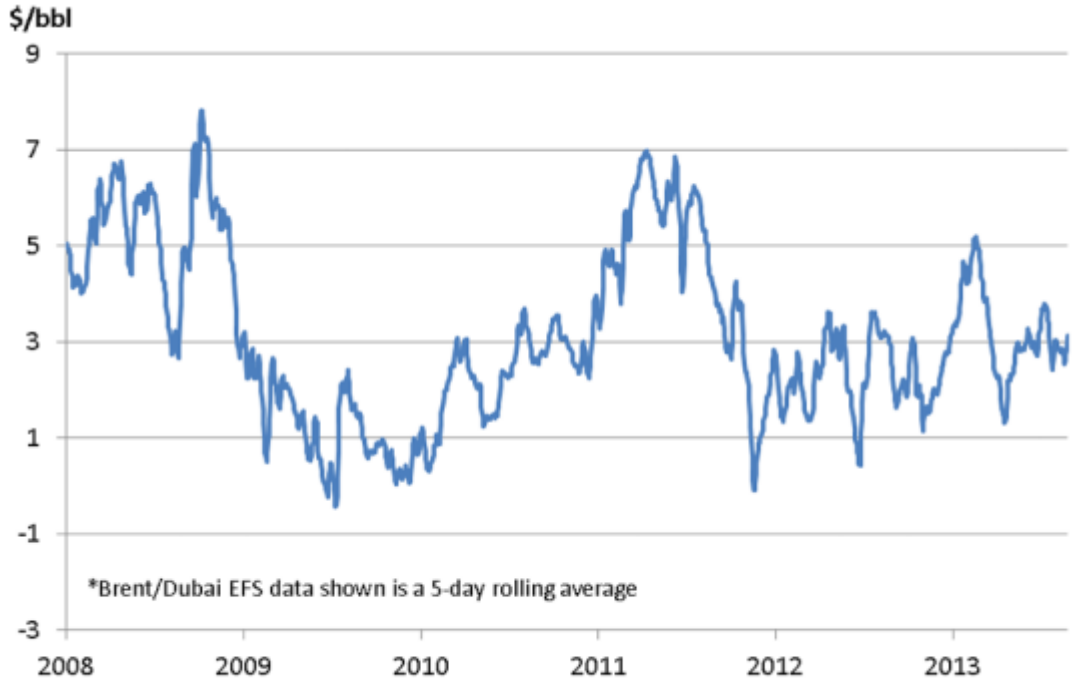
https://rbnenergy.com/netback-netback-to-where-you-started-from

Brent/WTI Spread

Source: ICE

Importance: a spread between waterborne cargo in North Sea and crude in Cushing

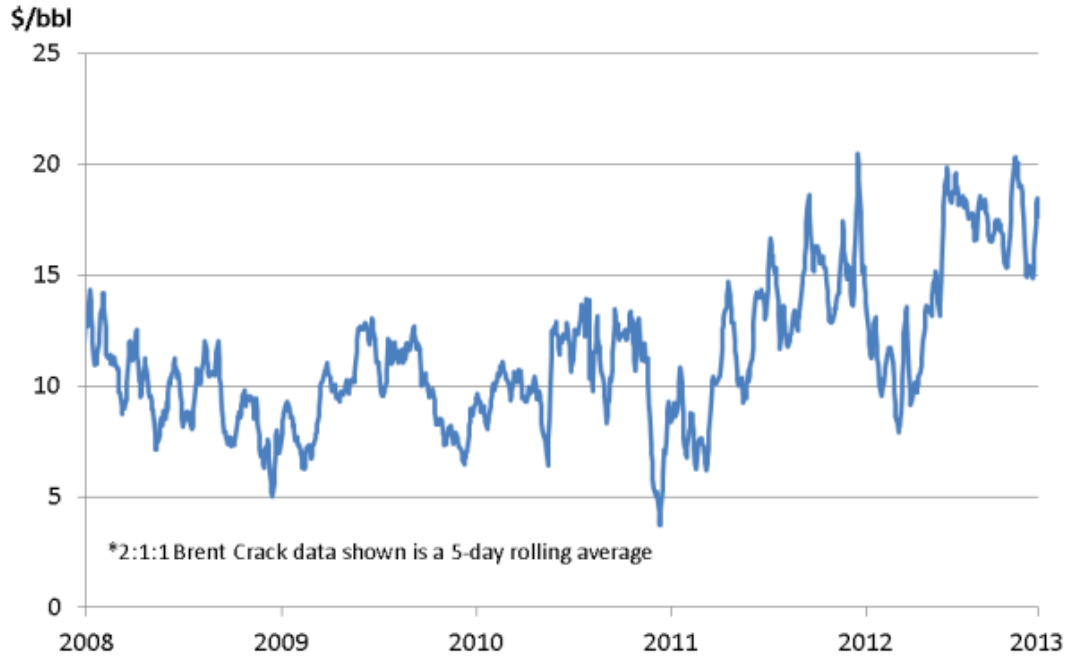
Brent Dubai Spread



Source: ICE, Platts

The spread between light and sour crude

2:1:1 Transatlantic Crack

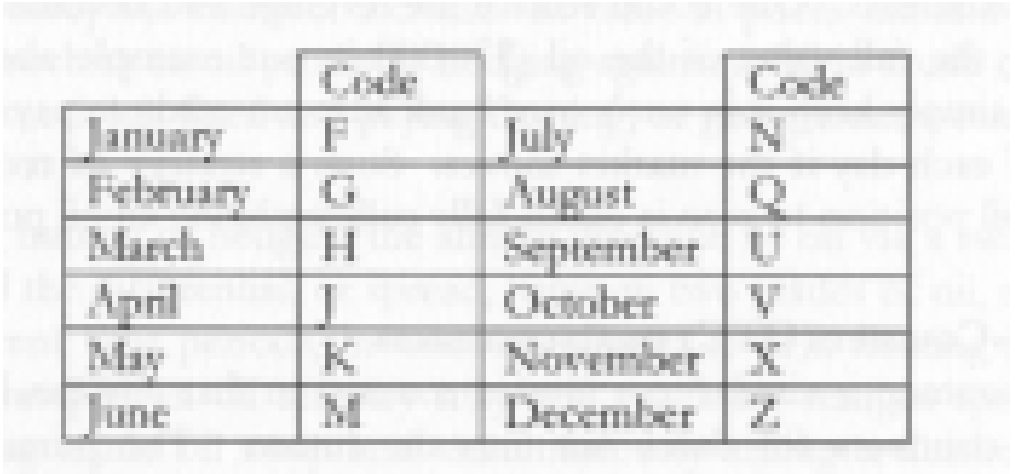


Source: Reuters, Platts

Two barrels of Brent, 1 heating oil and 1 gasoline

Main Oil Future Contracts (Oil 101)

NYMEX	Ticker
WTI Crude Oil	CL
Heating Oil	HO
Gasoline	RB



	Code		Code
January	F	July	N
February	G	August	Q
March	H	September	U
April	J	October	V
May	K	November	X
June	M	December	Z

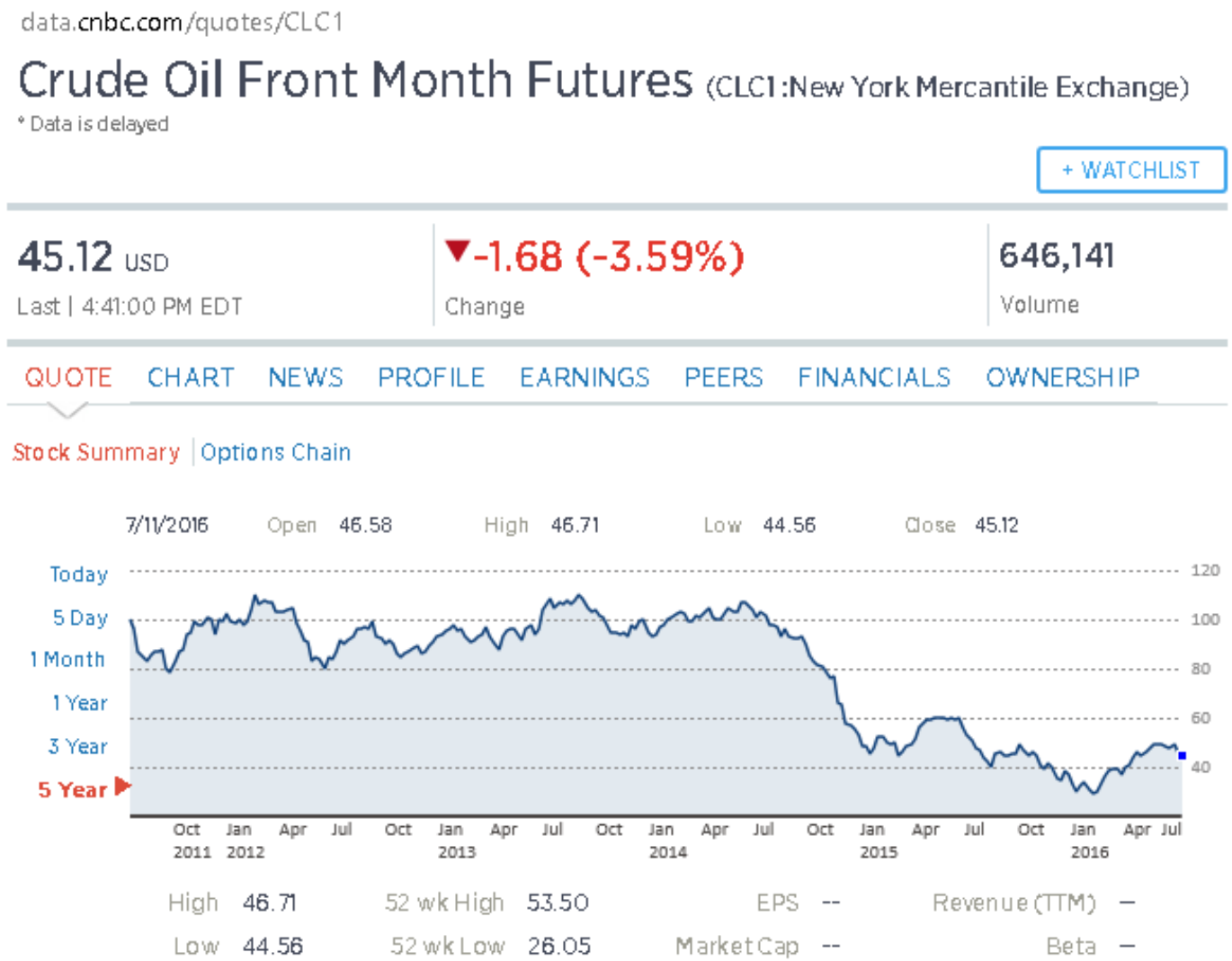
Jan, Feb…… December F,G,H,J,K,L,M,N,Q,U,V,X,Z

WTI for August 2016 : CL + Q + 6

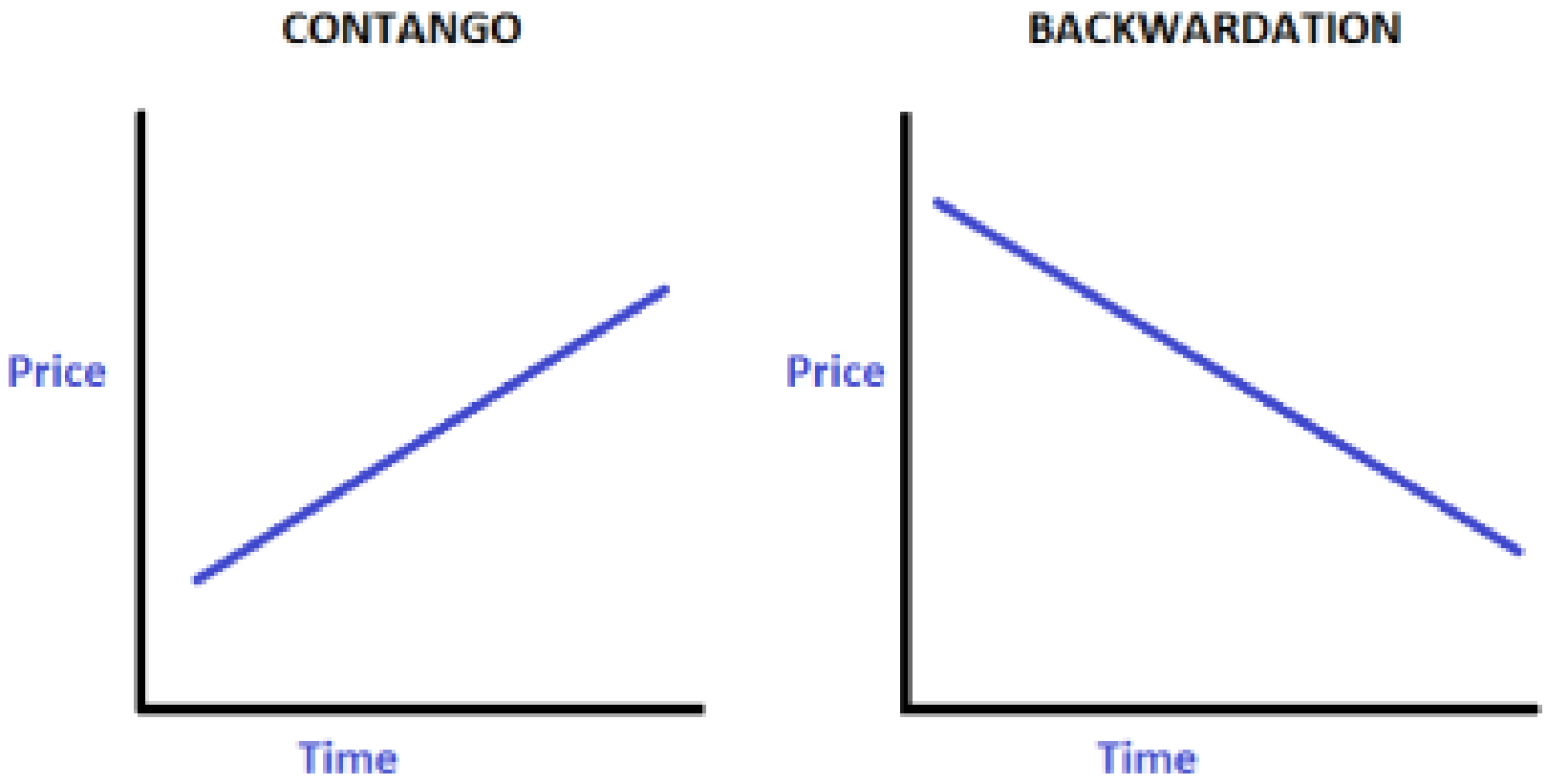
CLQ6


Crude Oil - Electronic Aug 2016
NMN: CLQ6
Set Aler
OVERVIEW
CHARTS
HISTORICAL QUOTES
Market closed
$45.14
Change -1.66 -3.55%
Volume 642,067
Jul 13, 2016 4:37 p.m.
Quotes are delayed by 10 min
Previous close $ 46.80
Day low $44.56
Day high $46.69
Open: 46.58
52 week low $32.22
52 week high $56.51
Compare: Indexes
Add
47
46
45
44
7p 9p 11p 1a 3a 5a 7a 9a 11a 1p 3p 5p
1d · 5d · 3m · 6m · 1y · 3y · 5y
Set

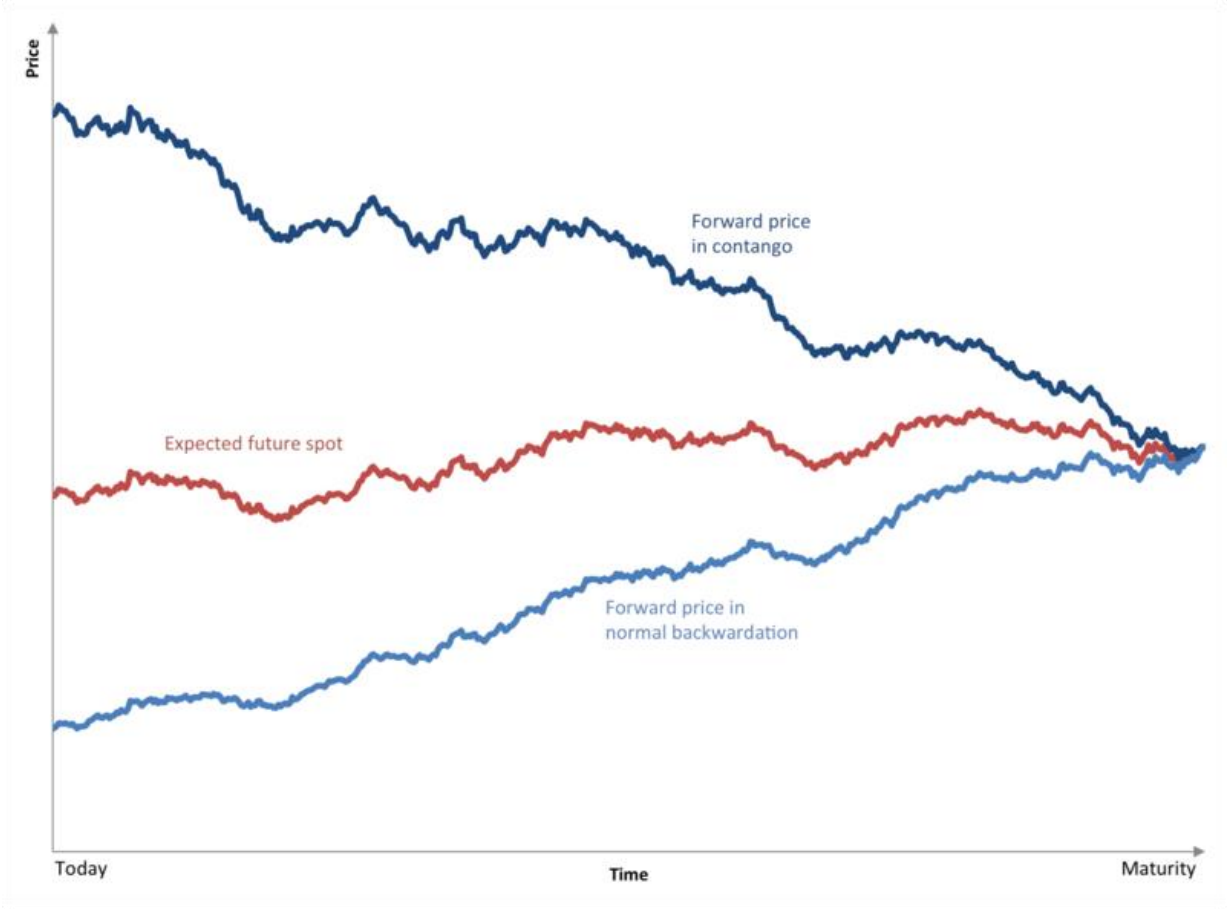
CLc1 – Front Month



Contango and Backwardation



Contango - Backwardation



https://en.wikipedia.org/wiki/Contango#/media/File:Contangobackwardation.png

Fundamental Info

- Nymex
  - WTI, NY ULSD(former heating oil), RBOB gasoline
- ICE
  - Brent, gasoil

- Futures: right & obligation , centralized
- Forward:
- Short: sell
- Long : buy

Forward, Futures, Spreads, Options

Forward vs Futures

	Forwards	Futures
Contract	Developed by industry	Fixed by exchange
Size	Bulk with operational tolerances	Small and fixed
Structure	Chains	Novation
Settlement	Offsets/bookouts	By Clearing House
Costs	Letters of credit, brokerage	Margins, fees, brokerage
Regulation	Informal	Formal
Security	Counterparty risk (same as physical market)	Clearing House guarantees
Users	Trade, financial institutions	Trade, financial institutions, locals
Profit/loss	On closure/delivery	Daily marking to market

Forward

- Physical contract
  - Extension of spot market
  - Hard to distinguish

Forward paper markets, 1997

Europe	United States	Arab Gulf and Far East
15-day Brent	WTI and other pipeline crudes Colonial Pipeline Boston Bingo	Dubai crude O/S naphtha

- Paper Contracts
  - Take the opposite position with a different counter party
  - “Bookouts”

CFD (Contracts for Differences): Purely financial, price swap rather than futures
For example Differential to June 15-day Brent … May2-6 = June+0.13, May 9-13 = +0.09

Futures

- Hedging mechanism
- 99% not result in physical delivery

- EFP (Exchange for Physicals)
  - Using futures to price a physical transaction without getting involved in exchange delivery process
  - Physical deal normal way

Futures Exchanges

- NYMEX
- ICE
- DME – Dubai Mercantile Exchange
- Shangai Futures Exchanges
- TURDEX

https://en.wikipedia.org/wiki/List_of_futures_exchanges

Short Hedge

Company A buys a 500,000 barrel cargo of crude oil from a supplier for $22/barrel. The current futures price is $22.20/barrel. It decides to sell futures as a hedge. A few days later it sells the physical cargo for $21.50/barrel and buys back its futures contracts, which are now trading at $21.60/barrel.

	Physical Market	$/bl	Futures Market	$/bl
Day 1	Cargo bought at:	$22.00		
			Futures sold at	$22.20
Day 6	Cargo sold at:	$21.50		
			Futures bought at	$21.60
	Loss	–$0.50	Profit	+$0.60

Oil Trading Manual, David Long, 6

Long Hedge

In the same way, a company which is short of oil in the physical market will use a long hedge, i.e. will buy futures, to protect itself against a rise in price. For example, a gasoil distributor might agree to sell oil to a customer at a fixed price for some months ahead. In order to protect itself against a rise in price it will buy futures. When the company buys the oil to fulfil the order, the hedge will be lifted.

	Physical Market	$/tonne	Futures Market	$/tonne
Month 1	Oil sold at:	$223		
			Futures bought at	$222
Month 2	Oil bought at:	$230		
			Futures sold at	$228
	Loss	–$7	Profit	+$6

Oil Trading Manual, David Long, 6

Example

- To hedge October production, sell November crude futures
- Why? November expire middle of October

- November crude oil future $46.93
- When November settles with $35
- You gain 11.93

https://www.mercatusenergy.com/blog/bid/86597/The-Fundamentals-of-Oil-Gas-Hedging-Futures

Speculation

- Opposite of Hedging
- Just for profit
- Hedge funds

Example: Speculating on a price rise

A strike at an off-shore oil platform interrupts production in the North Sea. As a result, prices are expected to rise and a speculator buys IPE Brent futures in the hope of making a profit. Several days later, the strike is settled and production is restored so the speculator closes out his position before prices can fall back again. Since there is no physical transaction involved the 2 trades must be classed as purely speculative.

Oil Trading Manual

	Physical Market	$/bl	Futures Market	$/bl
Day 1	No transaction		Futures bought at	$23.20
Day 5	No transaction		Futures sold at	$25.10
			Profit	+$1.90

Oil Trading Manual, David Long, 6

Arbitrage

- Simultaneous buying of a product/crude in one market and sell in another
- If price diffs widen

Example: Heating oil arbitrage

August gasoil on the IPE and heating oil on the Nymex are trading at the same price. Many traders expect Nymex heating oil to move to a premium over the IPE because of good demand in the US and plentiful stocks in Europe. They therefore buy Nymex heating oil contracts and sell IPE gasoil, subsequently reversing the process when the spread has widened.

IPE gasoil contracts are 100 tonnes and Nymex heating oil contracts are 1,000 gallons. It is therefore necessary to trade *3* Nymex heating oil contracts for every *4* IPE gasoil contracts. Furthermore, IPE gasoil prices are quoted in $/tonne while Nymex heating oil prices are quoted in cents/gallon. In order to convert cents/gallon into $/tonne the Nymex heating oil price is multiplied by 3.13 because there are 313 gallons of heating oil in a tonne assuming an average specific gravity for gasoil of 0.845 kg/litre. Both contracts have a maximum specific gravity but a range is deliverable so traders tend to use different factors. The important thing is to use the same factor to put on and take off the spread.

	Nymex heating oil	Price cts/gall	Price $/tonne	IPE gasoil	Price $/tonne	Price differential
21 June	Buy 3 at:	75.27	235.60	Sell 4 at:	236.00	–0.40
22 July	Sell 3 at:	75.08	235.00	Buy 4 at:	230.00	+5.00
	Loss	–0.19	–0.60	Profit	+6.00	+ 4.60

Oil Trading Manual, David Long, 6

Spreads

- Time
- Location
- Grade

Example: Crack spread arbitrage

A trader notes that the Nymex crack spread in August is trading at $5.00/barrel, narrower than normal. Crack spreads involve an equivalent number of crude and product contracts, usually 2 gasoline and 1 heating oil against 3 crude oil: a 3:2:1 crack spread of $5.00 means that the products are trading at a $5.00 premium to crude oil. When the spread widens to $6.50 the trader decides to take his profit. There are 42 US gallons in a barrel of oil.

2 gasoline contracts bought at	76.00 cts/gall	($31.92/bl)
1 heating oil contract bought at	72.64 cts/gall	($30.51/bl)
3 crude oil contracts sold at		$26.45/bl

Differential = $(2 \times 31.92 + 30.51)/3 - 26.45 = \$5.00/\text{bl}$

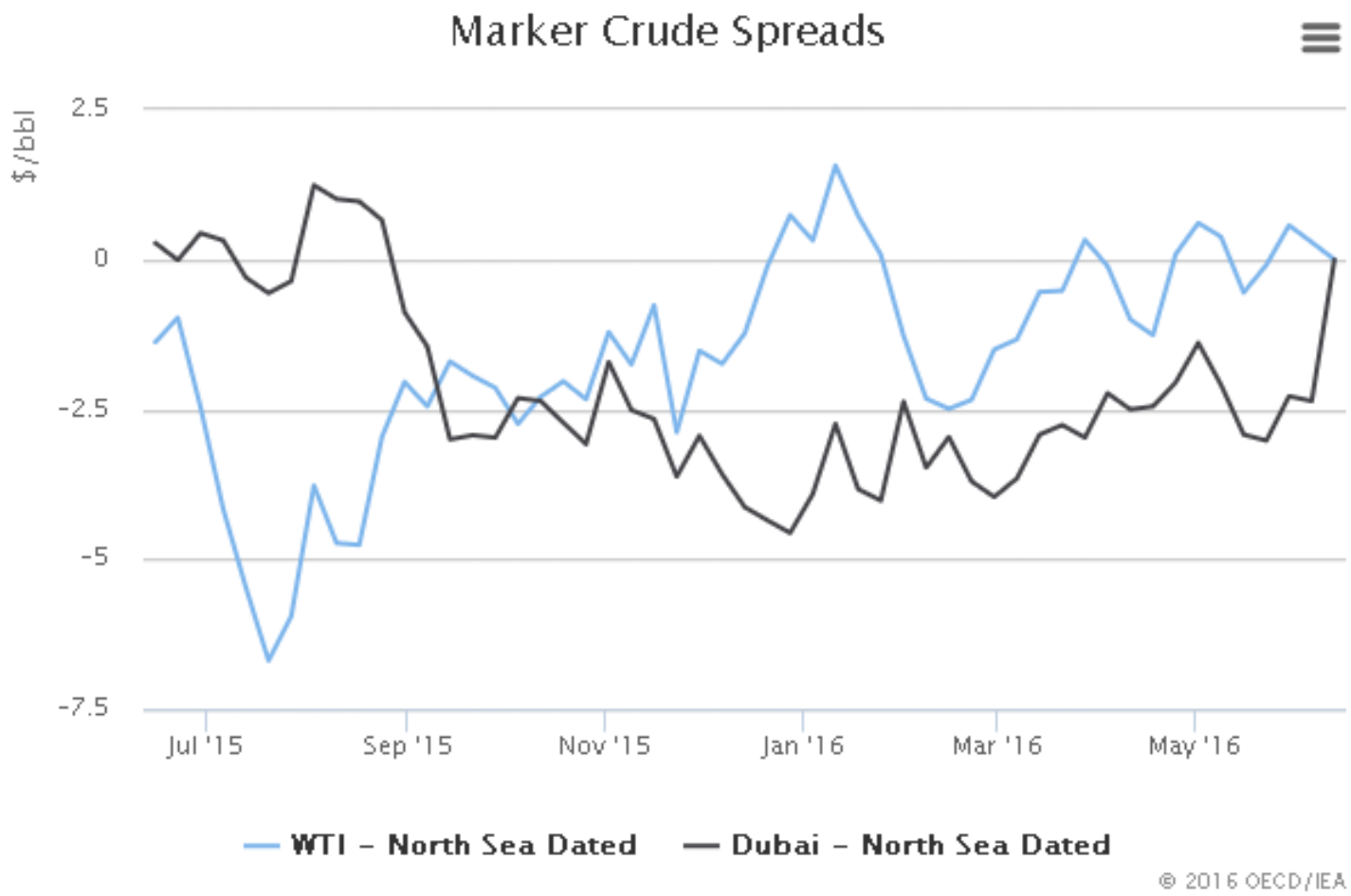
When the spread increases the reverse transaction is done.

2 gasoline contracts sold at	84.00 cts/gall	($35.28/bl)
1 heating oil contract sold at	78.43 cts/gall	($32.94/bl)
3 crude oil contracts bought at		$28.00/bl

Differential = $(2 \times 35.28 + 32.94)/3 - 28.00 = \$6.50/\text{bl}$

Oil Trading Manual, David Long

Spreads


Marker Crude Spreads
$/bbl
2.5
0
-2.5
-5
-7.5
Jul '15
Sep '15
Nov '15
Jan '16
Mar '16
May '16
WTI – North Sea Dated
Dubai – North Sea Dated
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Options

- Like insurance
  - Call option – holder right to buy (ceiling)
  - Put option – holder right to sell (floor)

- Pays a premium

Buy a call option

Buy a call option:

Strike price:	$20.00/barrel
Premium:	$0.50/barrel

If the price of oil rises to $22/barrel at expiration of the contract, the option will have an in-the-money value or intrinsic value of $2.00/barrel and will therefore be automatically exercised. The

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as well, including United Continental Holdings, which saw four times its average daily call volume on Wednesday.

Among the calls bought in United, one trade stood out for being incredibly optimistic. A buyer went into the market and bought 10,000 of the May 95-strike calls for 5 cents each. Since each contract controls 100 shares, the trader paid $50,000 with the hope that United will move 56 percent higher from Wednesday's close in the next month.

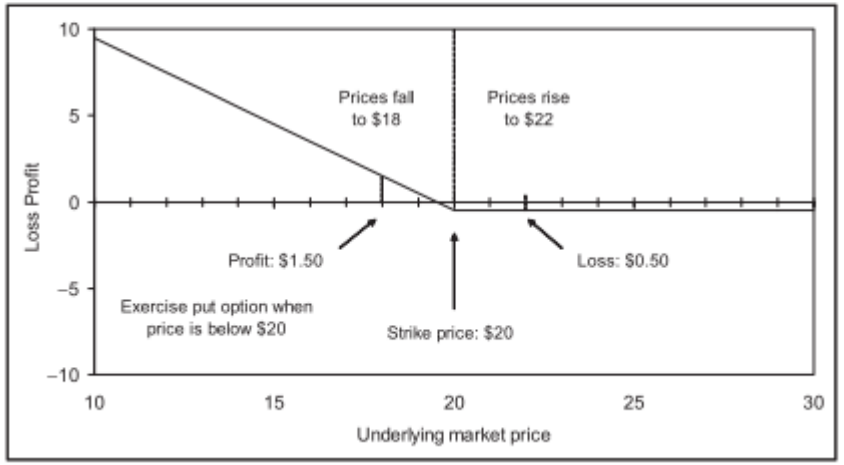
Oil Trading Manual, David Long

Put option

Buy a put option:

Strike price: $20.00/barrel
Premium: $0.50/barrel

If the price of oil falls to $18/barrel at expiration of the contract, the option will have an in-the-money value or intrinsic value of $2.00/barrel and will be automatically exercised. The profit of the



Mexico hedges oil at $49 a barrel

Price is 36% below the $76.40 at which 2015 sales were locked in

Oil Trading Manual, David Long

Basis Risk

- Difference in price between the product/crude to be hedged and the hedging instrument being used (UK – David Long)
- The price difference between the price of an energy commodity in one market and the price of an energy commodity in different market. (US- Mercatus Energy)

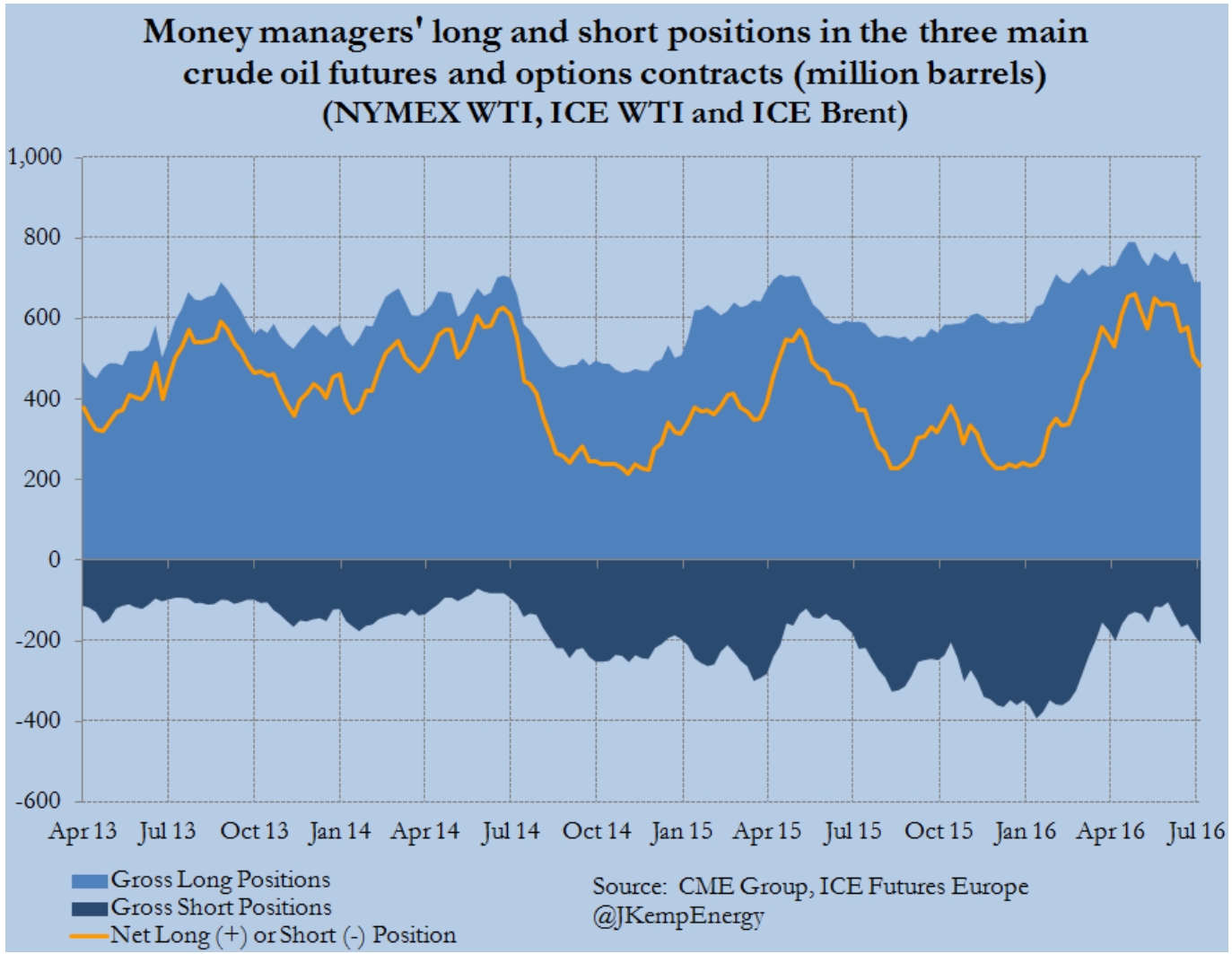
Impact on hedge efficiency	Basis widens	Basis narrows
Long hedge (short physical)	Worse	Better
Short hedge (long physical)	Better	Worse

Locational Basis
- US Golf Coast ULSD vs New York Harbor ULSD

Product/Quality Basis
- Singapore gasoil vs Singapore Jet fuel

Time frame (calendar basis)
- November NYMEX WTI crude oil futures vs calendar asp

Long and Short Positions



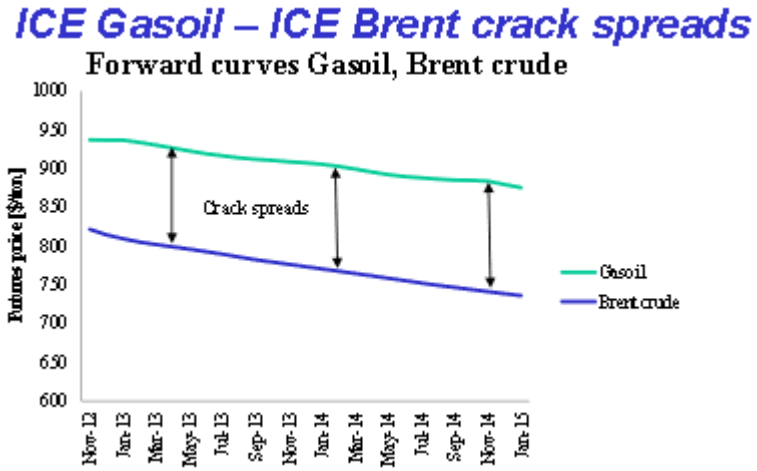
Type of deliveries

- FOB(Free on Board) : buyer takes title & risk at load port
- CFR (Cost and Freight) : seller arranges the transport, purchaser buys
- CIF(Cost, Insurance and Freight): Seller delivers to port, CFR+insurance
- DES (Delivered Ex Ship) : Seller tries to sell during the voyage, delivery takes place at destination

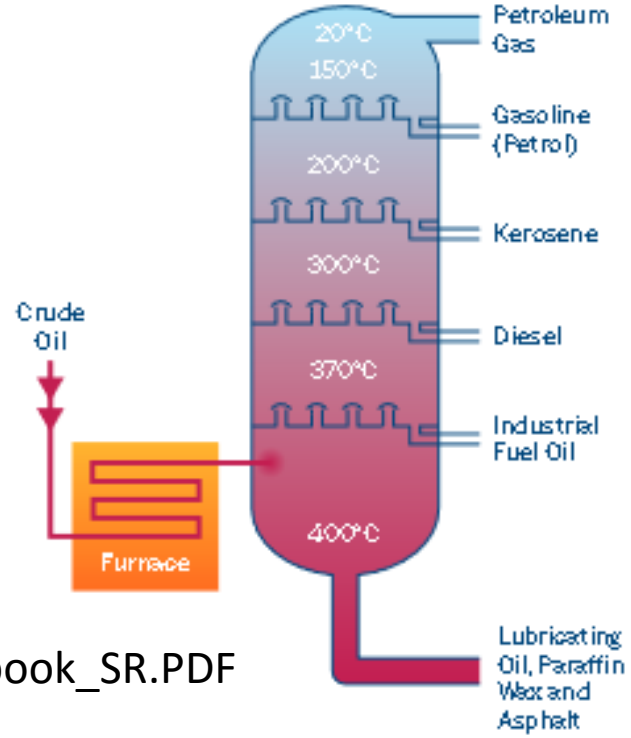
Crack Spreads

- 1:1
  - Theoretical refining margin
  - Sell refined (diesel/gasoline) buy crude
- 3:2:1 and 5:3:2
  - 3:2:1
    - Three crude futures, two gasoline one ULSD
  - 5:3:2
    - Five crude, sell 3 RBOB gaso, 2 ULSD

- Paper refinery
- Selling crack: sell gas/buy crude
- Buying crack : buy gas/sell crude



https://www.theice.com/publicdocs/Oil_Futures_Forward_Curves.pdf



https://www.cmegroup.com/trading/energy/files/EN-211_CrackSpreadHandbook_SR.PDF

Factors Affecting Crack Spread Value

Issue	Typically Affects	Crack Spread Effect
1. Geopolitical issues — politics, geography, demography, economics and foreign policy	Crude oil supply	*Crack weakens initially* — higher crude oil prices relative to refined products. *Crack strengthens later*, as refineries respond to tighter crude oil supply and reduce product outputs.
2. Winter seasonality	Increase in distillate demand	Crack strength
3. Slower economic growth	Decline in refined products demand	Crack weakness
4. Strong sustained product demand	High refinery utilization	Crack strength
5. Environmental regulation on tighter product specifications	Tightening of product supply	Crack strength
6. Expiration of trading month	Cash market realities — long or short products	Cracks values can vary due to closing of positions
7. Tax increase after certain date	Increased sales in front of tax deadlines	Crack weakens in front of tax deadline and strengthens post deadline
8. Summer seasonality	Increase in gasoline demand	Crack strength
9. Refinery maintenance	Decline in product production	Crack strength
10. Currency weakness	Crude oil strength	Crack weakness

https://www.cmegroup.com/trading/energy/files/EN-211_CrackSpreadHandbook_SR.PDF

Example

- In January, April Crude $90, May RBOB $109.20 (2.60/gallon)
  - 1:1 crack spread RBOB – Crude = 109.20-90 = $19.20

- In Cash market (physical) - March
  - Sells 1000 barrel gasoline $2.75/gallon
  - Buys 1000 barrel crude 100 $
  - Net positive cracking margin of 15.50

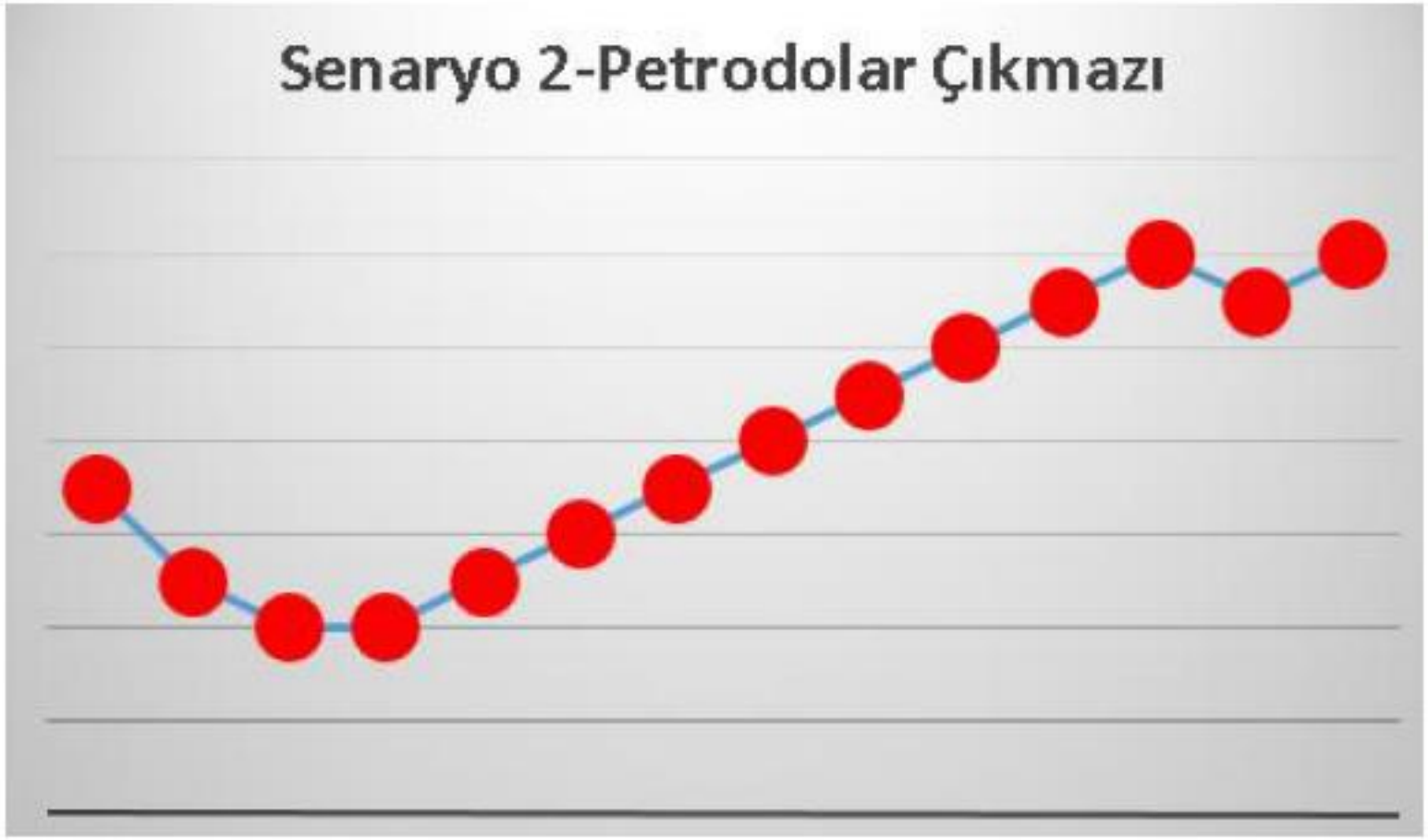
  - Hedged 19.20
  - Unhedged 15.50

https://www.cmegroup.com/trading/energy/files/EN-211_CrackSpreadHandbook_SR.PDF

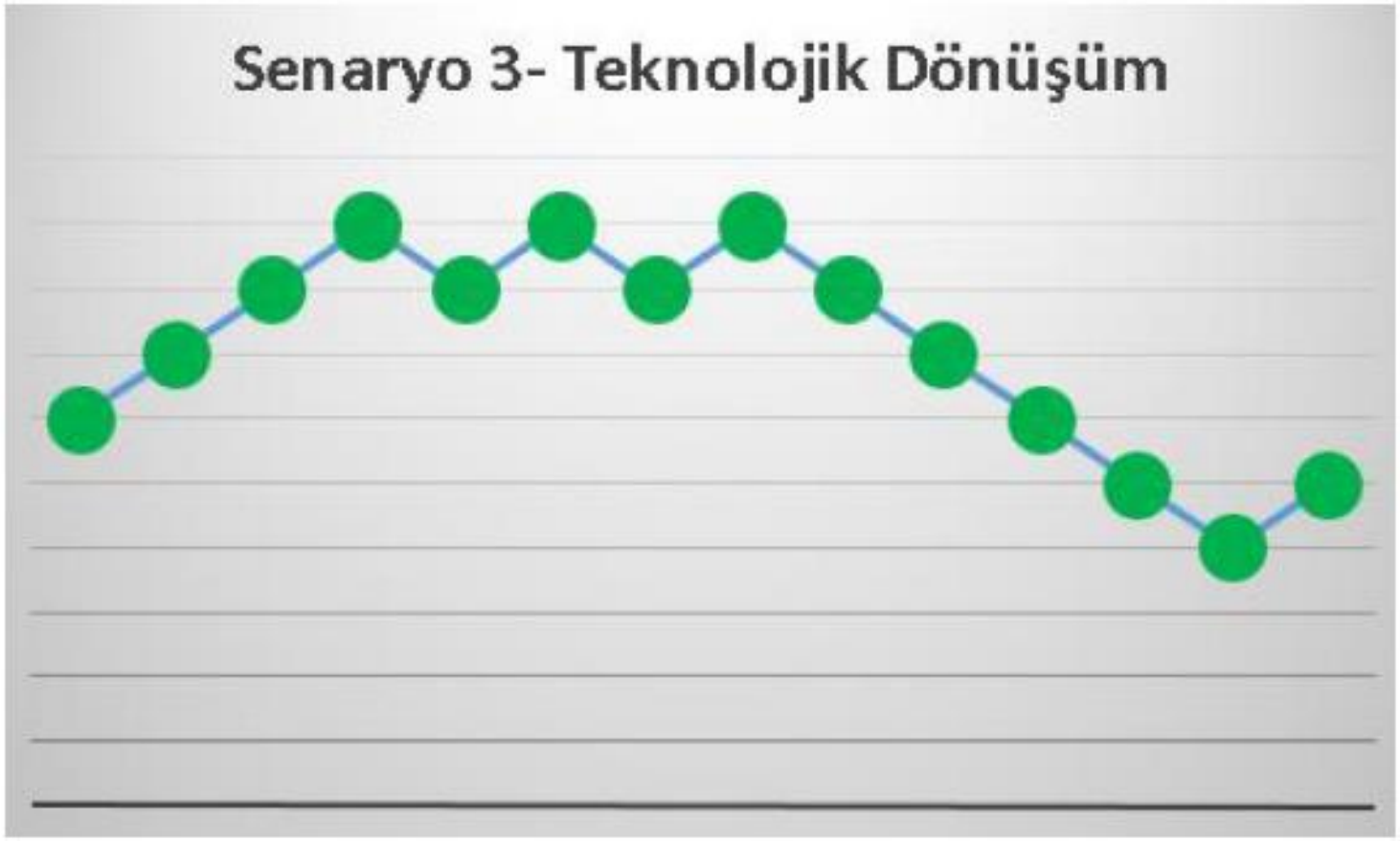
Scenarios

S 1- Market Wars

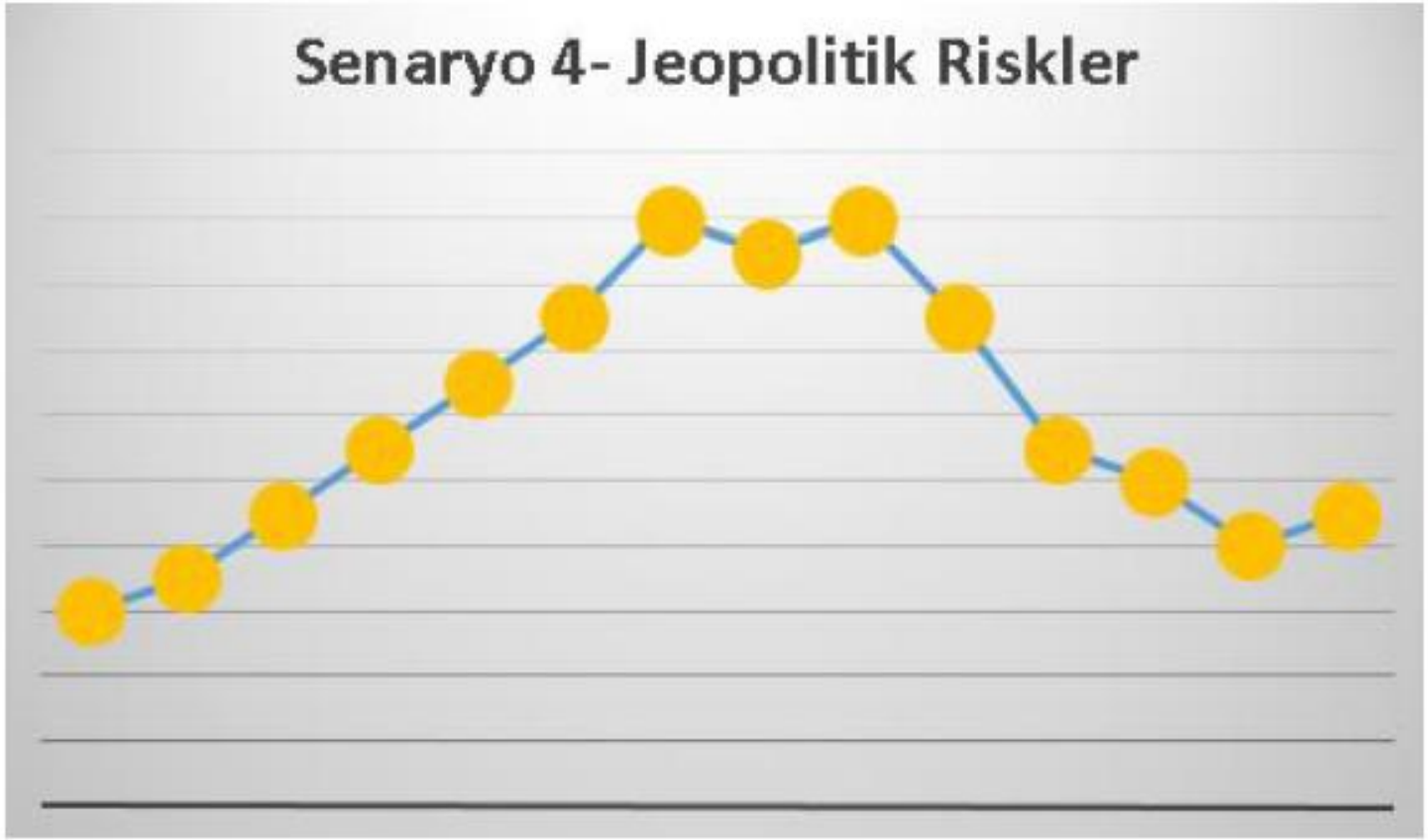
S 2 – Petrodollar Deathend



S 3 – Technology



S 4 – Geopolitical Risks



Thank you

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