

A large, stylized blue flame graphic on the left side of the slide, composed of several curved, overlapping shapes that suggest the movement of fire.

# Hybrids in Global Pricing for Natural Gas

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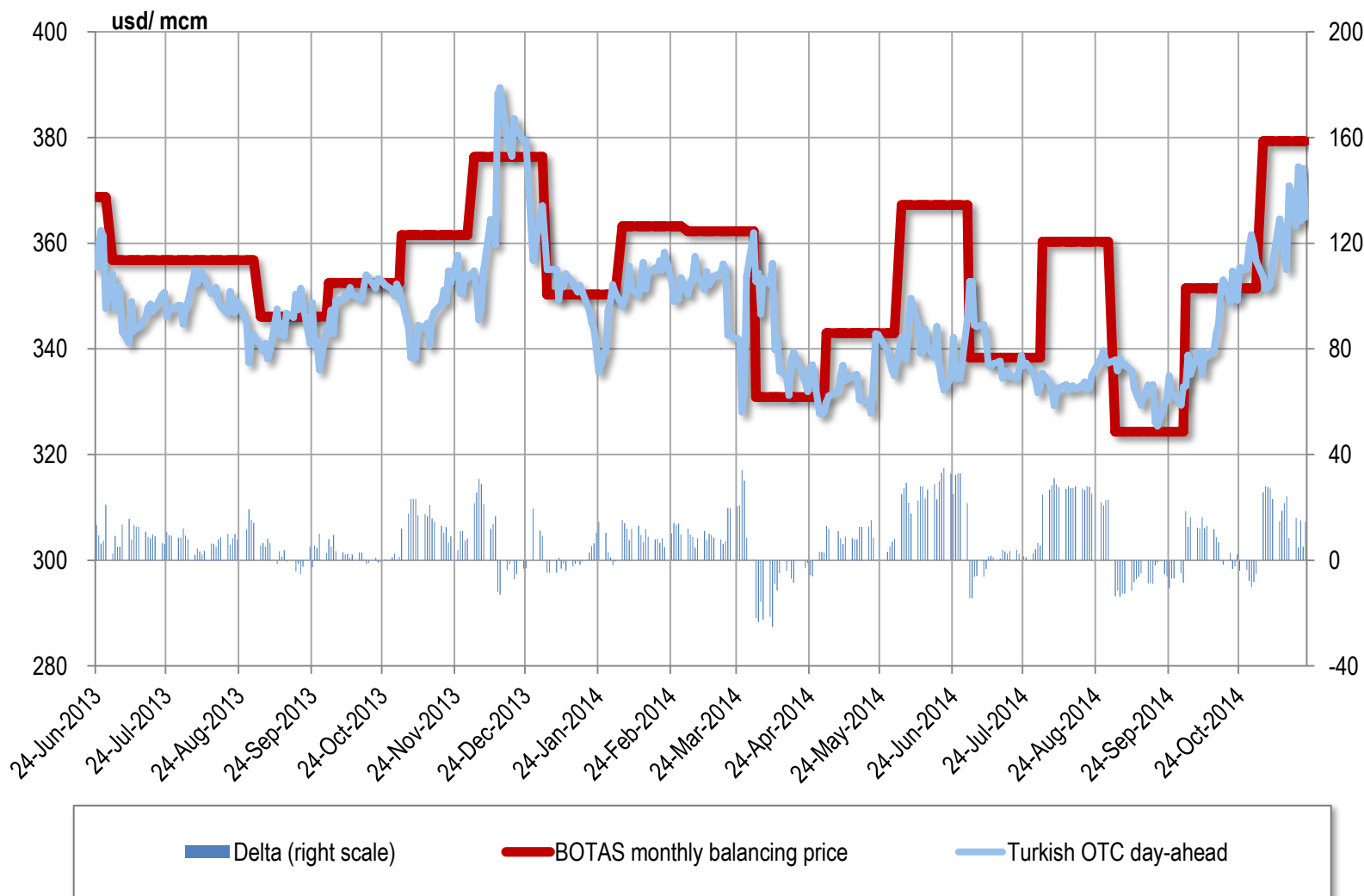
**5<sup>th</sup> UNECE Gas Centre Industry**

**Forum**

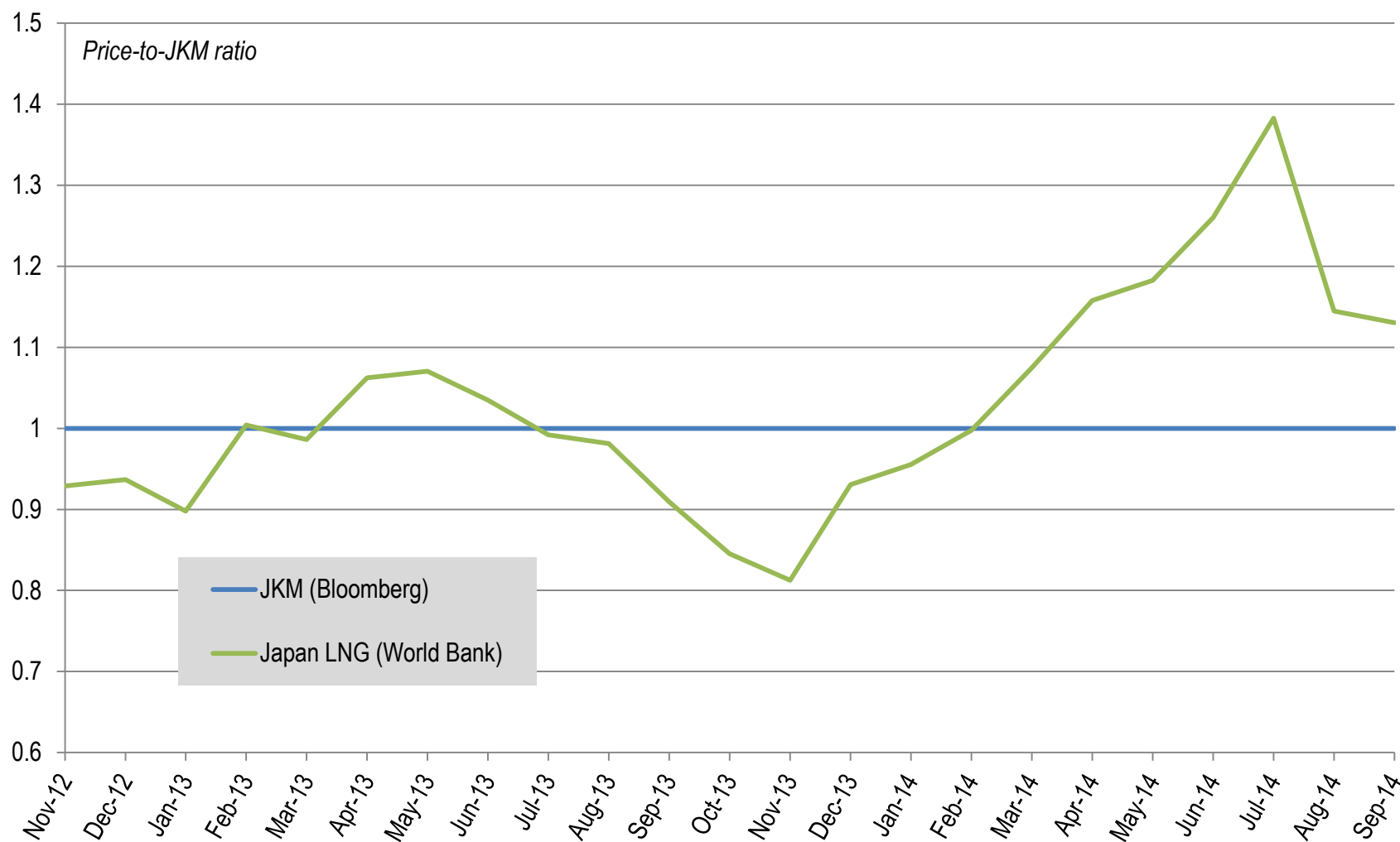
# Coexistence of Price Formation Mechanisms Creates Variety of Pricing Systems in Global Natural Gas Industry

Model	Applicable To	Description	Balance of Interests in LTCs
Oil-Index Dominated	Northeast Asia	<ul style="list-style-type: none"> <li>Long-term contracts</li> <li>100% indexed to crude oil</li> <li>Spot trades, hubs in the making</li> </ul>	Properly balanced because producers and buyers share the major risks. Evolution towards hybrid model
Pure Hub	North America	<ul style="list-style-type: none"> <li>Pricing based on supply &amp; demand.</li> <li>LTCs are not widespread on the internal market</li> </ul>	Requires flexible contracts with redirection option to minimize price risks for the exporters
Eclectic	Australia	<ul style="list-style-type: none"> <li>Hub pricing and LT contracts indexed to alternative fuels</li> <li>Geographically separated markets</li> </ul>	No dominance of consumers over producers domestically. Australian exporters prefer oil-indexation
Hybrid	Continental Europe	<ul style="list-style-type: none"> <li>Primarily, long-term oil/oil product indexed contracts</li> <li>Collars which reduce gap between term and spot prices</li> </ul>	Fair distribution of risks when hubs play a supportive role to LTCs for balancing and arbitrage
Modified (1)	Continental Europe	<ul style="list-style-type: none"> <li>Long-term contracts linked to gas indexes</li> <li>Hub pricing</li> </ul>	Supported by regulators and buyers. The system is not stable and inevitably transforms into the U.S. pricing model
Modified (2)	Asia and Europe	<ul style="list-style-type: none"> <li>Long-term contracts priced at cost plus bases to Henry Hub price</li> <li>Take-or-pay obligations for the liquefied</li> </ul>	All the risks are on buyer side

# Dominant Regulated Price Sets Baseline Trend for Hub Price in Turkey



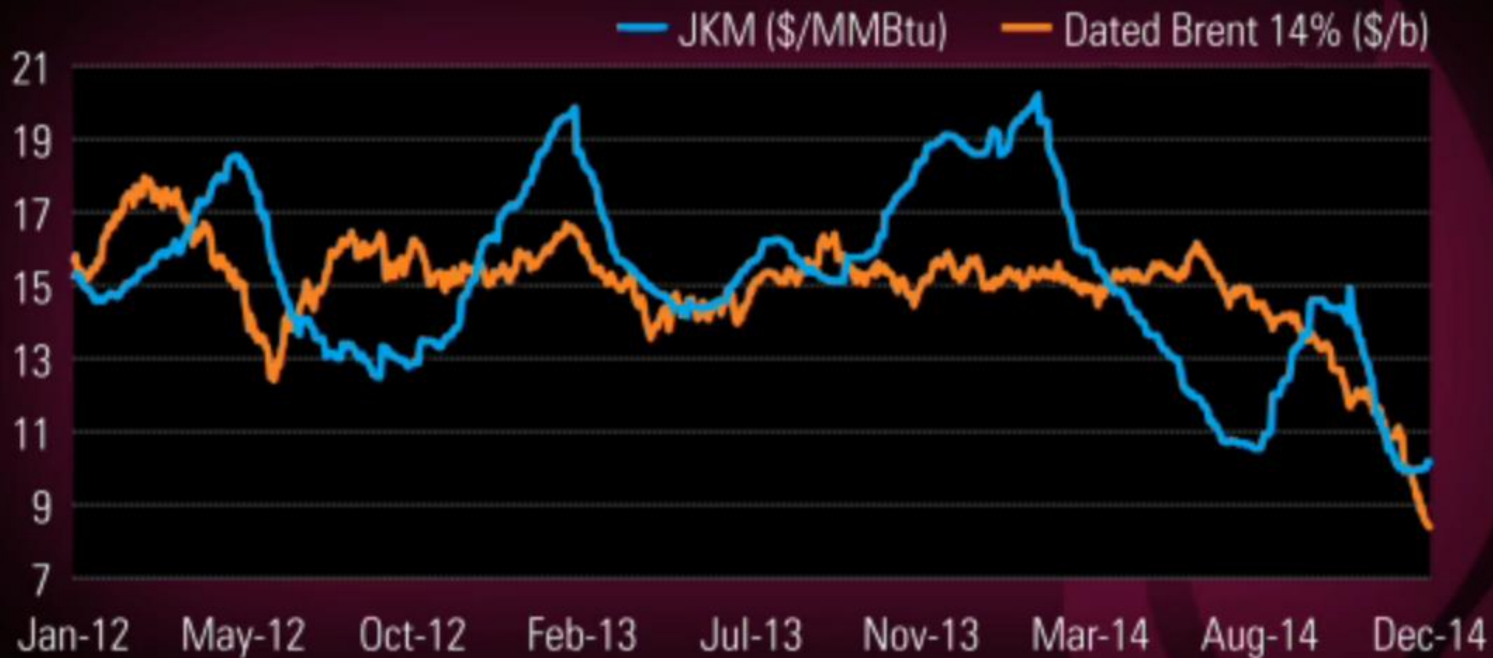
# Dominant Oil-Indexed Price (Japan LNG) Sets Baseline Trend for Spot Prices in Asia



Source: BAFA, Bloomberg, World Bank, Platts

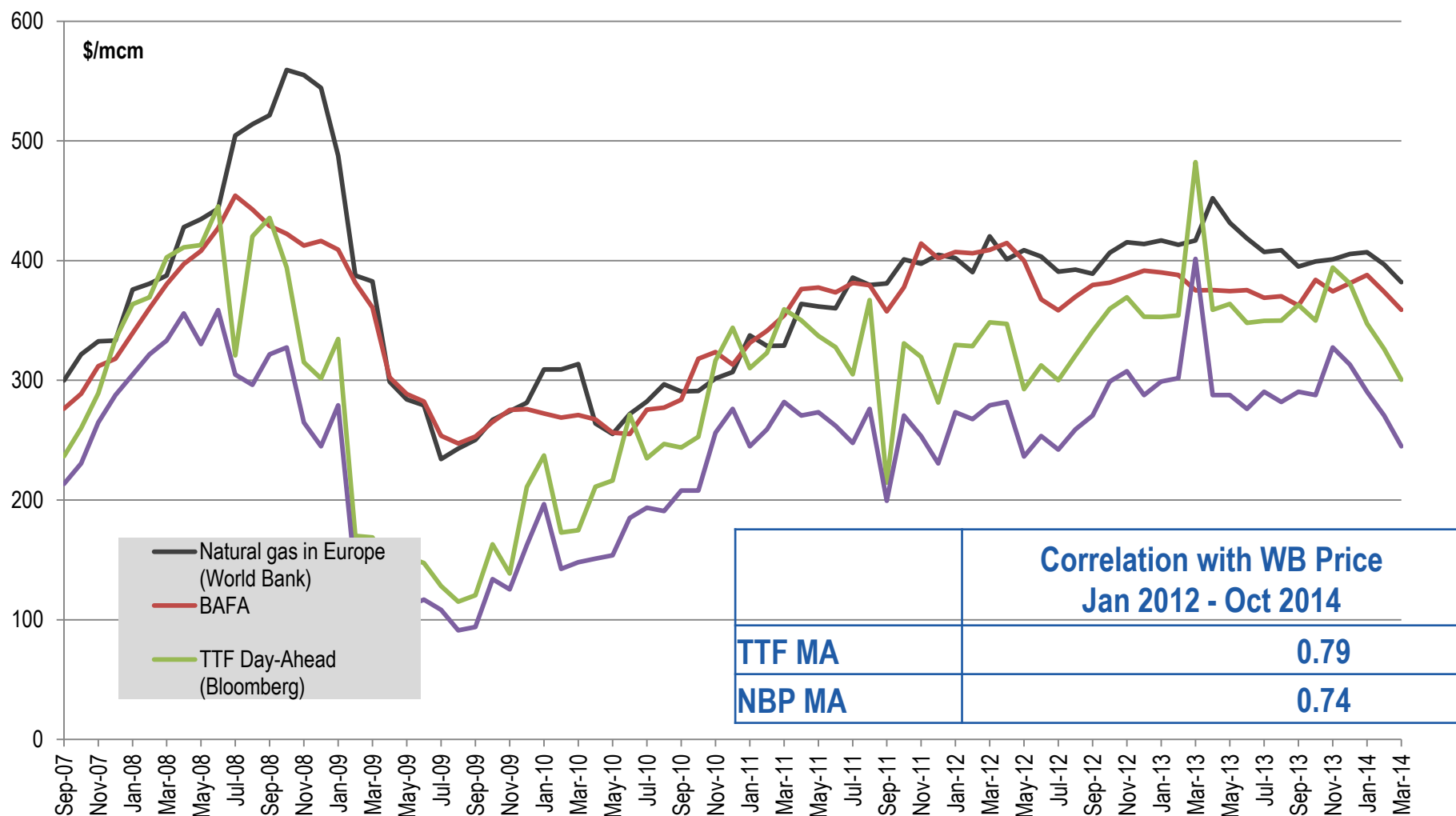
# Dominant Oil-Indexed Price (Proxy to Term Price ) Sets Baseline Trend for Spot Prices in Asia

## Platts Japan Korea Marker vs 14% of Dated Brent



Source: Platts

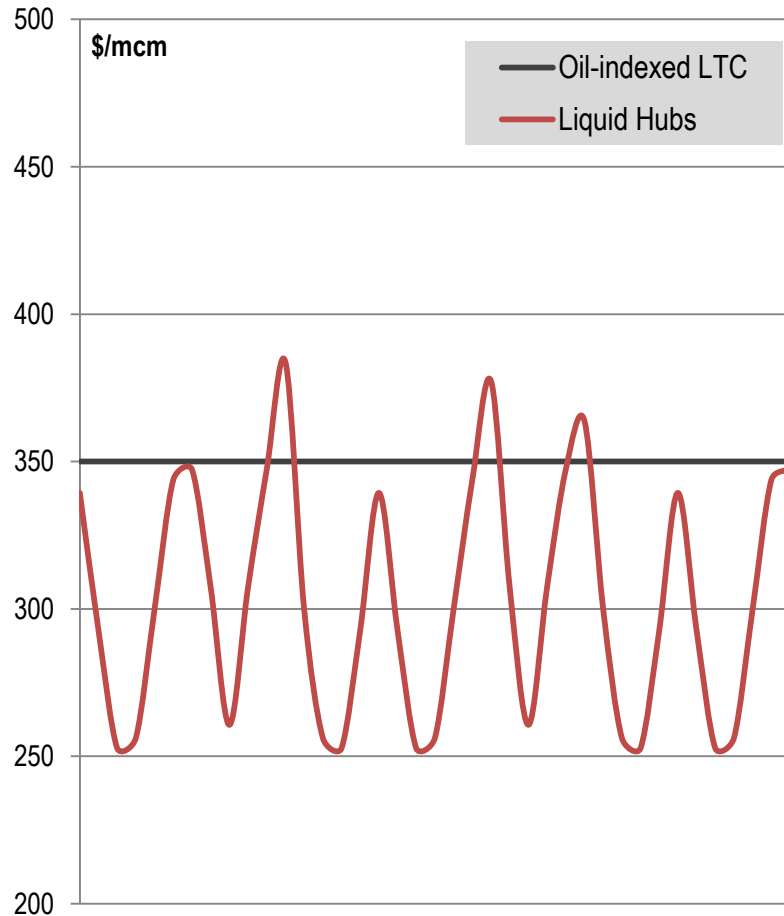
# Dominant Oil-Indexed (WB) and Quasi Oil-Indexed (BAFA) Prices Set Baseline Trend Hub Prices in Europe



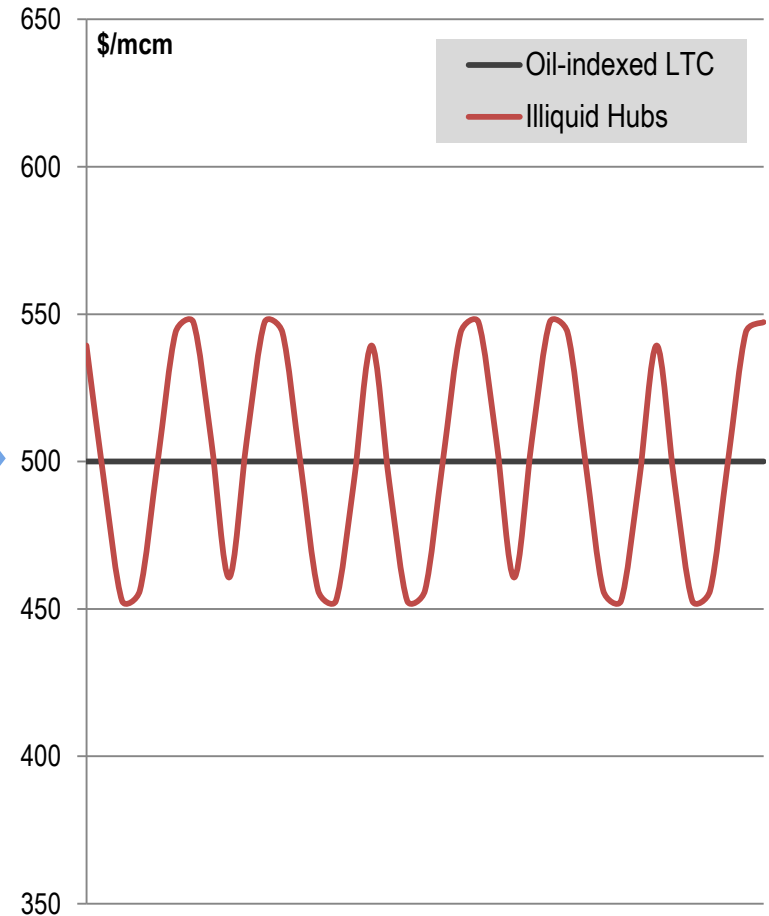
Sources: BAFA, Bloomberg, World Bank

# Hub-Price Behavior in Hybrid Pricing Model

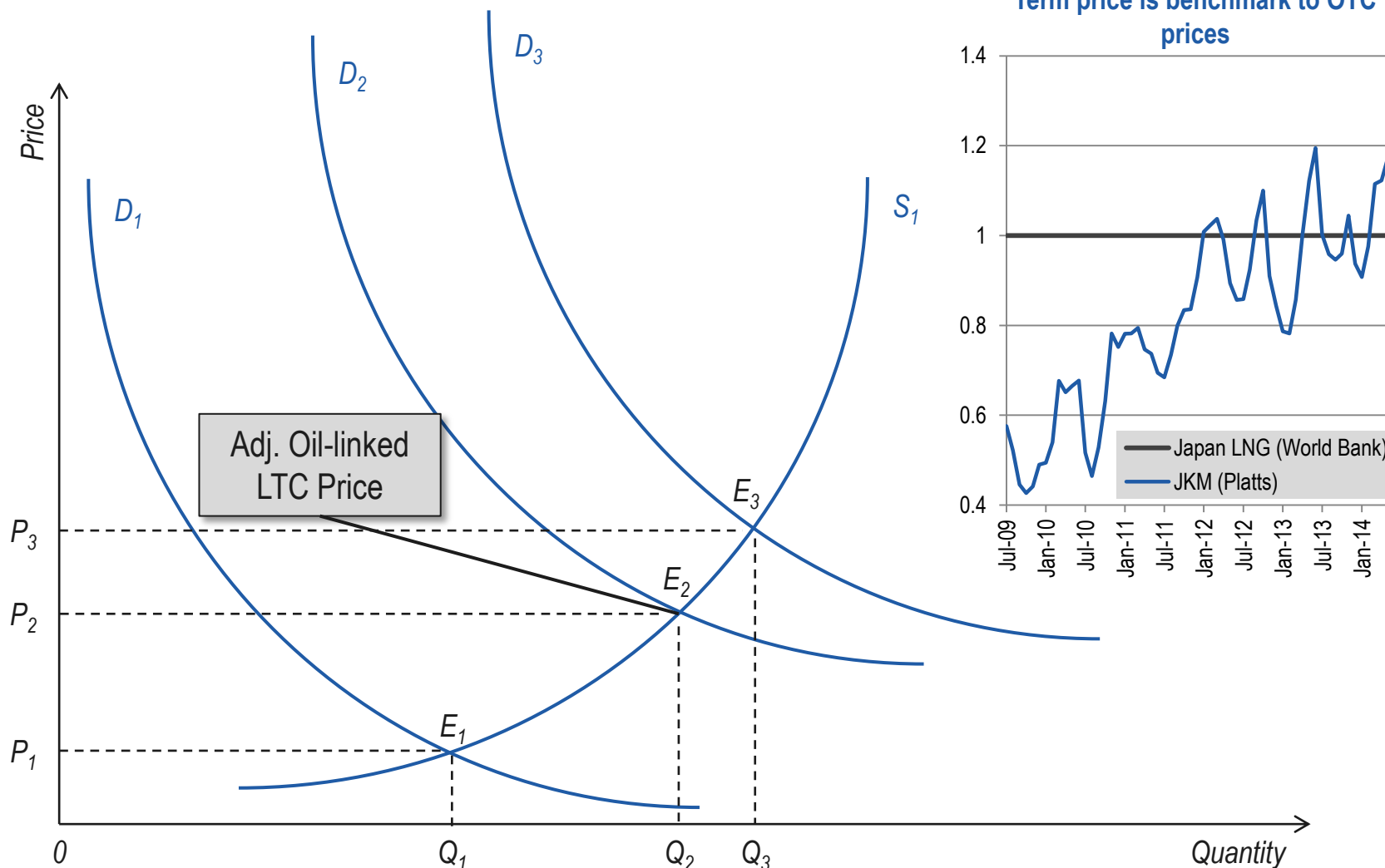
**Liquid Hubs (Europe)**



**Illiquid Hubs (Asia)**



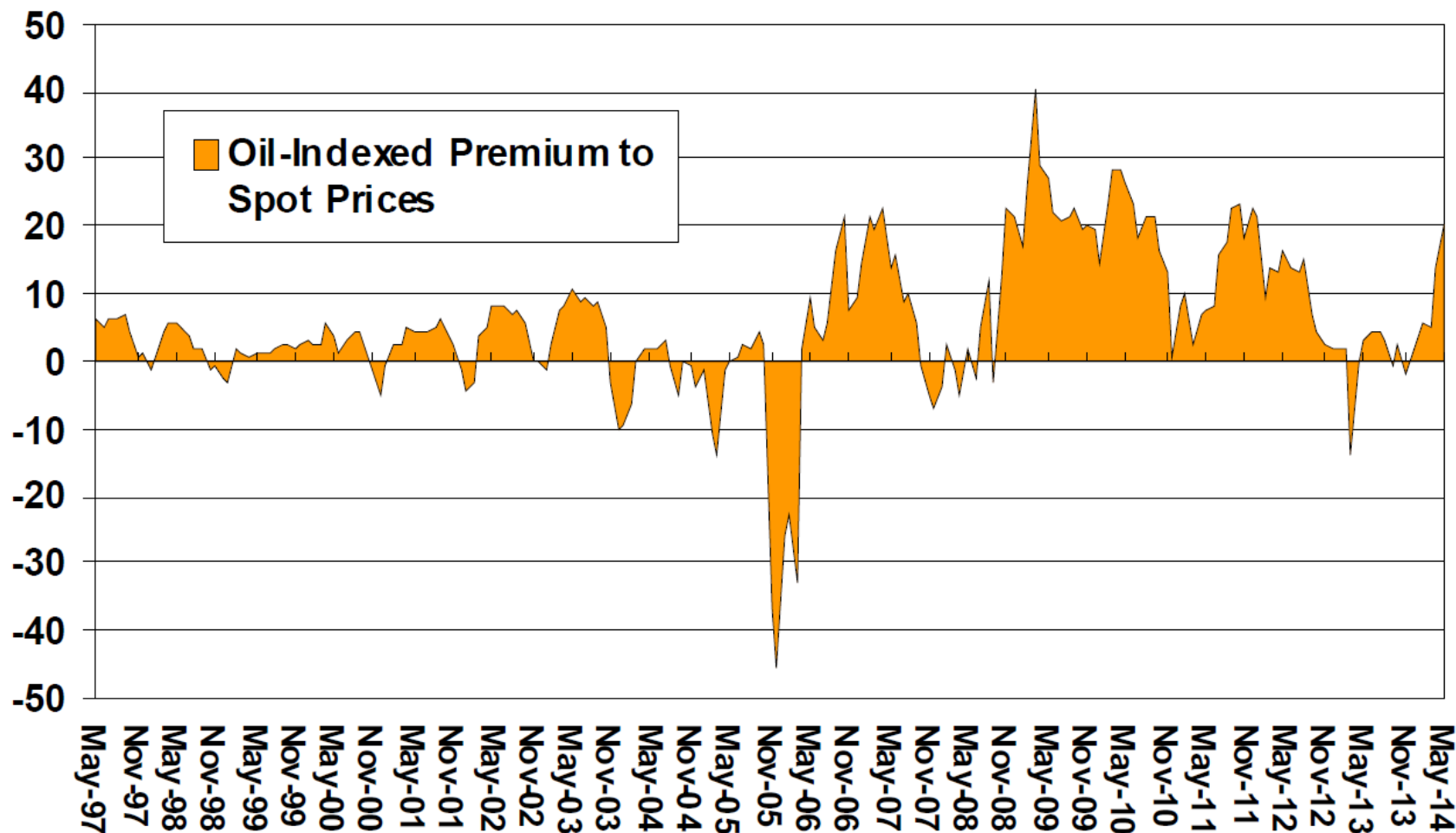
# Adjusted for Security and Flexibility of Supply Term Price Sets Hub Prices in Immature Hybrid System





# Financialization of Firm Delivery Obligations under LTCs Leads to Price Mismatch

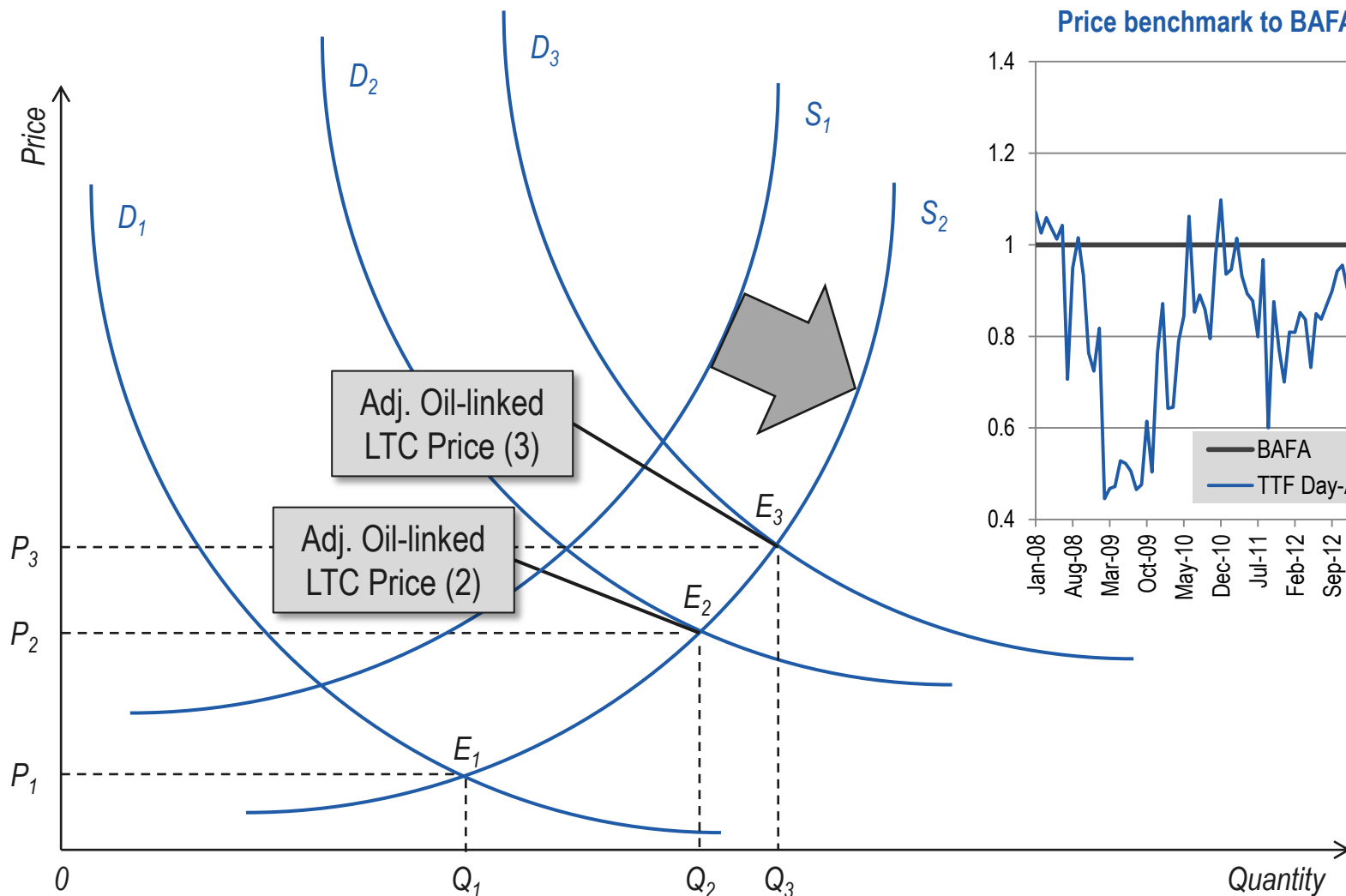
P/TH, Oil-Indexed (Contract) Premium Over Spot



# Oversupply Resulting from One-Side Balancing by Midstreamers

Volumes sold on forward curves (1) vs. actual demand (2)	Episode 1. Contract gas sold on a forward curve	Episode 2. Trading, portfolio optimization and gas buyback	Episode 3. Renegotiations and/or arbitration procedures	
	<u>Advantages:</u> <ul style="list-style-type: none"><li>price hedging</li><li>cash from forward sells</li></ul> <u>Disadvantages:</u> <ul style="list-style-type: none"><li>negative margins when contract prices (a) are higher than hub (b)</li></ul>	<u>Advantages:</u> <ul style="list-style-type: none"><li>possibility to turn negative margins into positive</li><li>volumetric risks mitigation (ToP) by buying back volumes on hub equal to the actual demand by the clients</li></ul> <u>Disadvantages:</u> <ul style="list-style-type: none"><li>absent on the overcontracted market</li></ul>	<u>Advantages:</u> <ul style="list-style-type: none"><li>although end-users pay hub+ price, hubs are promoted as the true market price indicator</li></ul> <u>Disadvantages:</u> <ul style="list-style-type: none"><li>complicated and lengthy procedure, not all requirements could be met by the seller / court</li></ul>	
	(1) = (2)	a > b by the size of premium for contract price security of supply and flexibility ( $P_{S/F}$ )	Negative margins are minimum and could be netted by trading	Sum of the rebates is the smallest
	(1) < (2)	a < b due to undersupply on the hubs minus $P_{S/F}$	Utilization of the contract volumes flexibility for price arbitrage between contract and hub gas	Seller can initiate a renegotiation procedure of its own. But on the overcontracted market buyer uses its nomination right to minimize mismatch
	(1) > (2)	a > b due to oversupply of hub gas plus $P_{S/F}$	Negative margins could be the highest in this case, but be minimized by trading and contract gas displacement by cheaper hub gas	Strong case to apply for rebates

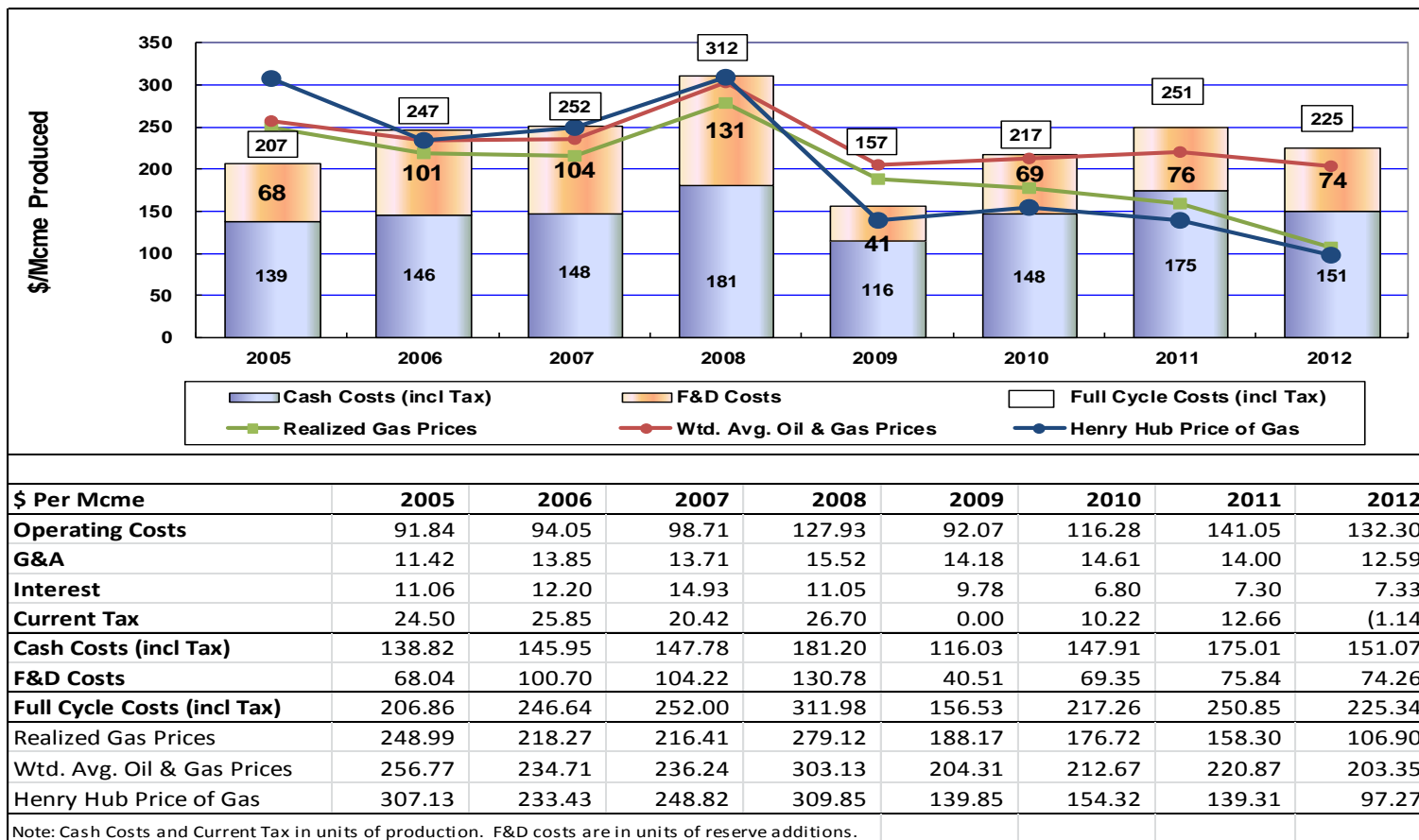
# Adjusted for Structural Oversupply Term Price Sets Hub Prices in Mature Hybrid System



# Types of Market Failure in the Natural Gas industry

Type of Market Failure	Negative Outcome	Treatment	Remedy Efficiency
Lack of mechanisms of adjusting supply to price signals leads to a wrong level of output	Gas as byproduct of oil is not a self sufficient commodity	O –I	For decades O-I and long-term contracts served as efficient instrument of matching supply and demand
Instability of prices undermines long-term investments	Inability to plan revenues makes projects difficult to finance	O-I and gov. guarantees	O-I makes projects financeable while gov. guarantees raise risk of antitrust actions
Price manipulation by dominant suppliers	High prices for buyers	O-I and gov. intervention	O-L is a hedge against price manipulation. Poor track record of competition enhancement in gas market by governments
Externalities in gas	Free markets do not address security of supply	O-I and 'Too big to fail' policies'	Competition promotion leads to 'free riding' while O-I provides security of supply

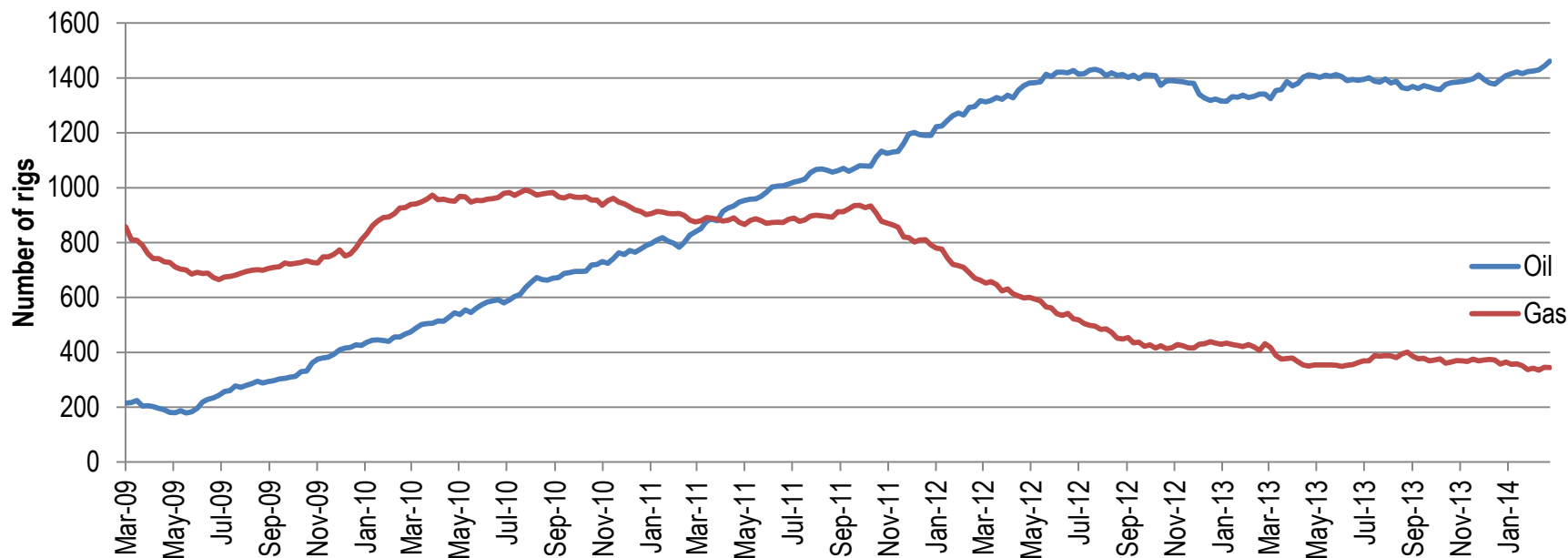
# US Companies' Costs Exceeded Revenues on a Unit Basis for Six Years in a Row



Source: Company 10-Ks

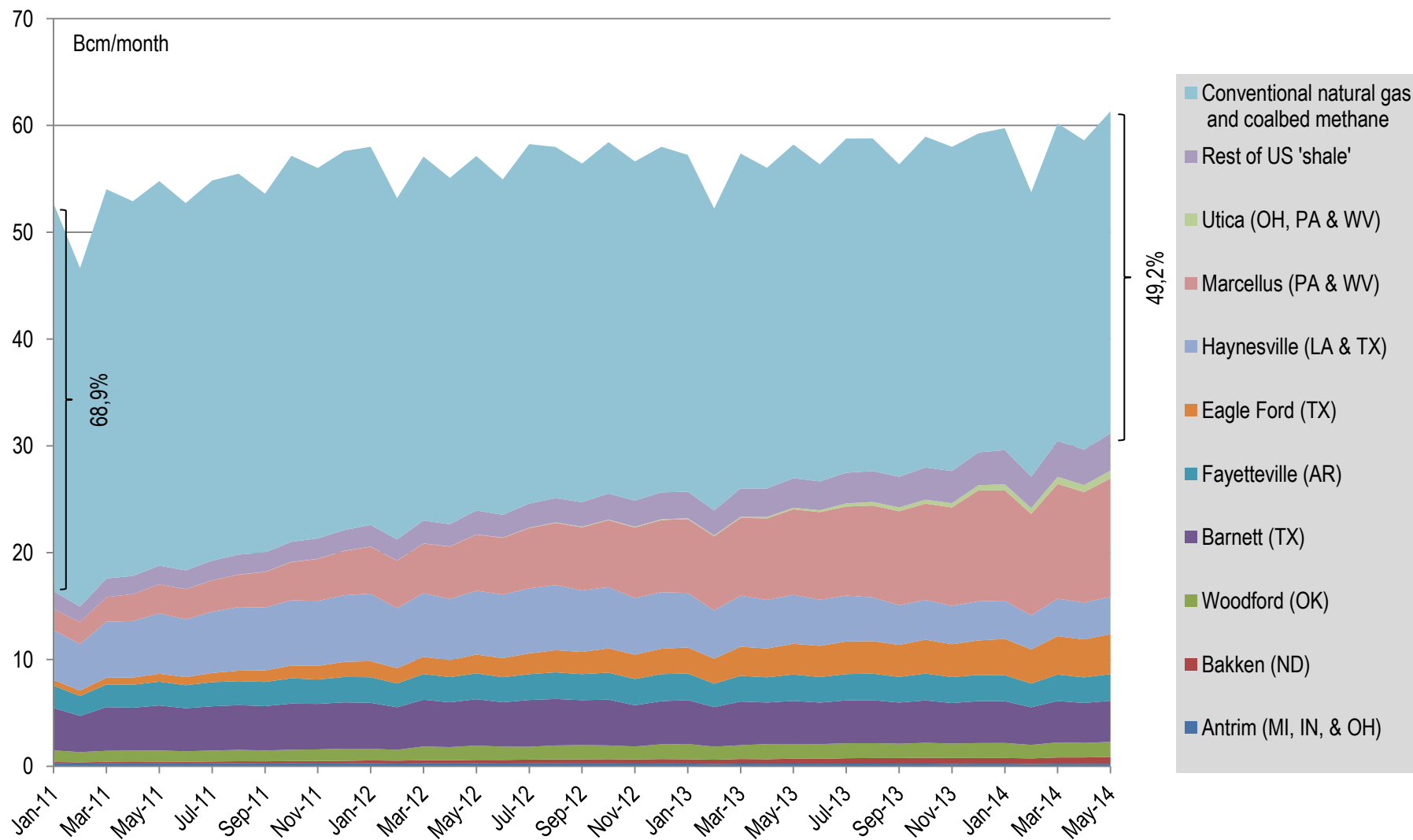
**Notes:** "Full cycle" or "All in" costs are defined herein as the sum of operating costs (on a unit of production basis) plus the cost of acquiring, exploring for, and developing new reserves (on the basis of an equal unit of new reserves identified). The annual presentation of costs incurred in property acquisition, exploration and development activities (collectively referred to as "costs incurred") is an SEC requirement for publicly listed oil and gas companies. Such an accounting, however, is not required, and is typically not reported, on a quarterly basis. Thus, this interim update will not discuss 2012 YTD all-in costs.

# USA Dry Gas Industry is the State of Coma Pointing to Shale Gas Price Anomaly



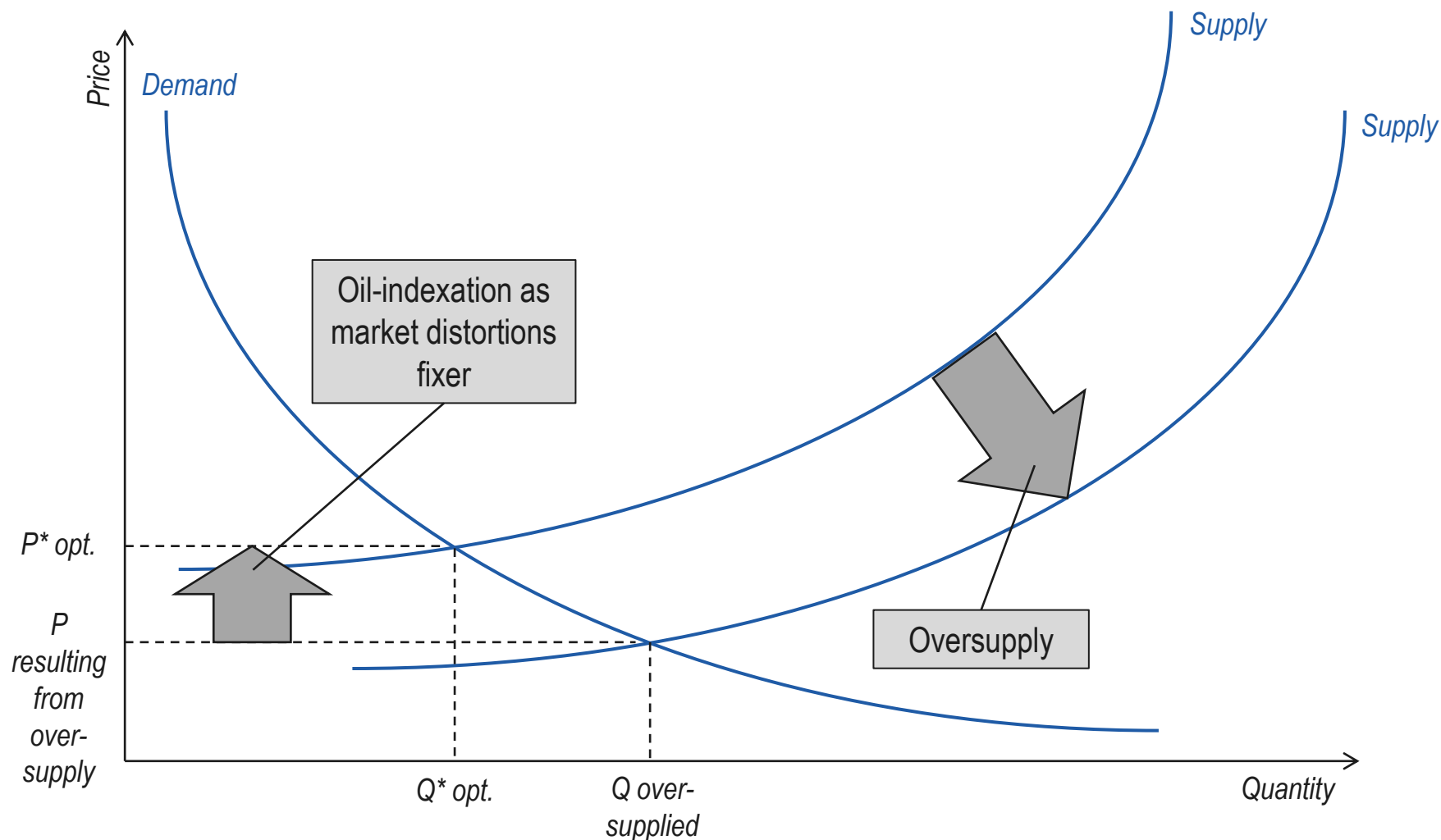
Henry Hub price does not cover dry gas production costs estimated to be USD 6 per MMBTY on average for more than five years. Production of dry gas because of the depressed prices is possible only as by-product of gas liquids of shale oil. This situation is not sustainable and will eventually lead to the Henry Hub price rise above the USD 6 MMBTU levels. There are already no major increases in shale gas output over the last two years in the USA and there are predictions that dry gas output may fall unless price adjustments takes place.

# Natural Gas Production in USA is Stagnant



Source: EIA

# Oversupply Caused by 'By-Product' Status of Natural Gas (USA)







THANK YOU FOR YOUR ATTENTION!