

Risks in Energy Markets and Policy

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METU-IMA
(Jan 3, 2018)

Disclaimer

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Question

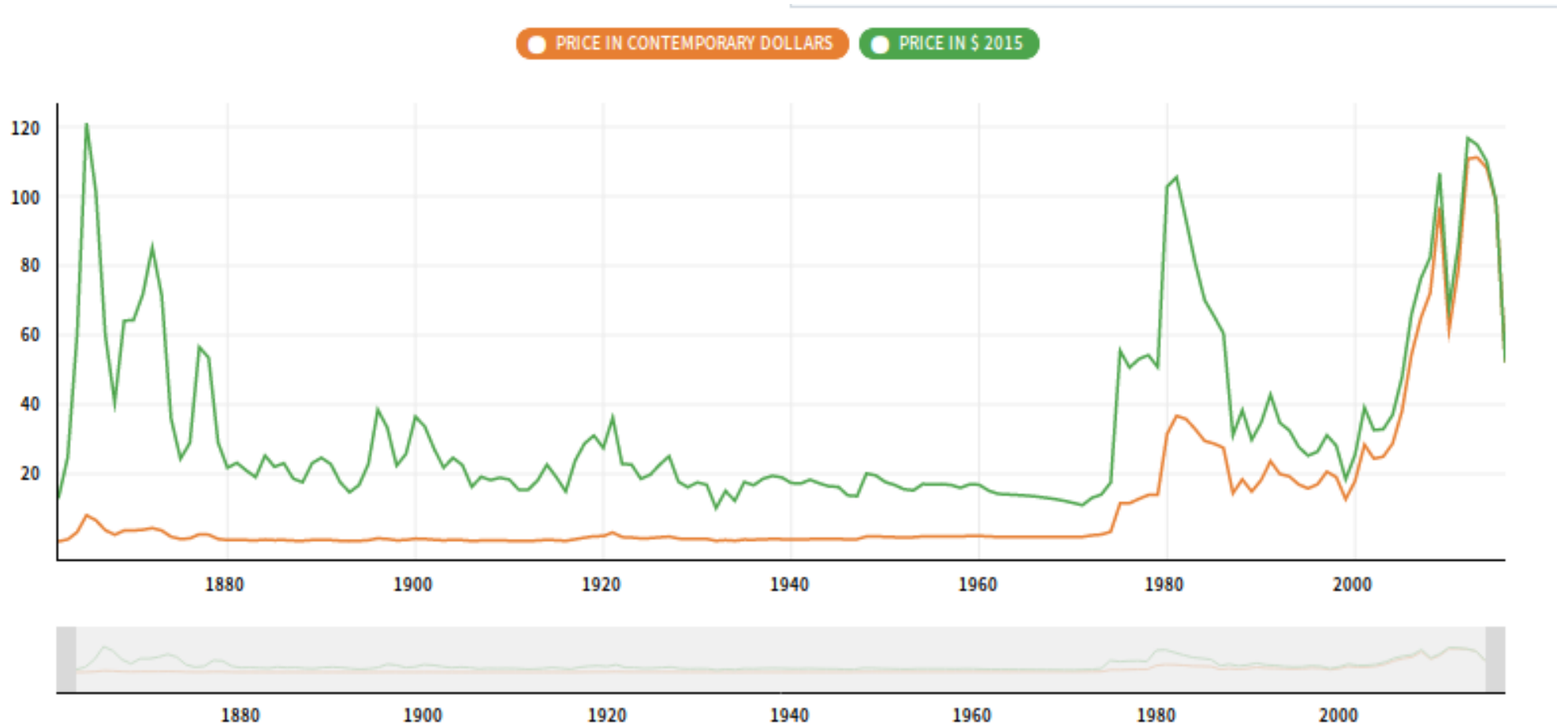
Under which market structure volatility is lowest?

- a) State-owned
- b) Monopolistic
- c) Oligopolistic
- d) Competitive
- e) Other...

Which can be modelled more easily?

- a) Cartel
- b) State
- c) Market
- d) Oil Market

Crude Volatility

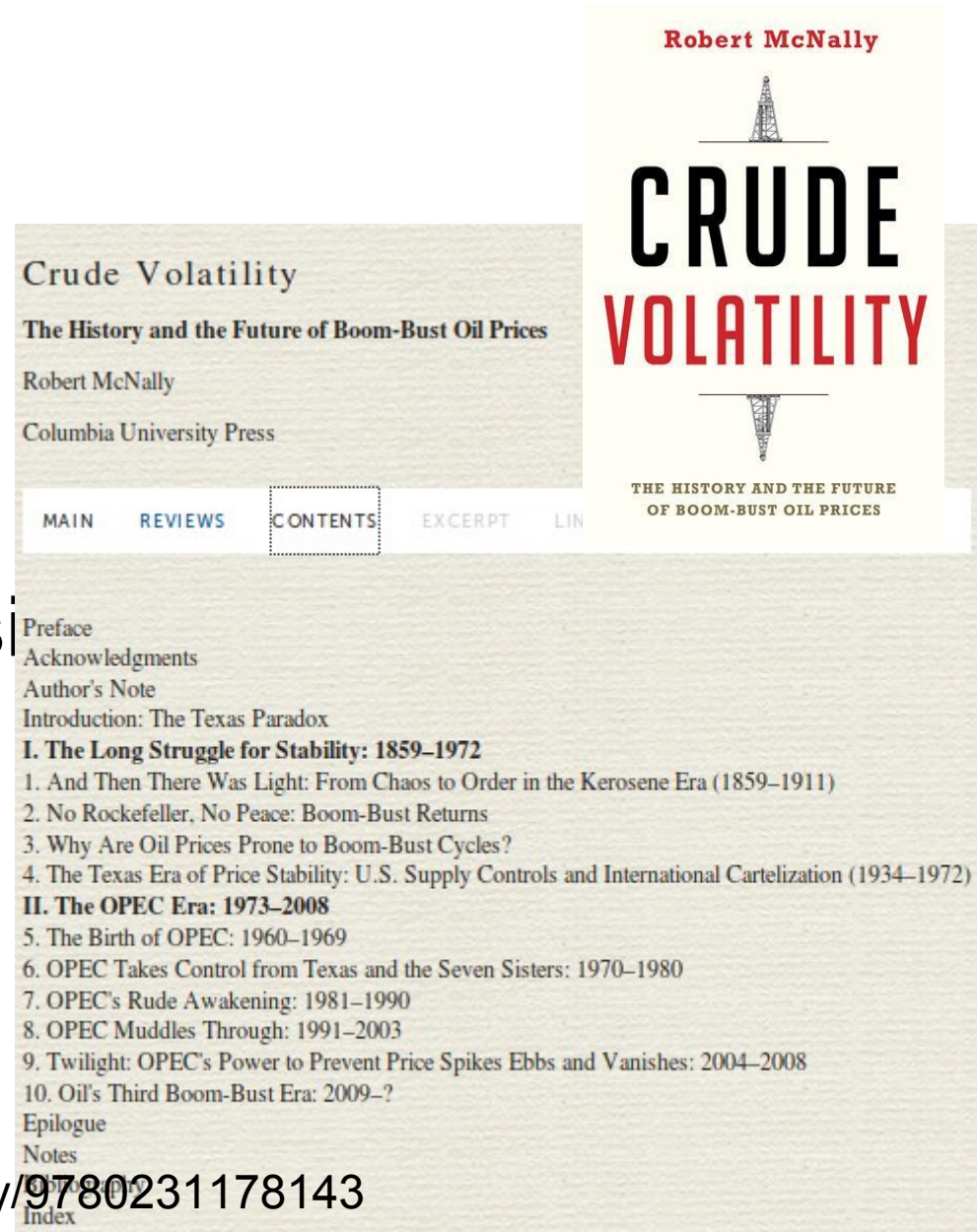


https://www.quandl.com/data/BP/CRUDE_OIL_PRICES-Crude-Oil-Prices-from-1861

Crude Volatility (Book) claims

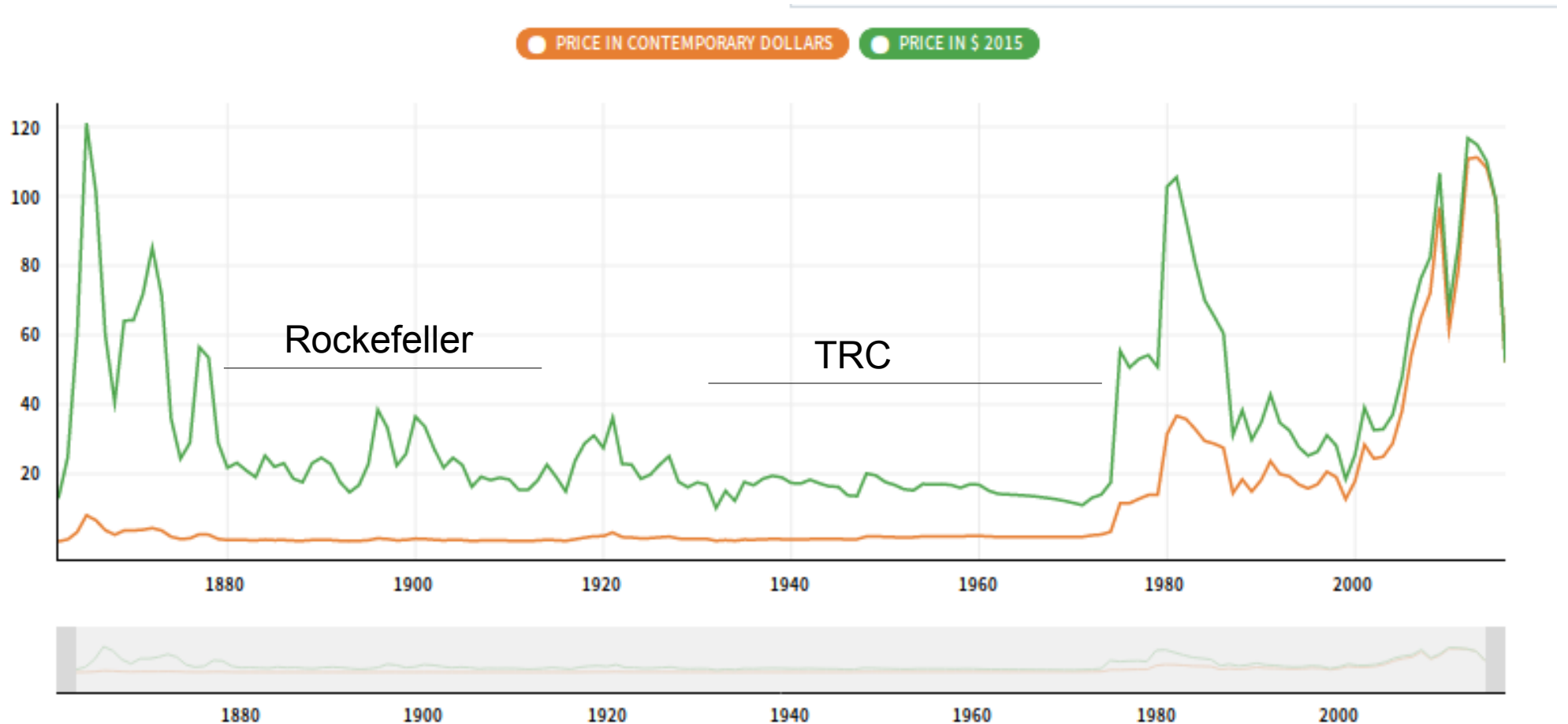
Stable periods are:

- Rockefeller
 - Standard Oil
 - 1911 divided
- Texas Railroad Commission
- ~!~OPEC era



<https://cup.columbia.edu/book/crude-volatility/9780231178143>

Crude Volatility

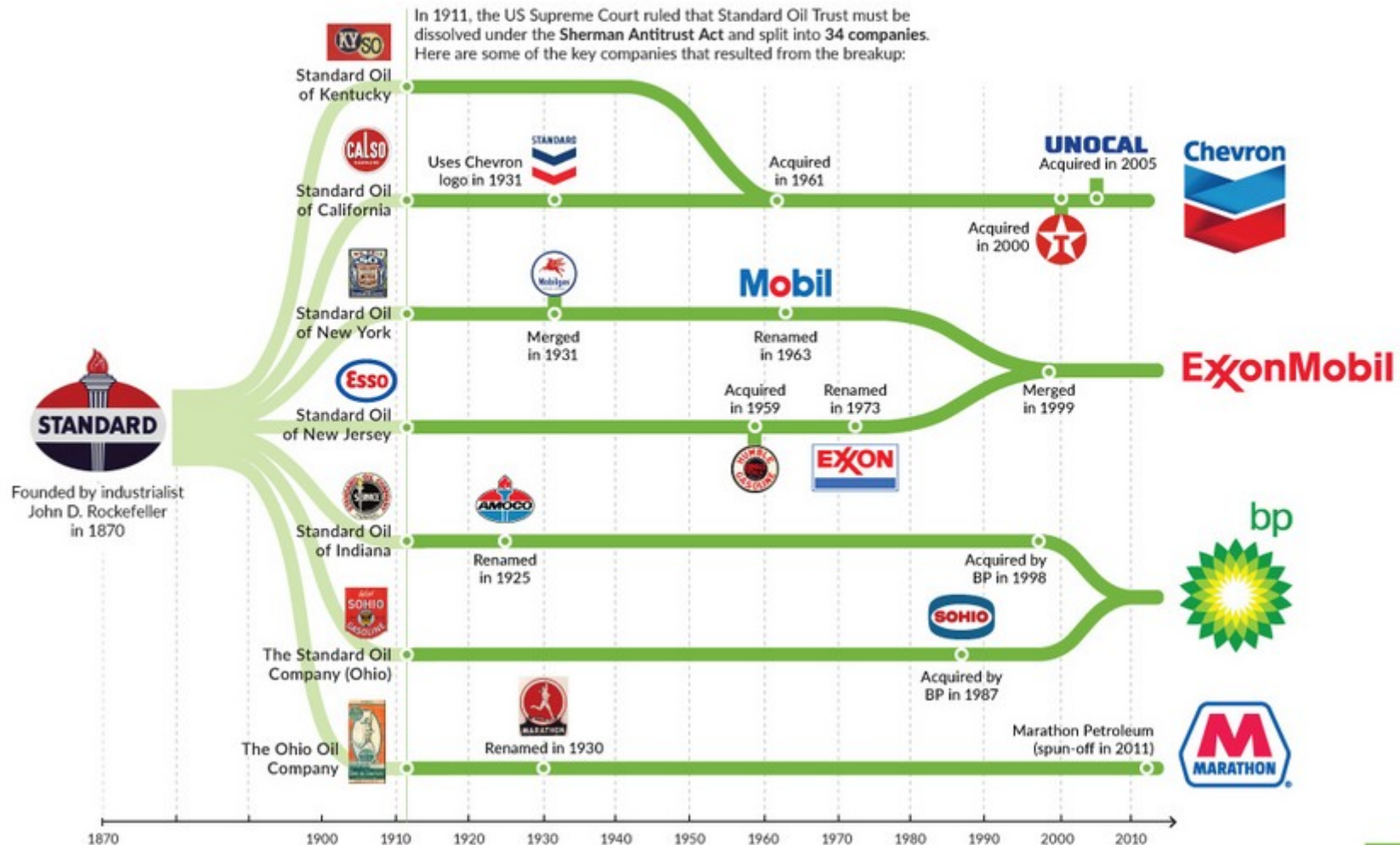


https://www.quandl.com/data/BP/CRUDE_OIL_PRICES-Crude-Oil-Prices-from-1861

Evolution of Standard Oil

THE EVOLUTION OF STANDARD OIL

Following the remnants of John D. Rockefeller's oil juggernaut

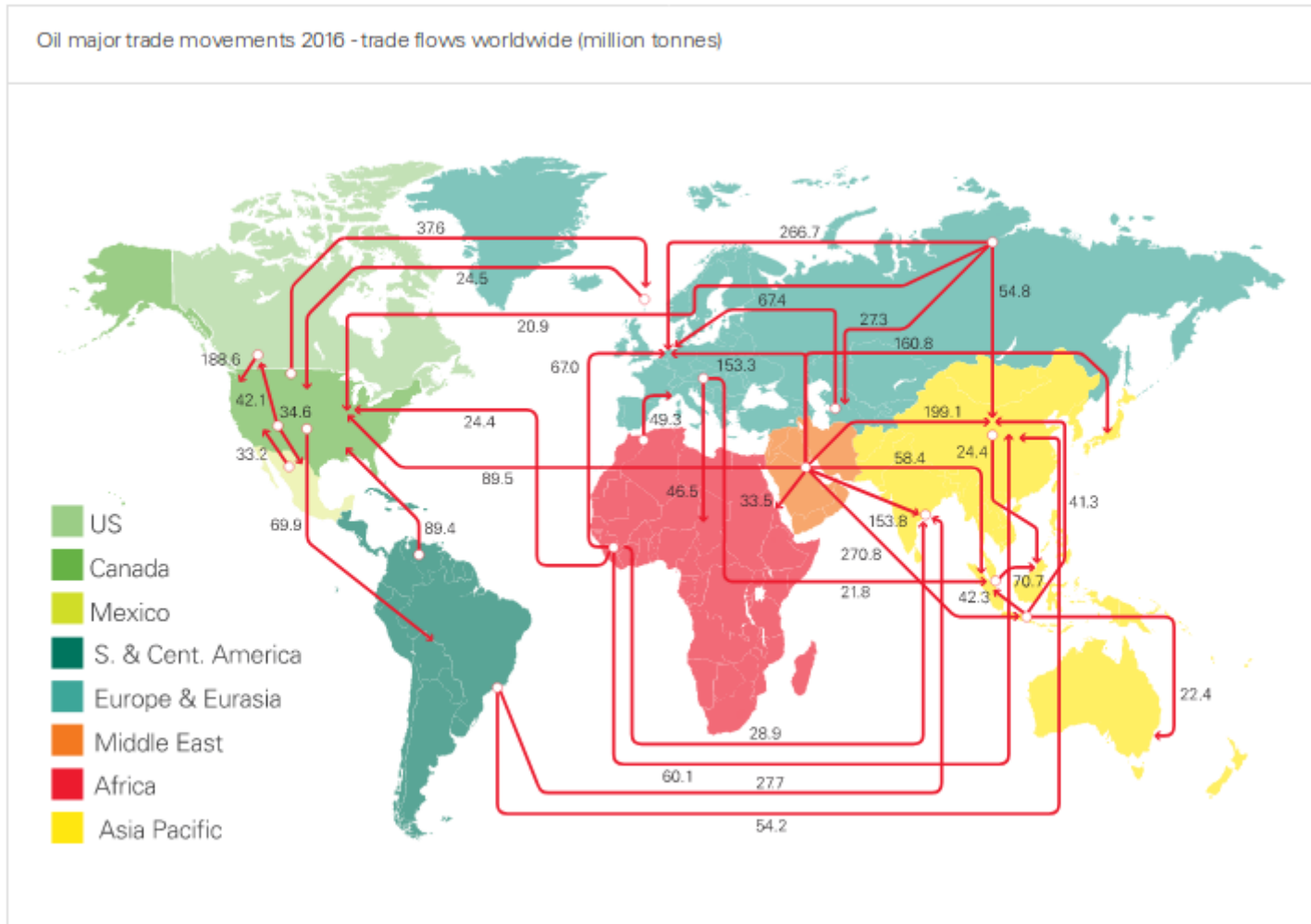


SOURCE: Wikipedia

visualcapitalist.com



Oil trade today...

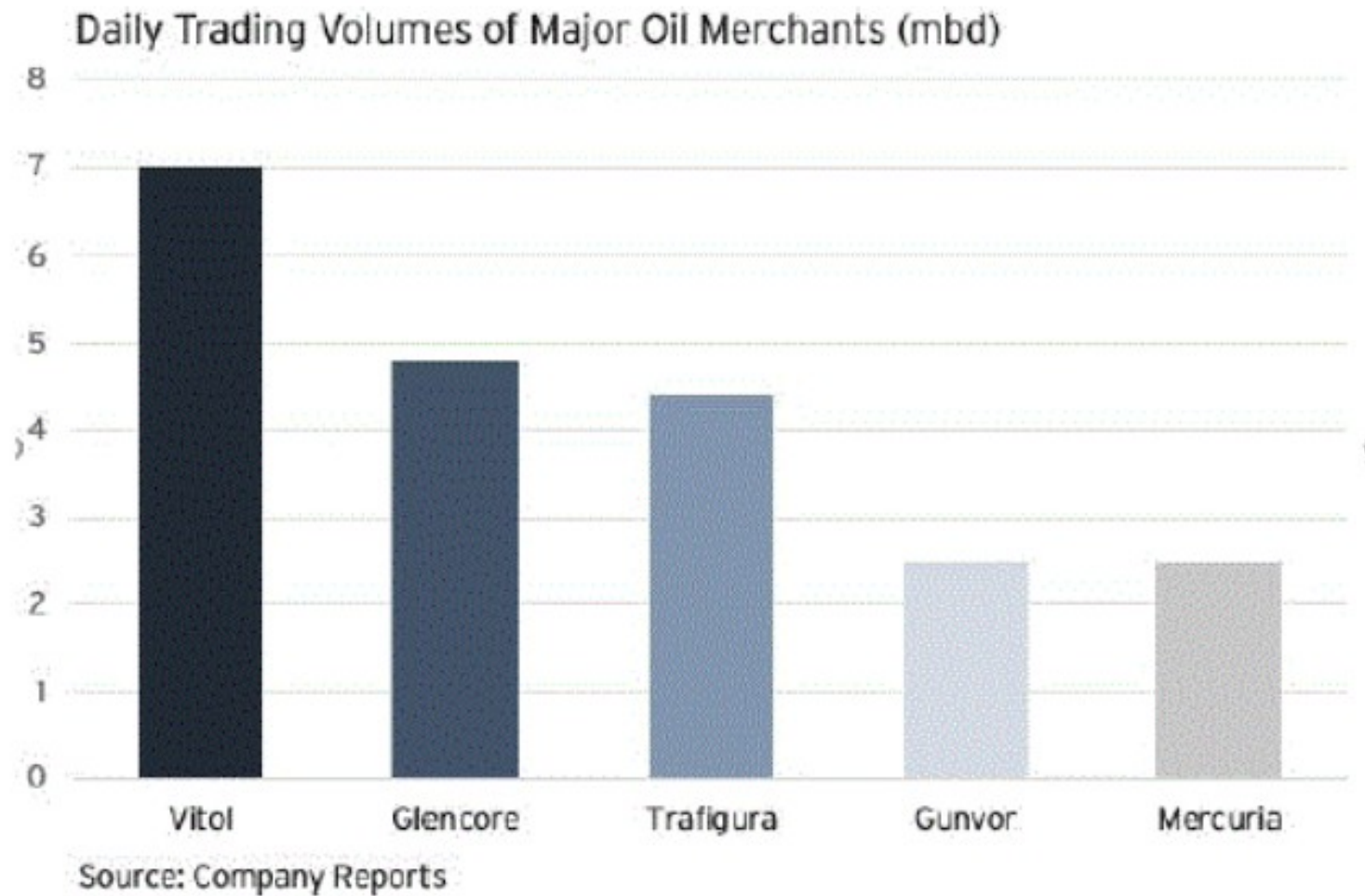


Demand: 98 mb/d

Crude oil trade: 42 mb/d

Product trade: 23 mb/d

Major oil traders



<http://energyfuse.org/nigerias-prepayment-deal-traders-necessary-support-economic-goals/>

Glencore strikes oil deal with Libyan company

Deal covers 150,000 b/d and provides consistent buyer for exports



A National Oil Corporation worker checks pipelines at the Zawiya installation

Anjli Raval and Neil Hume

NOVEMBER 20, 2015

Glencore, the commodity trader and miner, has secured a deal with Libya's state-owned oil company to help it find buyers for crude from the war-torn

IMF credit to Chad delayed over Glencore oil debt

Julia Payne, Madjiasra Nako

4 MIN READ



LONDON/N'DJAMENA (Reuters) - Chad's stalled talks with Glencore on restructuring more than \$1 billion in debt due to the trading firm has delayed the release of IMF funds for the struggling central African country until at least early next year, sources familiar with the matter said.

Trafigura denies involvement in illicit North Korea oil transfer

BY KANGA KONG & DAN MURTAUGH, BLOOMBERG

Published 02.01.18 at 14:42

Oil trader Trafigura denies involvement in the illegal transfer of fuel to North Korea after South Korea said the company originally owned the cargo that was shipping in violation of UN sanctions.

Ship-to-ship transfer attempt, 19 Oct 2017



Source: US Treasury

<https://www.ft.com/content/393347ee-8fa5-11e5-a549-b89a1dfede9b>

<http://shippingwatch.com/secure/carriers/Tanker/article10164837.ece>

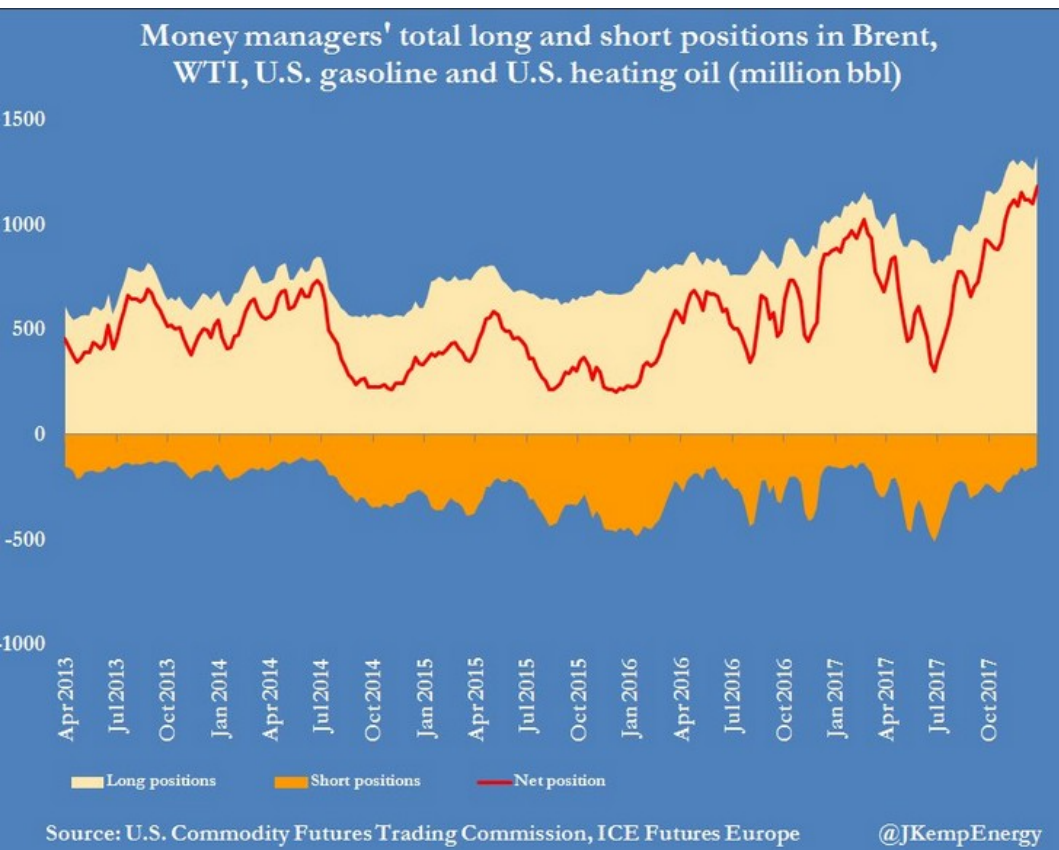
<https://www.reuters.com/article/us-glencore-chad-imf/imf-credit-to-chad-delayed-over-glencore-oil-debt-idUSK>

How 90,000 b/d change prices?



<https://www.investing.com/commodities/crude-oil-streaming-chart>

Long-Short WTI-Brent



#MONEY JANUARY 2, 2018 / 4:23 PM / UPDATED 5 HOURS AGO

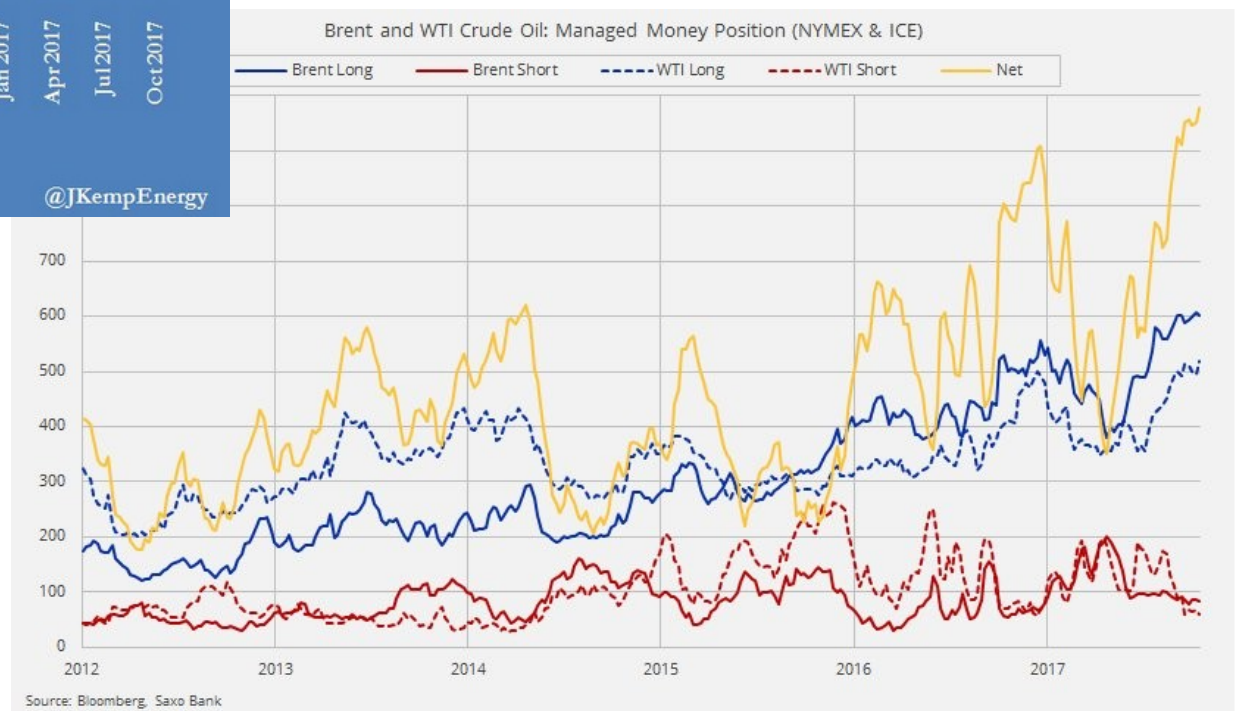
Column: Hedge funds **gamble** OPEC will tighten oil market too much: Kemp

John Kemp

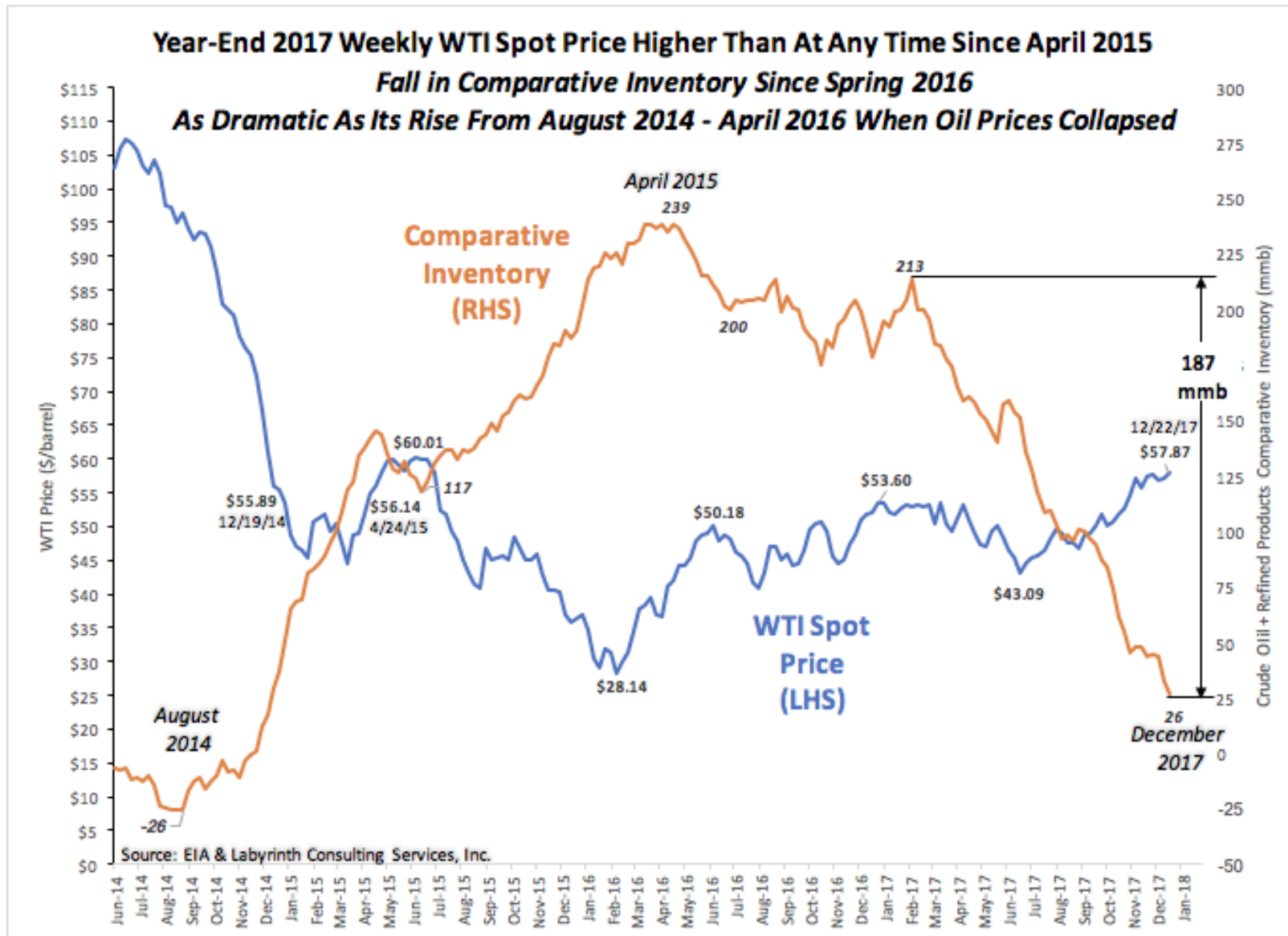
4 MIN READ



LONDON (Reuters) - Hedge funds are the most bullish about oil prices in years, expecting further gains even as prices touch multi-year highs and ignoring the risk linked to such a large concentration of positions.



Fundamentals?



Hedging case study: Mexican oil production

- Secretaría de Hacienda y Crédito Público
- Hacienda "hedge", to hedge Mexican oil production
- Put options 66.50-87 \$ (for year 2009 in 2008)
- 330 million barrels=1.5 billion \$
- Mexico made 5 billion \$
- 2001-2017, a profit of \$2.4 billion
- \$14.1 billion in gains
- paid out \$11.7 billion in fees

Uncovering the Secret History of Wall Street's Largest Oil Trade

Year after year, Mexico places a multi-billion-dollar bet in a deal that big banks lust after. This is the untold story of how the "Hacienda hedge" happens.

By **Javier Blas**

April 4, 2017, 7:01 AM GMT+3

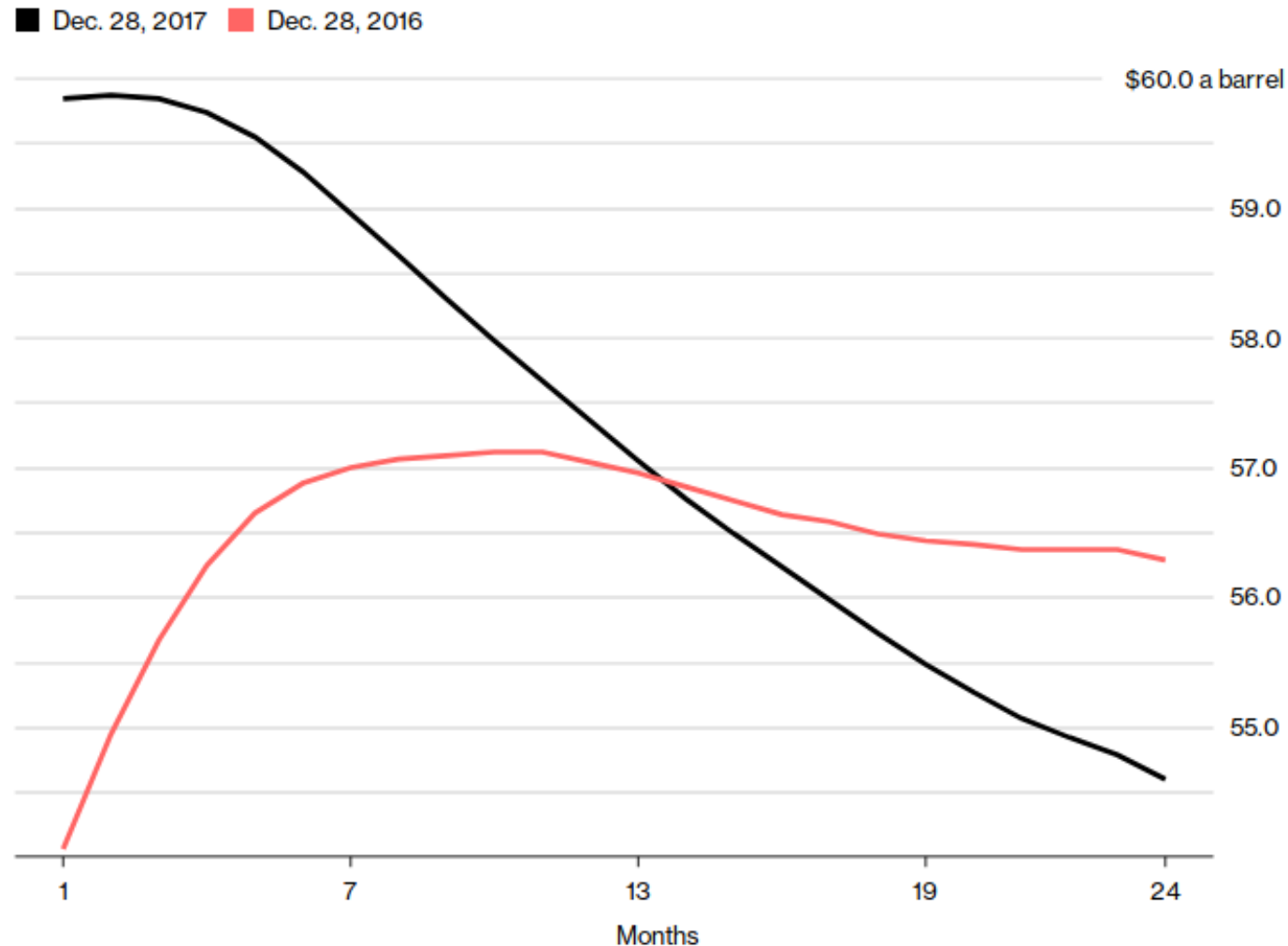
Backwardation & Contango



Difference in 1 year

OPEC's Big Year

WTI forward curve shows rebalancing in oil market



Source: CME, Bloomberg

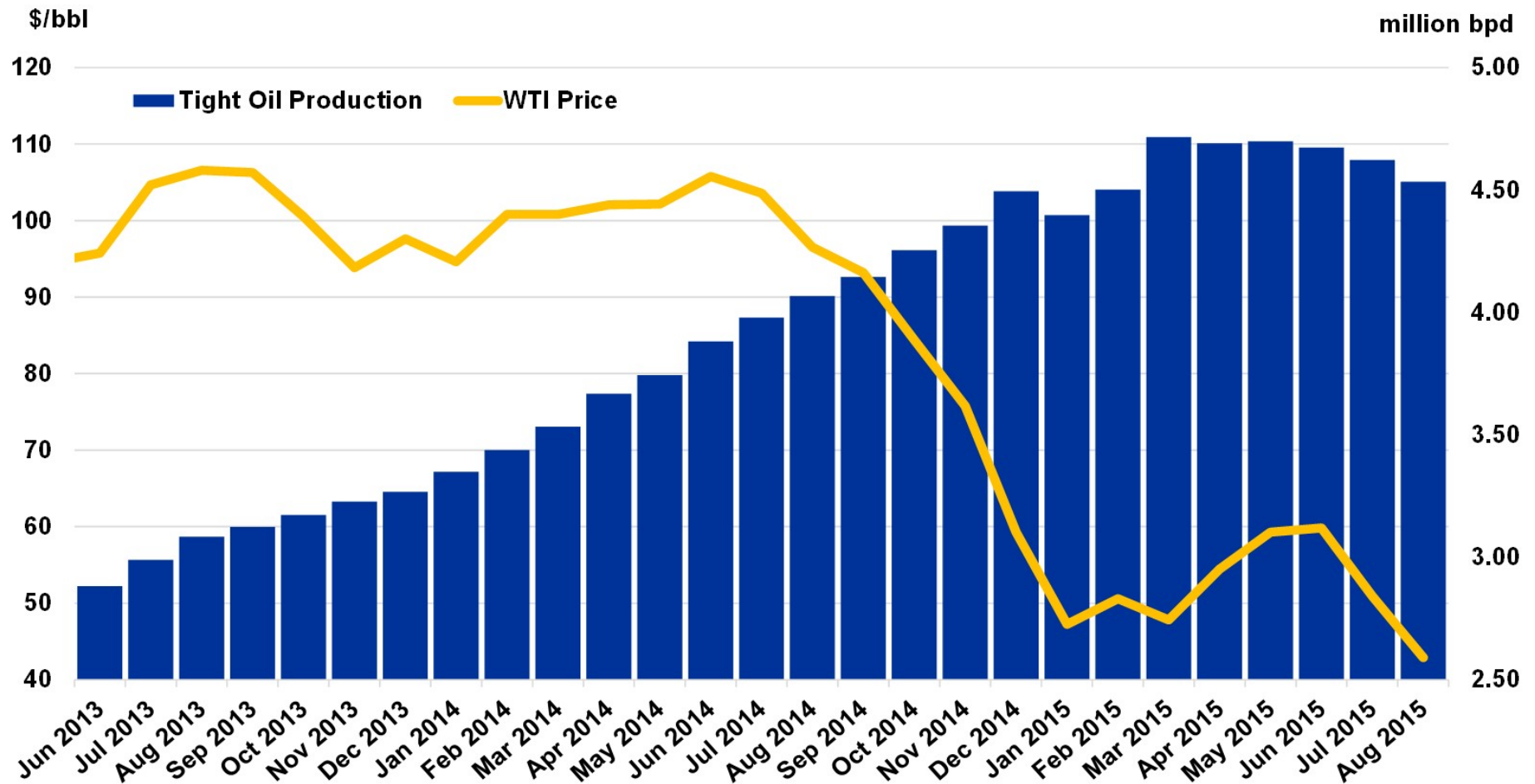
In 2014 - hedging

EBTIDAX for this group is cut by 17% at \$80, and 24% at \$70. We expect some of these companies to be the first to reduce capex for drilling, then large cap independents (Figure 7), and then the major IOCs

Company	Change in EBITDAX from \$100- to \$80*	Debt/EBITDAX Ratio at \$80*	% oil	Oil Hedge Ratio	2014 Production	2015 Growth	2016 Growth
Antero Resources	10%	2.9x	3%	44%	25	20	18
Bill Barrett Corp.	9%	2.3x	72%	65%	16	2	4
Cabot Oil & Gas	7%	1.1x	6%	11%	11	8	6
Chesapeake Energy	15%	1.5x	18%	22%	202	12	25
Cimarex Energy	21%	1x	33%	0%	76	13	10
Comstock Resources	20%	2.4x	51%	0%	12	4	3
Concho Resources	12%	1.5x	65%	34%	72	22	30
Denbury Resources	29%	3.3x	94%	59%	72	4	5
Eclipse Resources	17%	0.8x	18%	6%	3	17	5
Exco Resources	11%	4.1x	14%	26%	7	2	2
Gulfport Energy	13%	0.9x	11%	40%	13	7	6
Halcon Resources	18%	4.3x	85%	48%	37	8	7
Jones Energy	20%	3.2x	29%	30%	13	2	2
Quicksilver Resources	8%	7.8x	0%	53%	7	1	0
Memorial Res. Dev.	9%	1.1x	5%	24%	9	6	6
Penn Virginia	13%	2.6x	65%	31%	17	7	4
Resolute Energy	17%	4.3x	77%	39%	10	1	1
Rice Energy	0%	1.7x	0%	43%	0	0	1
RSP Permian	18%	1.8x	71%	31%	10	6	5
SandRidge Energy	12%	2.8x	40%	36%	40	14	9
SM Energy	17%	1.9x	31%	34%	78	15	15
Stone Energy	17%	1.7x	40%	35%	20	6	5
Swift Energy	22%	4.8x	27%	1%	14	(1)	0
W&T Offshore	25%	2.8x	40%	0%	24	3	2
Whiting Petroleum	26%	2.1x	80%	3%	99	65	25
Total	17%				887	+245	+195

Result

US Tight Oil Production & WTI Crude Prices, Jun 2013 - Aug 2015



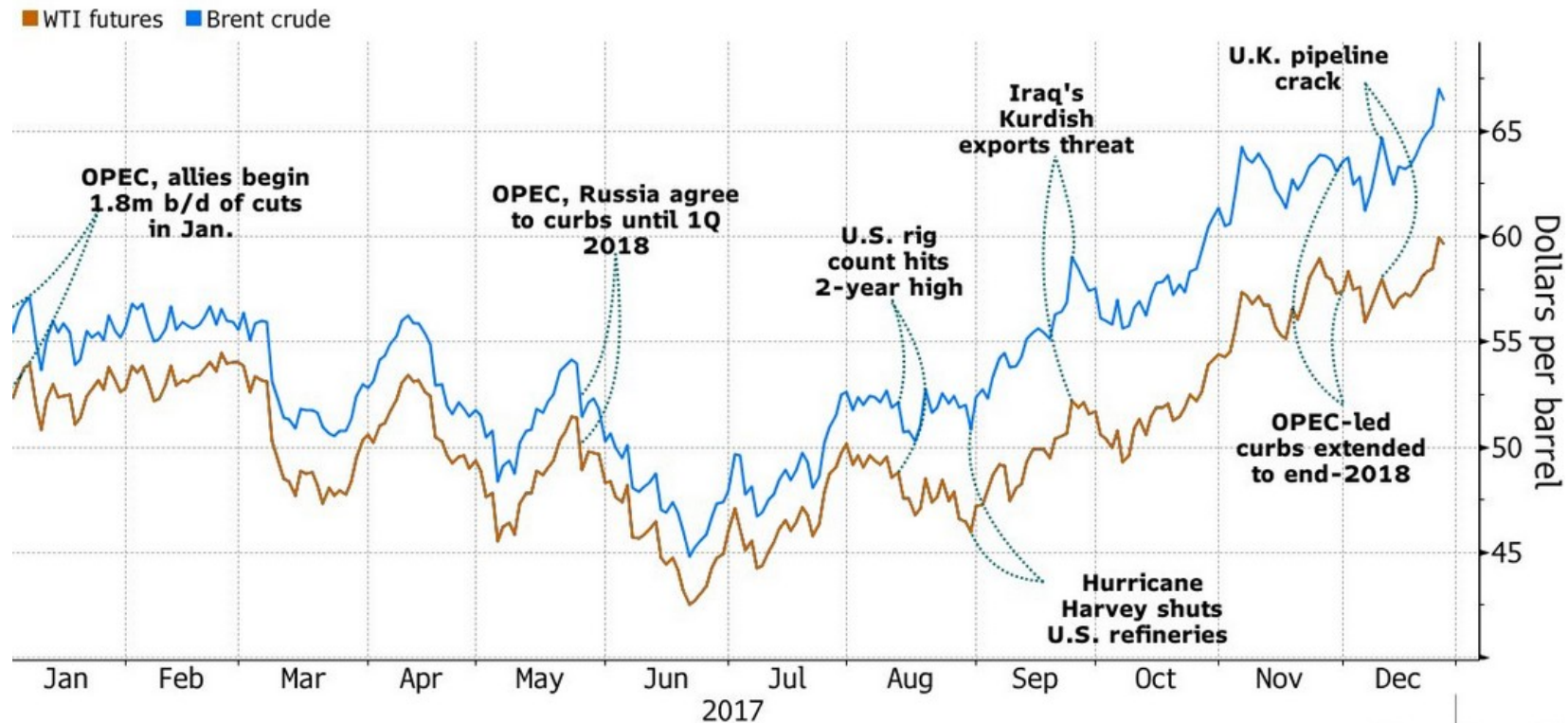
Source: EIA

*Selected plays of Eagle Ford (TX), Bakken (MT & ND), Spraberry (TX & NM Permian), Bonespring (TX & NM Permian), Wolfcamp (TX & NM Permian), Delaware (TX & NM Permian), Yesso & Glorieta (TX & NM Permian), Niobrara-Codell (CO, WY), Haynesville, Utica (OH, PA & WV), Marcellus (PA, WV, OH & NY), Woodford (OK), Granite Wash (OK & TX), Austin Chalk (LA & TX), Monterey (CA)



Spread

OPEC, geopolitical risks drive oil's advance in 2017

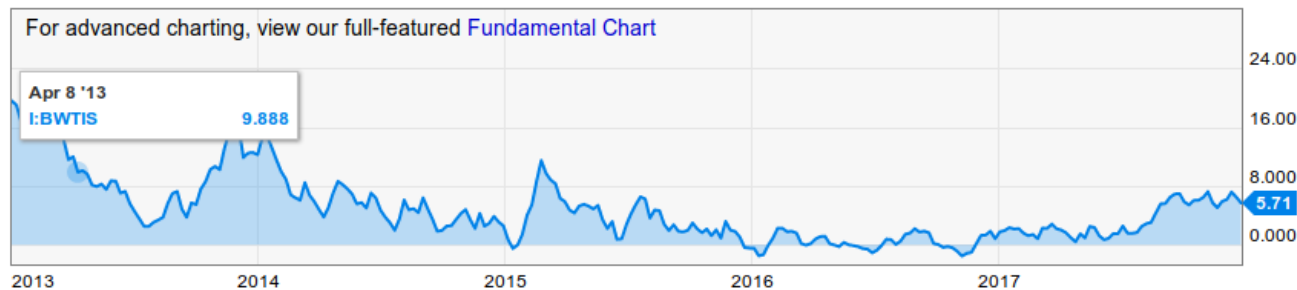


Source: Bloomberg

Bloomberg

5d 1m 3m 6m YTD 1y 5y 10y Max

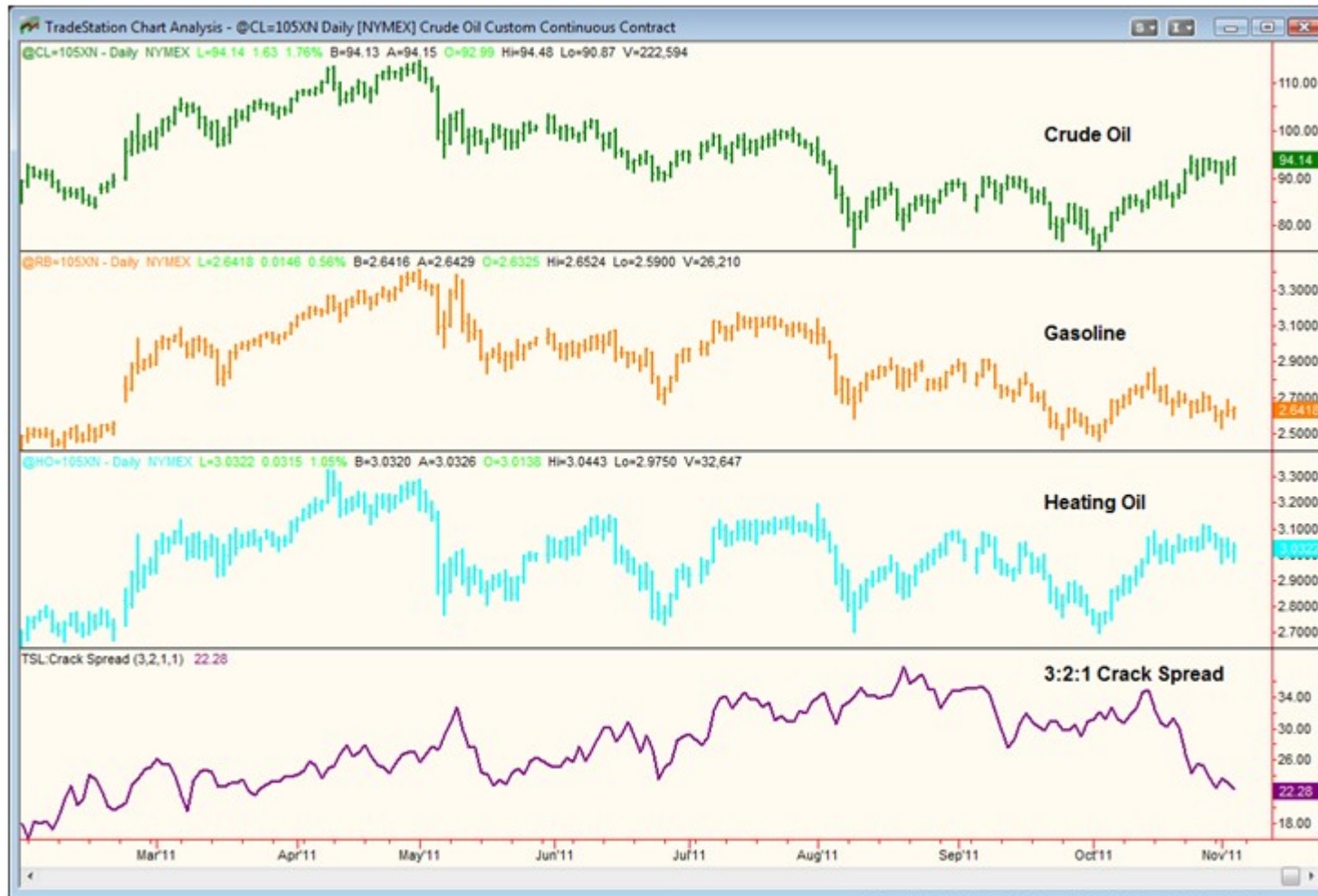
Export Data Save Image Print Image



https://ycharts.com/indicators/brent_wti_spread

Crack spread

3:2:1 crack - 3 WTI=2 gasoline+1 heating oil



Created with TradeStation. ©TradeStation Technologies, Inc. All rights reserved.

<https://finance.yahoo.com/news/crack-spread-101-part-1-150706378.html>

Future prices

Energies					
CL	Crude Oil	NYM	F,G,H,J,K,M,N,Q,U,V,X,Z	0.01	1000
HO	NY Harbor ULSD/Heating Oil	NYM	F,G,H,J,K,M,N,Q,U,V,X,Z	0.01	420
HU	Unleaded Gas	NYM	F,G,H,J,K,M,N,Q,U,V,X,Z	0.01	420
NG	Natural Gas	NYM	F,G,H,J,K,M,N,Q,U,V,X,Z	0.001	10,000
RB	RBOB Gasoline	NYM	F,G,H,J,K,M,N,Q,U,V,X,Z	0.01	420
ITCO	Brent Crude	ICE	F,G,H,J,K,M,N,Q,U,V,X,Z	0.01	1000

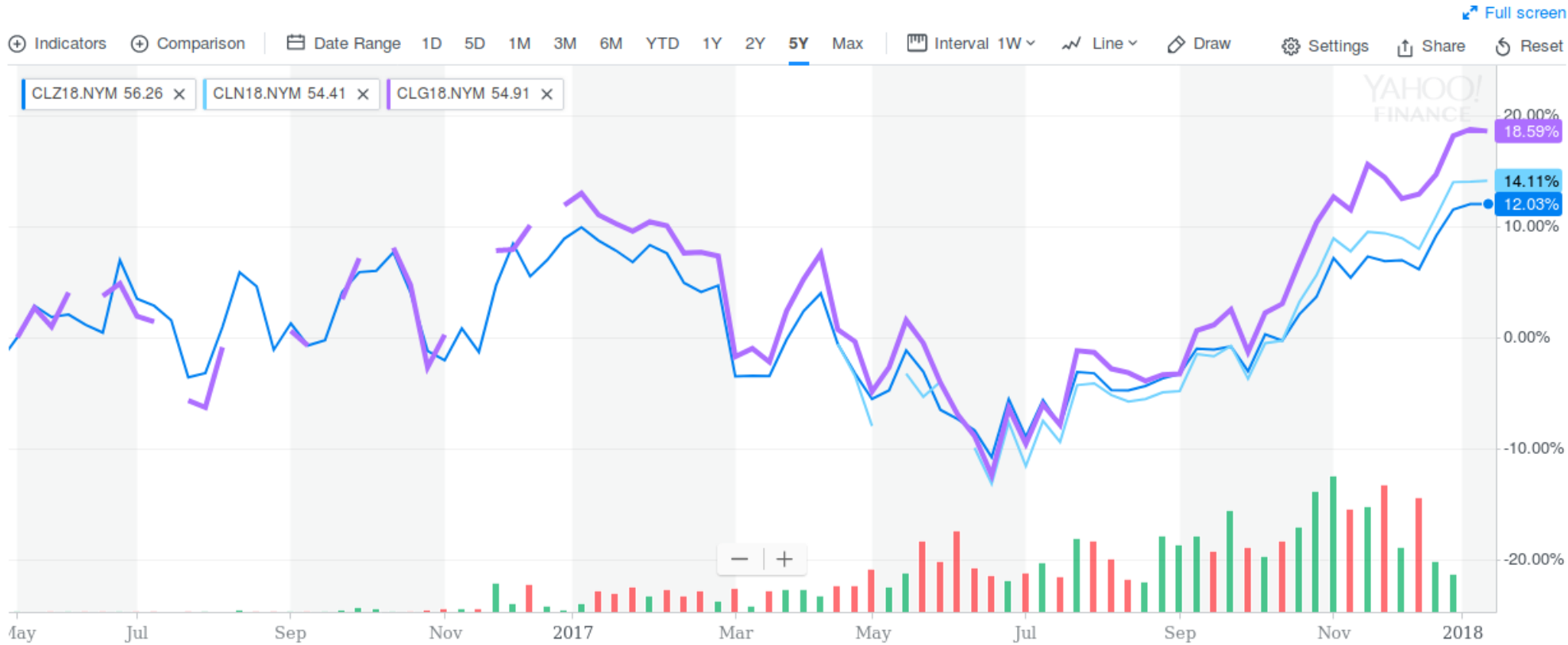
Month Codes	
Code	Month
F	January
G	February
H	March
J	April
K	May
M	June
N	July
Q	August
U	September
V	October
X	November
Z	December

<https://finance.yahoo.com/quote/CLZ18.NYM?p=CLZ18.NYM>



<http://www.mrci.com/web/online-explanation-pages/symbols-a-codes.html>

Comparing Feb-Jul-Dec 2018



Heisenberg Uncertainty

Anomalies in stock market movements

- January effect (stocks go up Dec 2 Jan)
- Small-firm effect (tend to have higher returns)
- The day-of-the-week (do poorly on Monday)

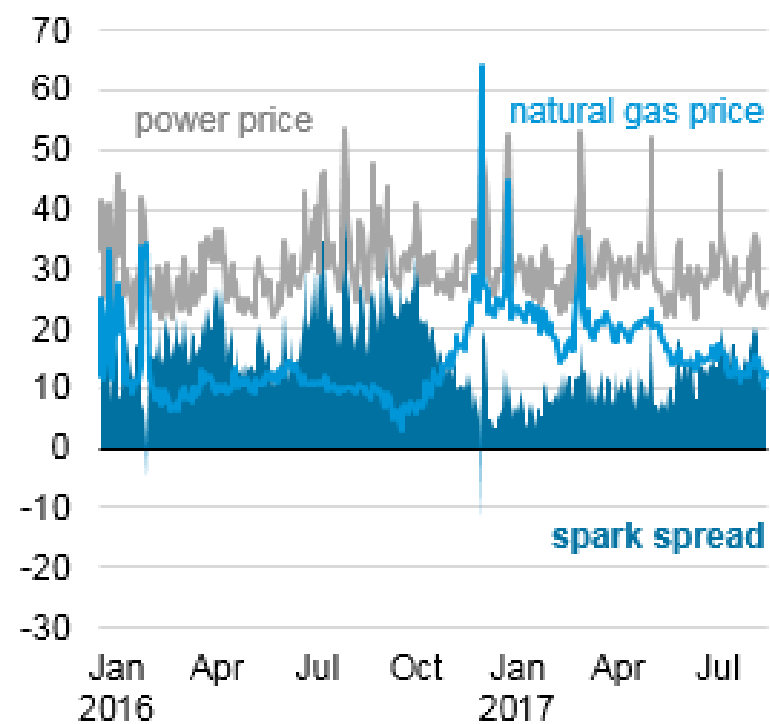
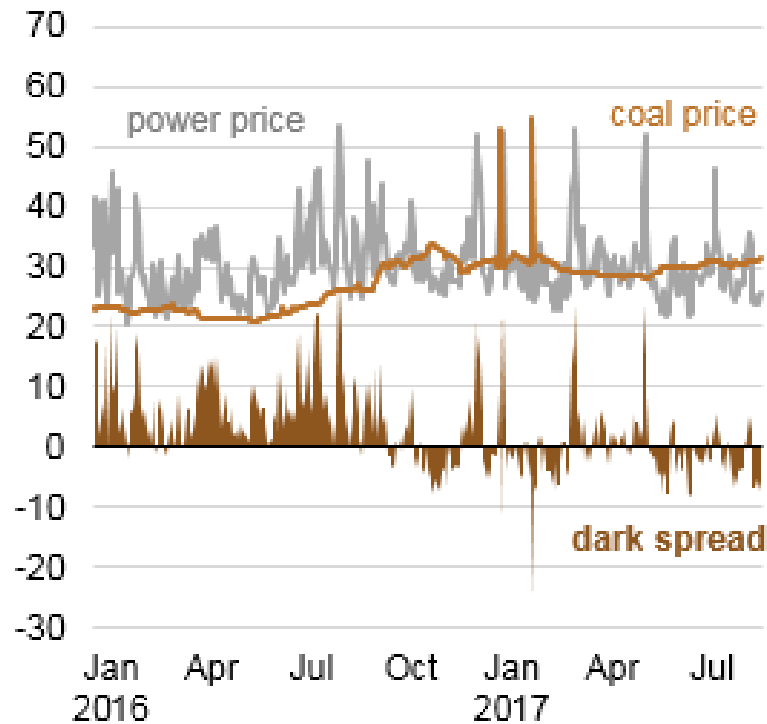
January effect weakened after 1995

More patterns are exploited, more random

Electricity Markets

Electricity : Spark & Dark spread

Daily PJM Western Hub wholesale electricity price and delivered fuel costs
dollars per megawatthour



<https://www.eia.gov/todayinenergy/detail.php?id=33312>

Electricity: Clean spreads

CLEAN SPARK SPREADS

Platts clean spark spreads are indicative prices giving the average difference between the cost of gas and emissions, and the equivalent price of electricity on a HHV basis.

Prices are quoted daily for the UK, German, Italian and Spanish markets and weekly for the Belgian and Dutch markets.

German clean spark spreads are based on TTF gas assessments, equivalent German power assessments and third-party EU emissions Allowance (EUA) prices.

All other clean spark spreads are based on Platts assessments of relevant national power and gas contracts and third-party EUA prices.

CLEAN DARK SPREADS

Platts clean dark spreads are indicative prices giving the average difference between the cost of coal and emissions, and the equivalent price of electricity on any given day.

Prices are quoted for the UK and German markets.

UK and German clean dark spreads are based on Platts CIF ARA coal assessments, UK and German electricity assessments and third-party EUA prices.

The formula for the UK and German clean dark spreads uses an energy conversion factor of 6.978 (converting 1 metric ton of coal into MWh), a fuel efficiency factor (coal) of 35% and 45% (Germany only) and an emissions intensity factor of 0.973 mtCO₂/MWh.

The full formula is as follows: Baseload power price in euro –

Platts calculates the clean spark spread for gas-fired plants with efficiencies of 45% and 50% for all markets, and 60% for all markets excluding Spain, and an emissions intensity of 0.053942 tCO₂e/MMBtu HHV (thermal basis, before combustion).

The full formula for Belgian, Dutch, German, Italian and Spanish clean spark spreads is as follows: Platts spark spread – (EUA emissions price * emissions intensity factor 0.053942 * energy conversion 3.412141 / fuel efficiency)

The full formula for UK clean spark spreads is as follows: Platts UK spark spread in GBP/MWh - (EUA emissions price in euro/mt converted to GBP * emissions intensity factor 0.053942 * energy conversion 3.412141 / fuel efficiency)

$$(((\text{coal price in US dollar} \div \text{exchange rate}) \div \text{energy conversion factor}) \div \text{fuel efficiency factor}) - (\text{EUA price in euro} \times \text{carbon intensity factor})$$

Platts also publishes UK CPS clean dark spreads that incorporate the cost of the UK government's Carbon Price Support (CPS) levy at the following confirmed rates:

Year	Levy in GBP/mt
April 1, 2014 - March 31, 2015	9.55
April 1, 2015 - March 31, 2016	18.08
April 1, 2016 - March 31, 2017	18
April 1, 2017 - March 31, 2018	18
April 1, 2018 - March 31, 2019	18
April 1, 2019 - March 31, 2020	18

The full formula for UK CPS clean dark spreads is: Platts UK dark spread in GBP/MWh at 35% fuel efficiency - (EUA emissions price in euro/mt converted to GBP + CPS levy in GBP/mt * emissions intensity factor 0.973).

Platts also publishes UK CPS clean spark spreads that incorporate the cost of the UK government's Carbon Price Support (CPS) levy at the following confirmed rates:

Year	Levy in GBP/mt
April 1, 2014 - March 31, 2015	9.55
April 1, 2015 - March 31, 2016	18.08
April 1, 2016 - March 31, 2017	18.00
April 1, 2017 - March 31, 2018	18.00
April 1, 2018 - March 31, 2019	18.00
April 1, 2019 - March 31, 2020	18.00

The full formula for UK CPS clean spark spreads is: Platts UK spark spread in GBP/MWh - (EUA emissions price in euro/mt converted to GBP + CPS levy in GBP/mt * emissions intensity factor 0.053942 * energy conversion 3.412141 / fuel efficiency)

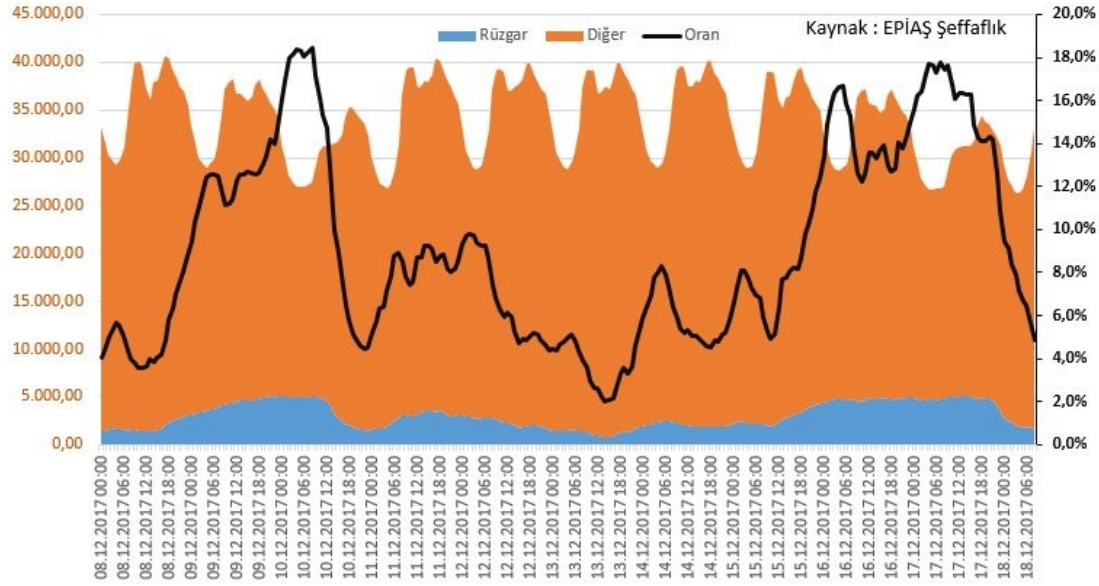
Emissions roll dates

The EUA component of Platts clean fuel spreads reflects a December annual expiry date. Platts clean fuel spread calculations will typically reference the emissions contract most relevant to the delivery period for the fuel legs of the spread. In the UK, seasonal clean fuel spreads that include delivery during winter periods which touch on two calendar years will use an average of two emissions contracts for the 'clean' component of the spread.

Platts clean fuel spread calculations incorporate three emissions contracts ahead with specifications and roll dates as listed on the European Energy Exchange (EEX).

Turkey's renewable surge

Rüzgardan elektrik üretiminin 8 Aralık-18 Aralık miktarı ve oranı



GES'LERİN SAAT BAZLI TÜKETİM KARŞILAMA ORANI (%)



GÜNEŞ ENERJİSİ İLE ELEKTRİK ÜRETİMİ (AYLIK) (GWh)

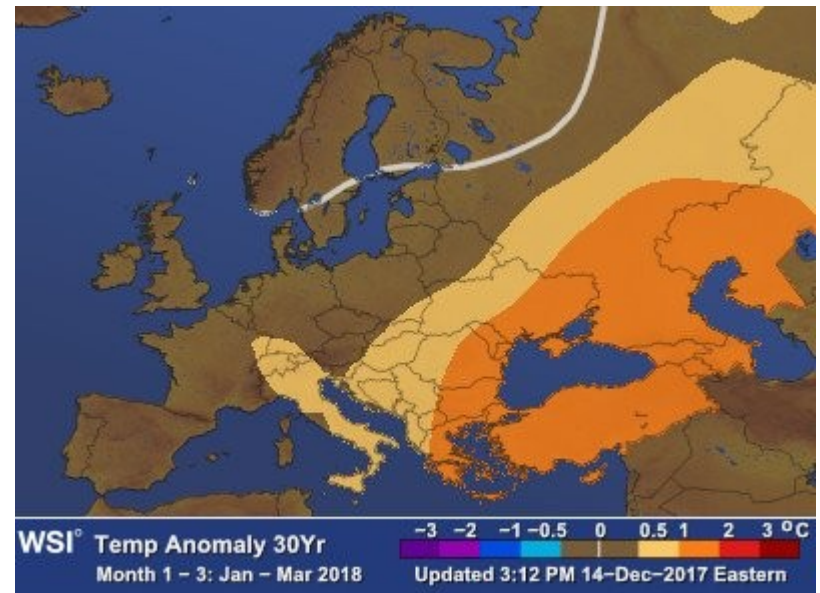


<http://www.enerjياتlasi.com/elektrik-uretimi/gunes>

Weather impact

System more exposed to weather events

- LT – hydro
- ST – wind-solar
- Sets Fossil Fuel PPs earnings



For different hours different effects

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cor(veri06[,c(1,2,3,4,5,6,7,11,16,17)], use="complete.obs")
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	Toplam	Do.al.Gaz	Barajl.	Linyit	Akarsu	X.thal.K.m.r	R.zgar	Ta..K.m.r	PTF	SMF
Toplam	1.00000000	0.7684164	0.457113565	0.731048139	0.09352298	0.74741002	0.36986317	0.44307467	0.28563179	0.24633328
Do.al.Gaz	0.76841643	1.00000000	0.024502301	0.552588923	-0.25708911	0.62916515	0.10696060	0.14036956	0.34343876	0.37273555
Barajl.	0.45711356	0.0245023	1.000000000	-0.001105283	0.46644271	0.05144333	-0.03431656	0.41772219	0.17547346	0.12446489
Linyit	0.73104814	0.5525889	-0.001105283	1.000000000	-0.21999381	0.80982579	0.37808428	0.38845790	0.21150500	0.16331757
Akarsu	0.09352298	-0.2570891	0.466442712	-0.219993815	1.00000000	-0.35260032	-0.10980713	-0.02497233	-0.25039707	-0.31936055
X.thal.K.m.r	0.74741002	0.6291651	0.051443325	0.809825791	-0.35260032	1.00000000	0.29062979	0.37930830	0.31308051	0.28978926
R.zgar	0.36986317	0.1069606	-0.034316563	0.378084285	-0.10980713	0.29062979	1.00000000	0.06971585	-0.03381973	-0.06355195
Ta..K.m.r	0.44307467	0.1403696	0.417722186	0.388457903	-0.02497233	0.37930830	0.06971585	1.00000000	0.08992921	0.02813091
PTF	0.28563179	0.3434388	0.175473456	0.211504995	-0.25039707	0.31308051	-0.03381973	0.08992921	1.00000000	0.71153247
SMF	0.24633328	0.3727356	0.124464894	0.163317573	-0.31936055	0.28978926	-0.06355195	0.02813091	0.71153247	1.00000000

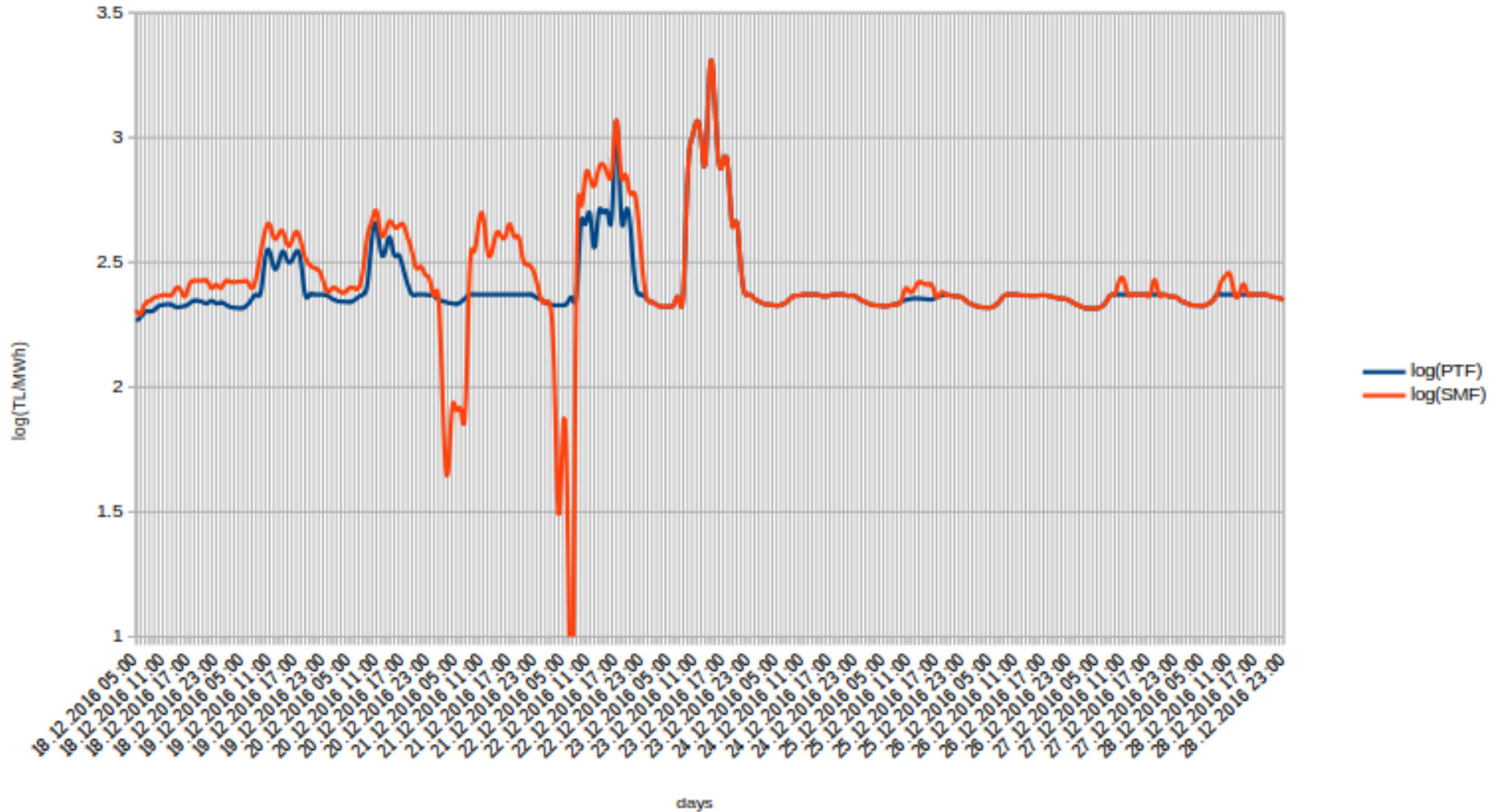
	Toplam	Do.al.Gaz	Barajl.	Linyit	Akarsu	X.thal.K.m.r	R.zgar	Ta..K.m.r	PTF	SMF
Toplam	1.00000000	0.8039811	0.60715196	0.7684750	0.07970970	0.7734711	0.37984679	0.41780701	0.31710854	0.25026091
Do.al.Gaz	0.8039811	1.00000000	0.20236648	0.6258201	-0.26031467	0.6914325	0.13856148	0.15241630	0.48528204	0.36167679
Barajl.	0.6071520	0.2023665	1.000000000	0.2173455	0.32871354	0.1999724	0.07525418	0.42401335	0.13138195	0.22438362
Linyit	0.7684750	0.6258201	0.21734554	1.00000000	-0.17686215	0.8420168	0.35184632	0.38983507	0.30924299	0.14642160
Akarsu	0.0797097	-0.2603147	0.32871354	-0.1768622	1.00000000	-0.2769729	-0.05120811	-0.01481113	-0.46406704	-0.27617620
X.thal.K.m.r	0.7734711	0.6914325	0.19997243	0.8420168	-0.27697292	1.00000000	0.33216625	0.33455756	0.38901522	0.23818283
R.zgar	0.3798468	0.1385615	0.07525418	0.3518463	-0.05120811	0.3321662	1.00000000	0.08072647	-0.05844651	-0.11811259
Ta..K.m.r	0.4178070	0.1524163	0.42401335	0.3898351	-0.01481113	0.3345576	0.08072647	1.00000000	0.03827848	-0.01407283
PTF	0.3171085	0.4852820	0.13138195	0.3092430	-0.46406704	0.3890152	-0.05844651	0.03827848	1.00000000	0.54779728
SMF	0.2502609	0.3616768	0.22438362	0.1464216	-0.27617620	0.2381828	-0.11811259	-0.01407283	0.54779728	1.00000000

What happens in emergency?

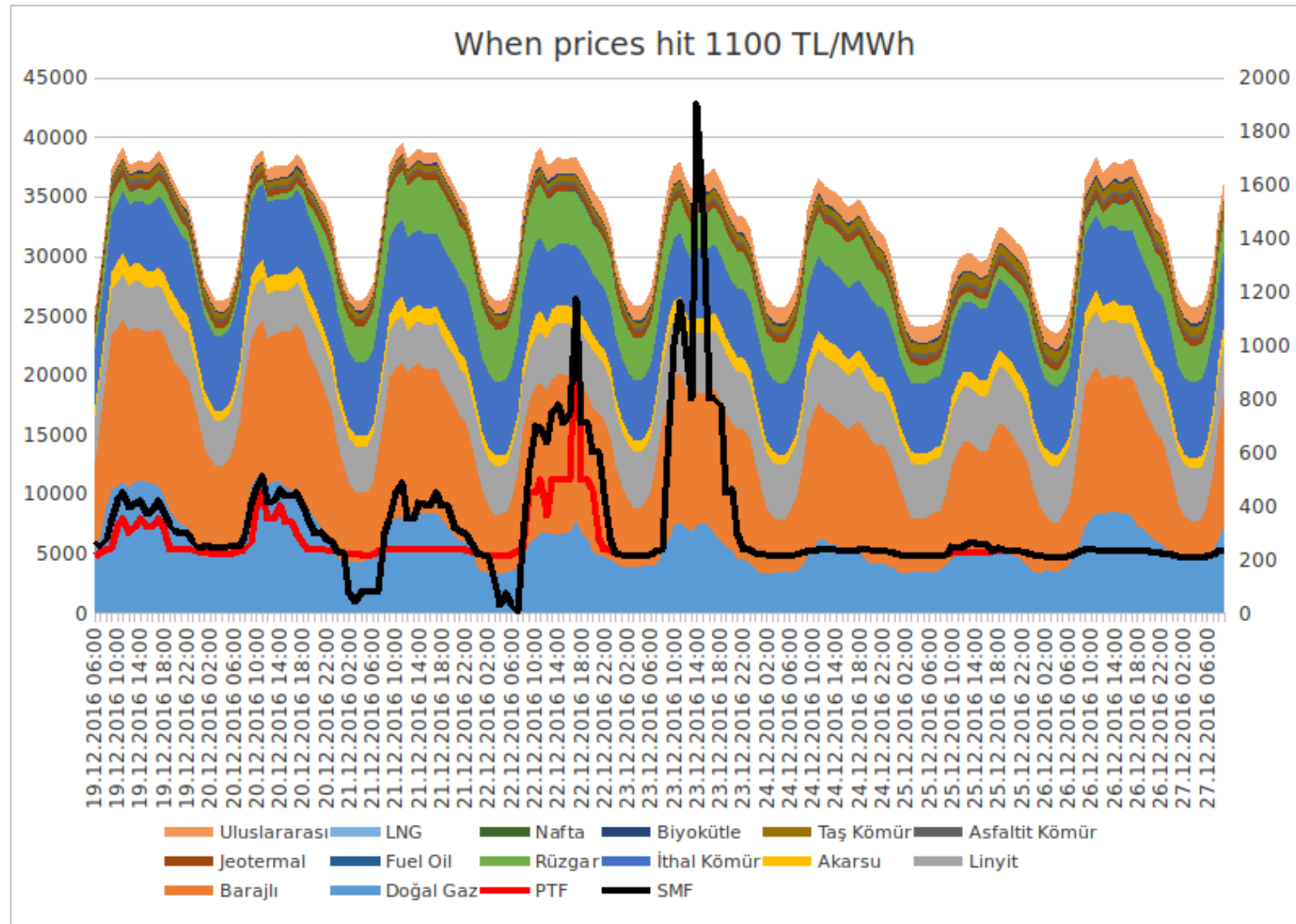
- One of the suppliers of NG may have difficulty
- System reserves may be enough but weather for the next 7 days uncertain
- You try to increase stock levels
- Is it an opportunity for earnings? For whom?

Who sets the price in NG emergency?

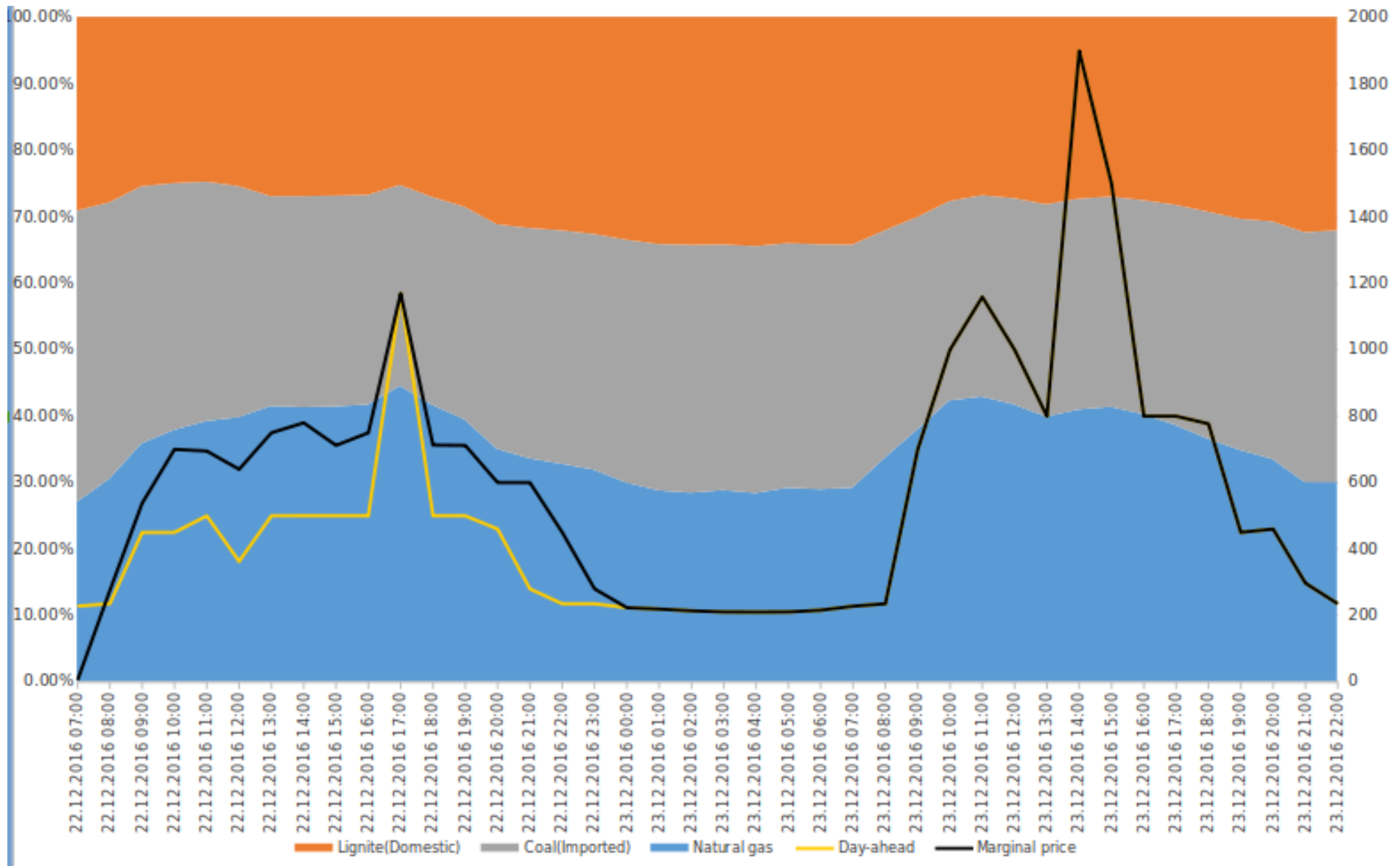
Log(PTF) & Log(SMF)



Which resource under normal conditions



How the production is shaped?



Risks in Energy Policy

Intended deeds – Unintended Consequences

- In 2007-2008 electricity demand soared
 - Policy makers came up with a clever idea
 - If people can not pay their bills, give them energy efficient bulbs
 - To the children
-
- Result?

Too much "Kurtlar Vadisi" bad for your health

Milliyet.com.tr » Gündem » **Haber** » "Dinleme cihazı var" diye ampulleri kırdılar

06.01.2009 - 17:08 | Son Güncelleme: 06.01.2009-17:09

  A+ A-

"Dinleme cihazı var" diye ampulleri kırdılar

 Paylaş

 Tweet

 G+

 g+

Sitene Ekle

Ebubekir KARATOPRAK/ŞIRNAK, (DHA)

ŞIRNAK Vali Yardımcısı Abdullah Akdaş, enerji sağlamak ve enerji tasarrufu bilincini kazandırmak amacıyla öğrencilere dağıtılan 97 bin ampülün bir bölümünün, dinleme cihazı bulunduğu iddiaları üzerine kırıldığını söyledi. Bu duruma çok üzüldüklerini söyleyen Akdaş, "Bu iddialar kesinlikle doğru değil kötü niyetli insanların işidir" dedi.

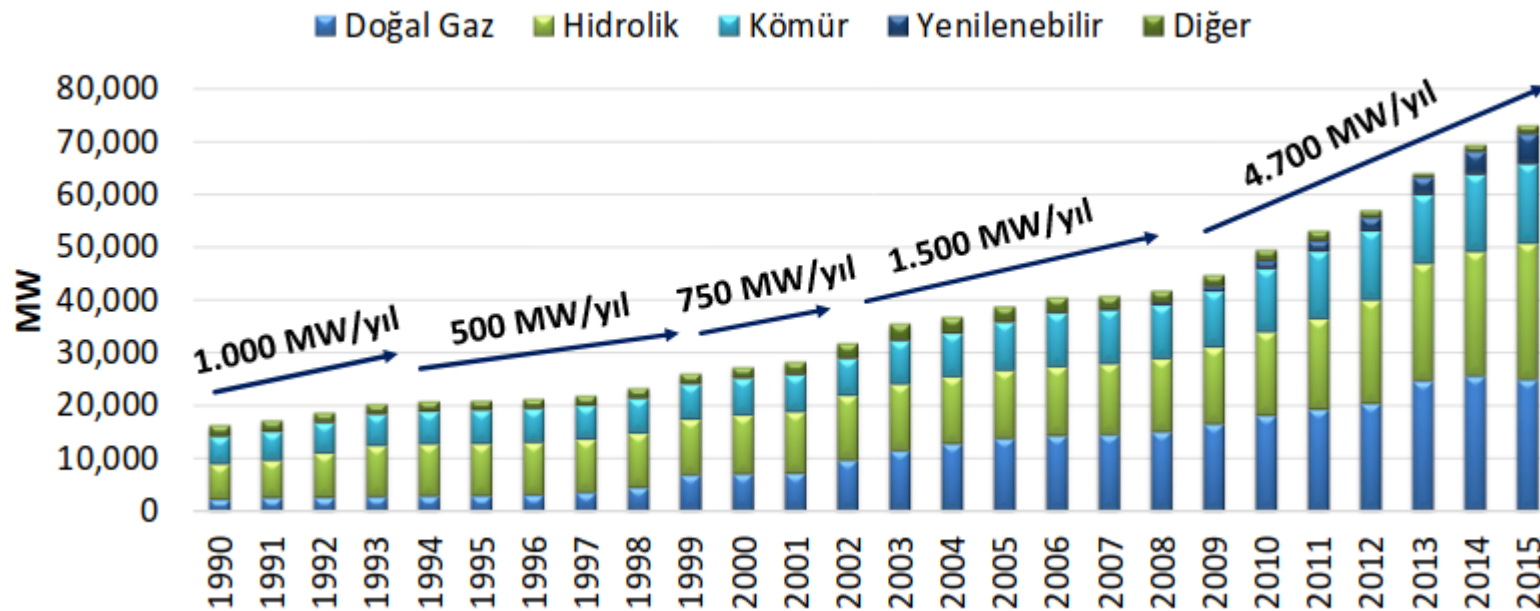
İddiayı gündeme getiren Esnaf ve Sanatkarlar Odaları Birliği Başkanı Süleyman Seven, bazı insanların ampüllerde dinleme cihazı bulunduğu yönünde iddiaları ortaya attığını belirterek, "Halkın bilinçlenmesi için bu konuyu vali yardımcımıza sordum. Ben eski elektrikçiyim böyle bir şey olmadığını biliyorum" dedi.

Başbakanlık ile Enerji ve Tabii Kaynaklar Bakanlığı tarafından Enerji Verimliliği (EN-VER) projesi kapsamında tüm Türkiye'de olduğu gibi Şırnak'ta da okullarda öğrencilere evlerinde kullanmaları için 97 bin 728 tasarruflu ampul dağıtıldı. Ancak, bir süre sonra kentte bazı çevreler tarafından 'ampüllerin içinde dinleme cihazı var' iddiaları ortaya atıldı. Şırnak'ta dün ampul dağıtımı sırasında Esnaf ve Sanatkarlar Odaları Birliği Başkanı Süleyman Seven, konuyu

<http://www.milliyet.com.tr/-dinleme-cihazı-var--diye-ampulleri-kirdilar-gundem-1043658/>


After 2009 – Shifting Priorities

Installed capacity investments at record levels



Renewable Law - 5346

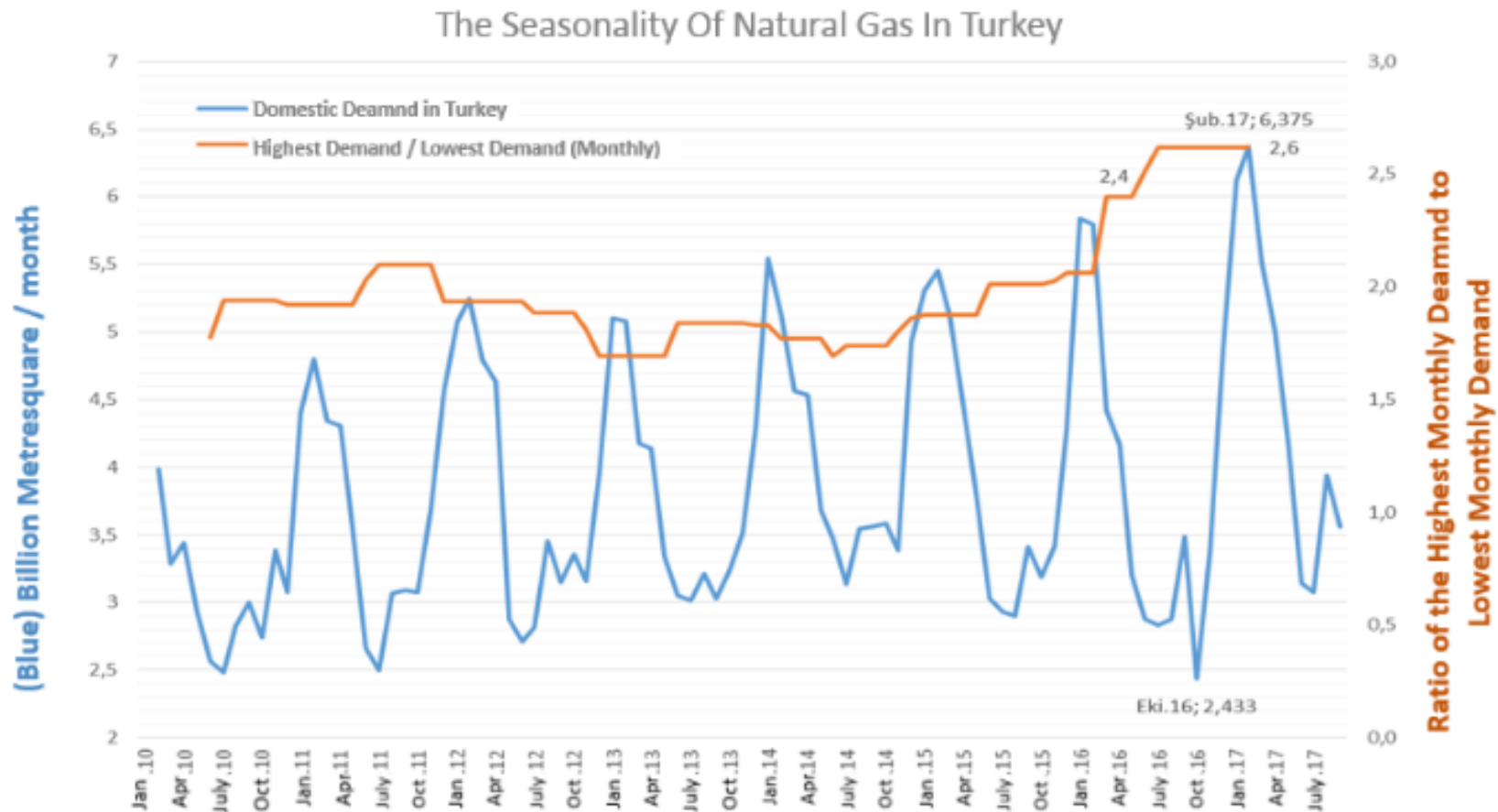
- Aim was to support renewables with FIT (no competition, govt pays you)
- Domestic content is rewarded

 Feed-in Tariffs for Renewable Energy			
Type of Plant	Feed-in Tariffs (\$cent/kWh)	Additional rate from domestically manufactured equipment usage (\$cent/kWh)	Max Feed-in Tariffs (\$cent/kWh)
Hydro	7.3	2.3	9.6
Wind	7.3	3.7	11
Geothermal	10.5	2.7	13.2
Biomass	13.3	5.6	18.9
Solar PV	13.3	6.7	20
Solar CHP	13.3	9.2	22.5

Source: Law on Utilisation of Renewable Energy in Electricity Generation No. 5346

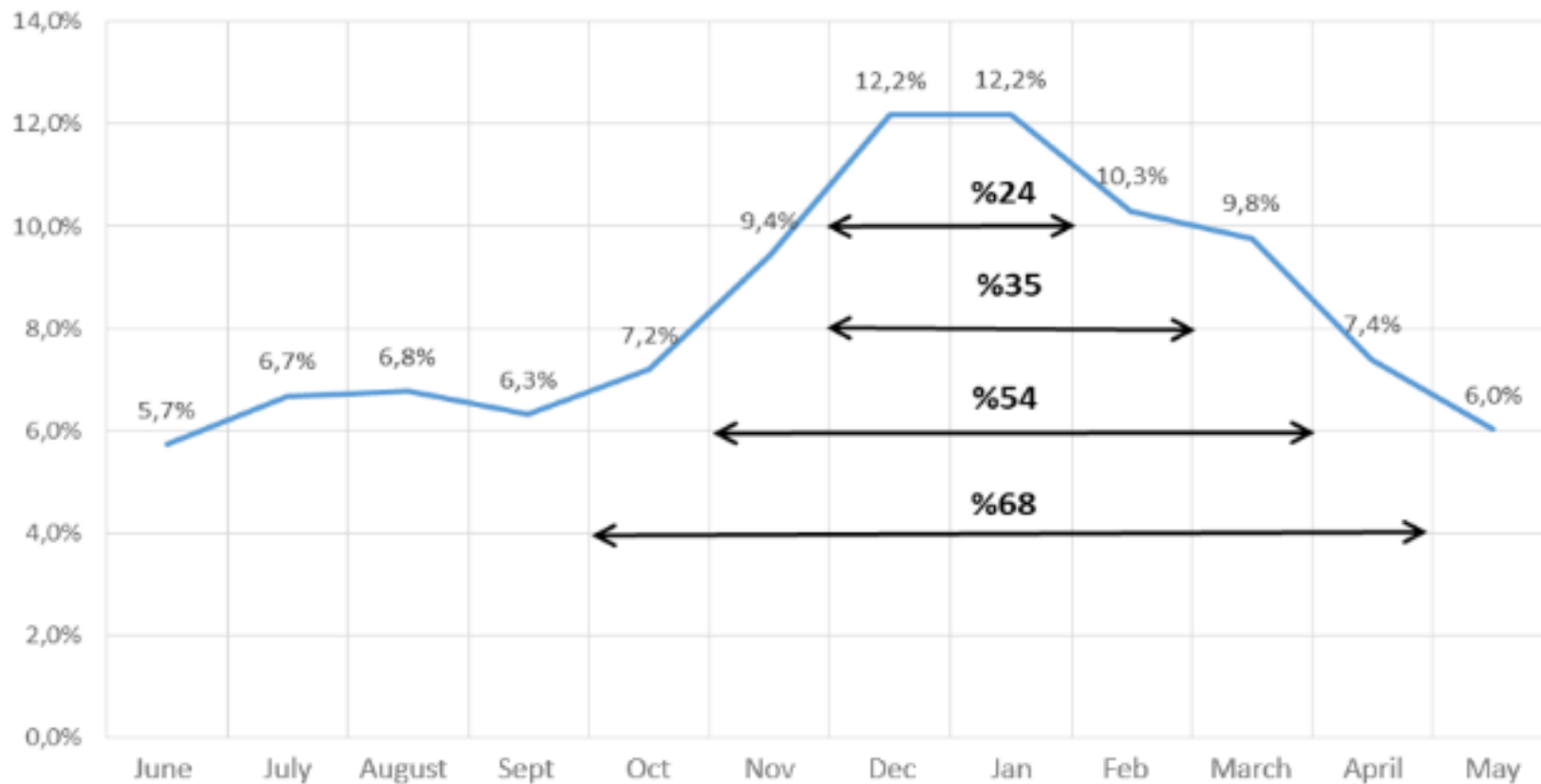
<http://stratejico.com/publications/turkey-investor-brief-renewable-energy>

Natural gas infrastructure



May+Summer+Sep=January bill (household)

Ratio on Annual Consumption



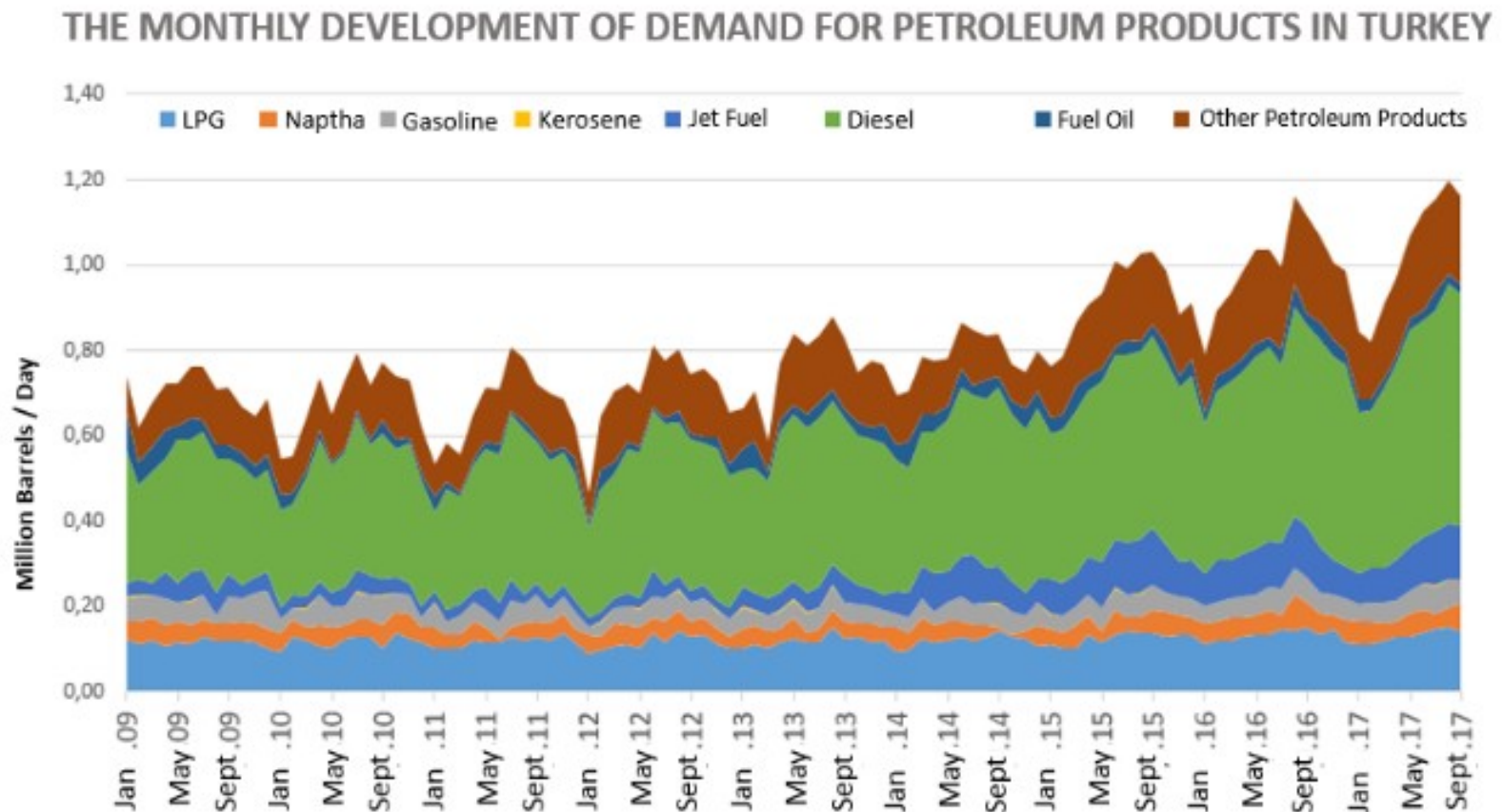
Narrative vs Reality

Narrative: The most expensive fuel prices in the world

(Narrative Economics by R Shiller

<https://cowles.yale.edu/sites/default/files/files/pub/d20/d2069.pdf>)

Reality:



24 Nov 2015



[Home](#) > [Turkey](#) > [Politics](#)

November 24 2015 13:40:00



Turkish PM Davutoğlu forms 64th government of Turkey

ANKARA



AFP

Initial impact assessment

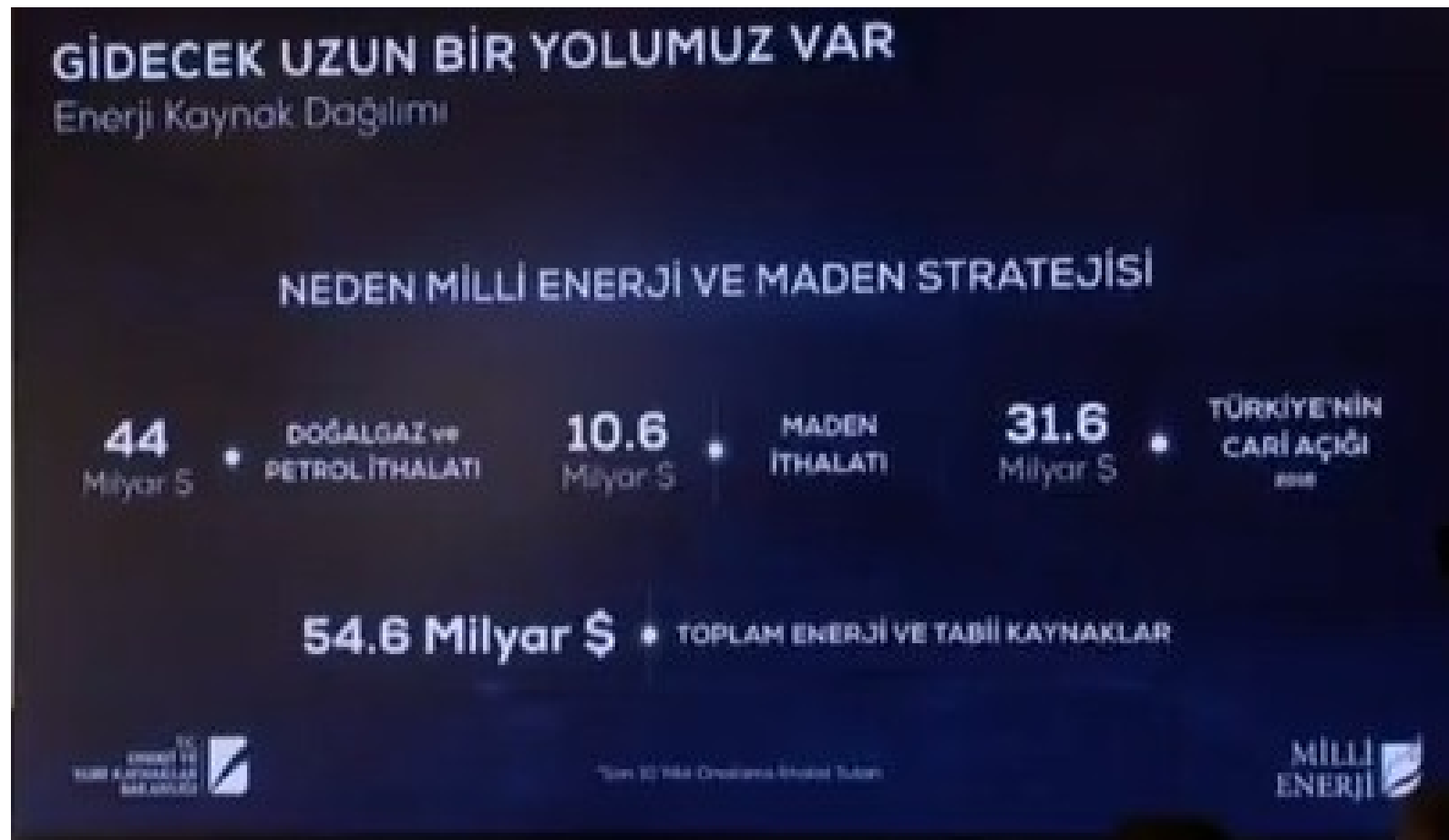
Security of Supply

- Natural gas flexibility needed
- Too much imported fuel dependence
- Oil E&P

Market structure

- FIT becoming cost burden
- Govt should make the playing ground ready for invs
- Domestic content = nuts&bolts&wings – no main comp

Economic rationale



An Energy & Mining Policy to

Minimize risks

- For the country (security of supply)
- For the investors (predictability)
- For the industry& next gen employment (localization)

National Energy Policy



- Security of Supply
 - Predictable Market Structure
 - Localization
-
- Domestic R&D
 - Cheaper renewables
 - Lignite replacing imported coal
 - Nuclear



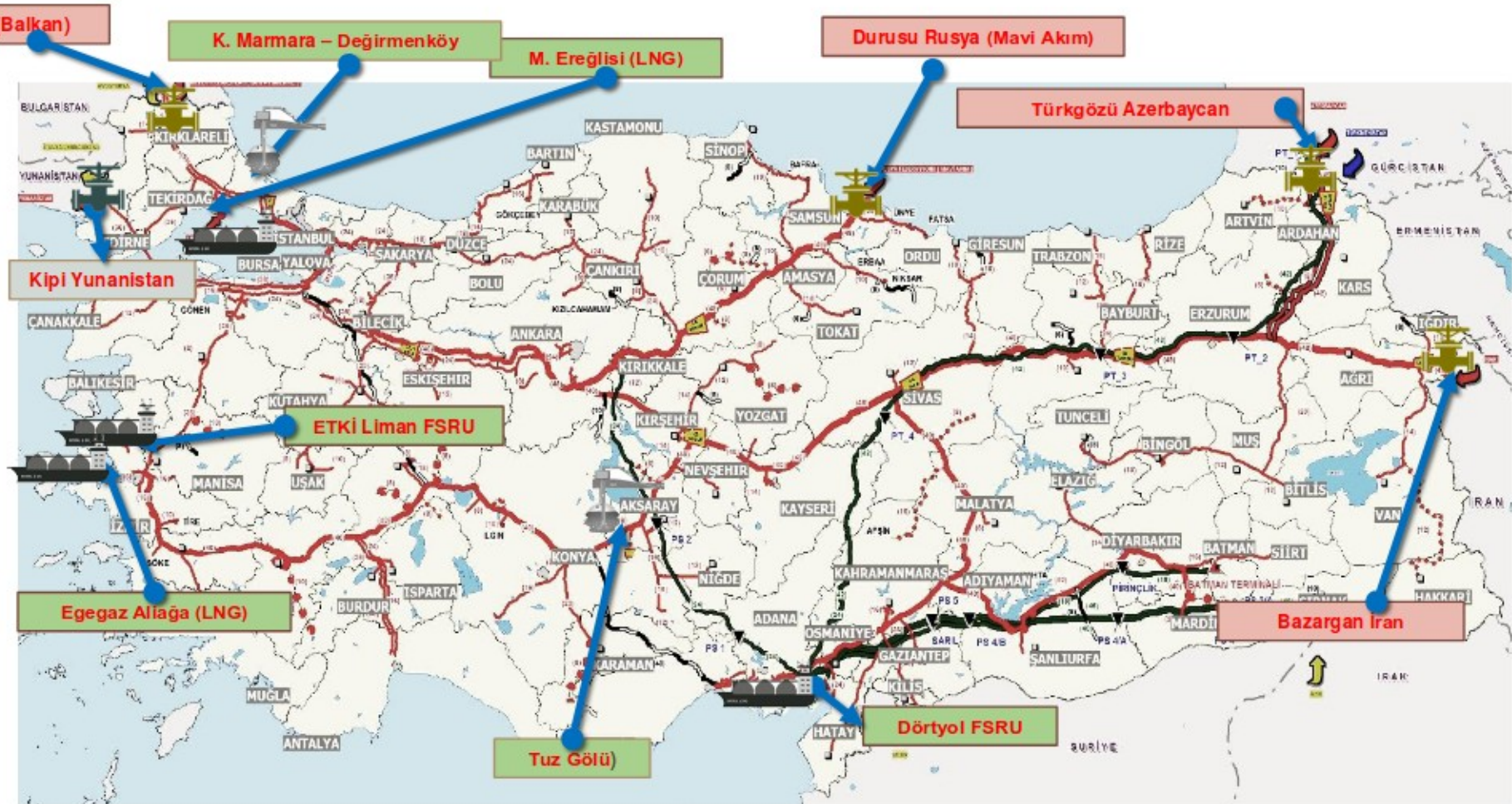
More of an Industrial Strategy than a usual Energy Sector Policy

Implications

REZ (Renewable Energy Zones)

- Wind auction : 3.48 cent/kWh
 - 5346 Law : 11 cent/kWh (incl domestic content)
- Solar auction : 6.99 cent/kwh
 - 5346 Law: 20 cent/kWh (incl domestic content)
- In 2004, investors were pushing for 25 cent/kWh no investments
- In 2016 no one favored REZ
- In 2017 solar factory construction began

Implications – Natural Gas



Implications – Oil prod

Turkey's first drilling ship passes Gallipoli

ÇANAKKALE



- TÜVEK
- UMREK



Final Words

With oil

- Which is more rational
 - Cartels or markets
- Whaling->illumination oil, petrol->illumination oil
 - Whaling not decreased increased
- Volatility
- Complex trade relations
 - Commodities-complex logistics
 - Kings of trades have vanished

It is a dangerous world

The Oil Trader Known as 'God' Is Closing Down His Main Hedge Fund

By Nishant Kumar, Javier Blas, and Suzy Waite

August 3, 2017, 6:06 PM GMT+3 Updated on August 4, 2017, 5:22 PM GMT+3

→ Renowned investor Andy Hall is said to close Astenbeck fund

→ His wrong-way bet on crude prices led to losses this year

The Epic Story Of How A 'Genius' Hedge Fund Almost Caused A Global Financial Meltdown



Stephanie Yang

Jul. 10, 2014, 4:26 PM

218,356



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Twenty years ago, one bond-trading hedge fund grew from launch to over \$100 billion in assets in less than three years. It saw yearly returns of over 40 percent. It was run by finance veterans, PhDs, professors, and two Nobel Prize winners. Everyone on Wall Street wanted a piece of their profits.



Christian Charisius/Reuters

Oil

+ Add to myFT

Andurand hedge fund's \$100 oil bet stands out from the herd

Bullish call rests on view that shale boom alone will not satisfy higher demand



<https://www.bloomberg.com/news/articles/2017-08-03/oil-trader-andy-hall-is-said-to-close-main-astenbeck-hedge-fund>
<https://www.ft.com/content/2bcb2dfc-7d14-11e7-9108-edda0bcb928>

In modelling electricity

- Use hybrid & multiple approaches, create a solution space
- Do not let 1000s hard to predict parameters to guide your model to perfect fit (especially longterm)
- Careful with neural networks – test at boundaries
- What is the underlying asset you'r working with
 - More technological disruption more volatility
 - Regulation?
 - Everytime "This time it is different"
 - Feed the model with history and expect future?
- Electricity is a technological product
- Price should keep falling (exp for fossil fuel hikes)

Thank you

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WEC Turkey, Head of Quant WG:

<http://www.dektmk.org.tr/incele.php?id=MzE5>