

Natural Gas: The Shale Revolution and its consequences to global energy markets

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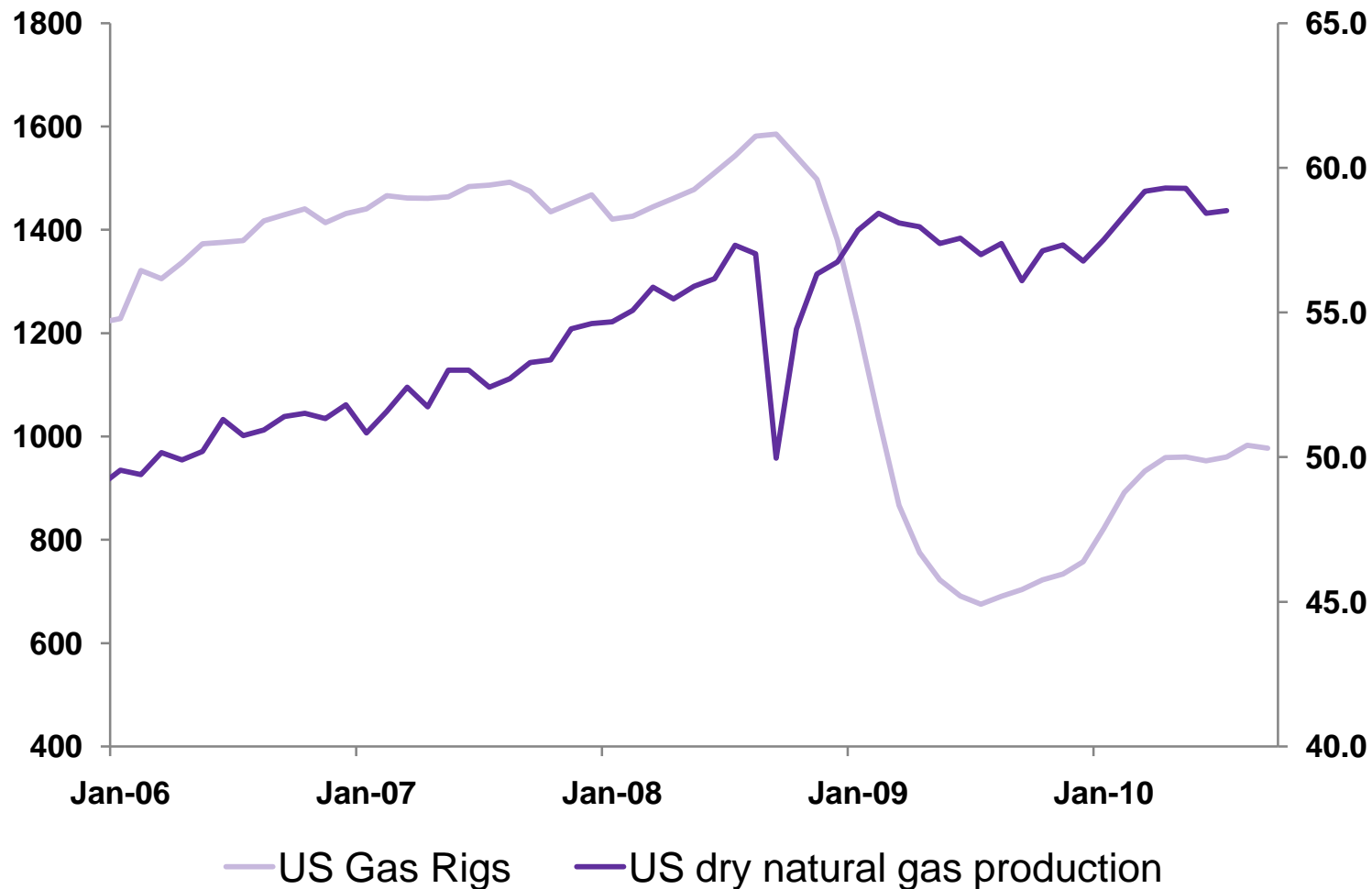
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Rig-production relationship has fundamentally changed in the United States

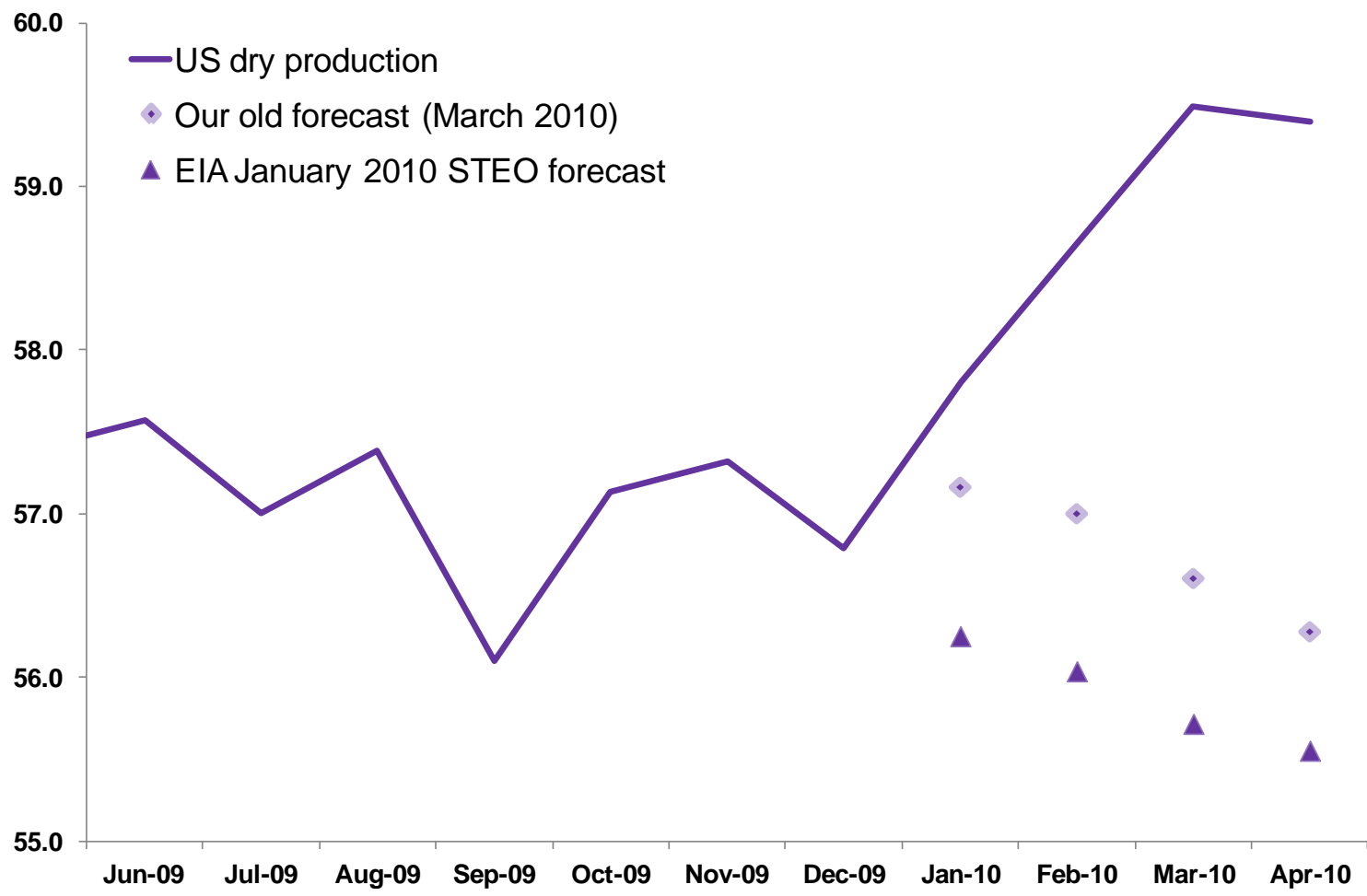
Left axis: number of rigs; right axis: Bcf/d



Source: EIA, Baker Hughes.

Production markedly overshoot our previous forecast early this year

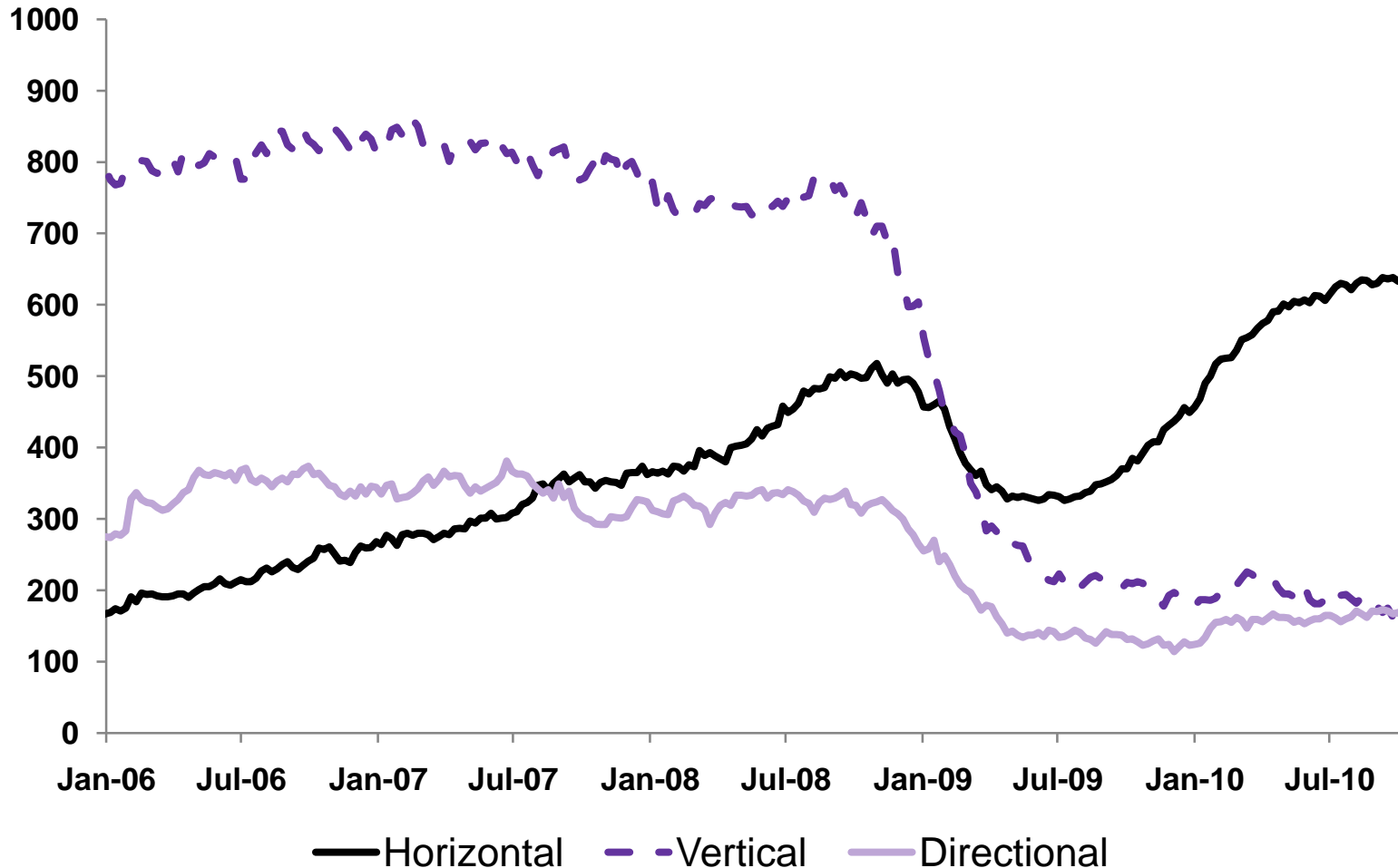
Bcf/d



Source: DOE

US conventional gas drilling has virtually come to a halt, while shale drilling has continued to rise

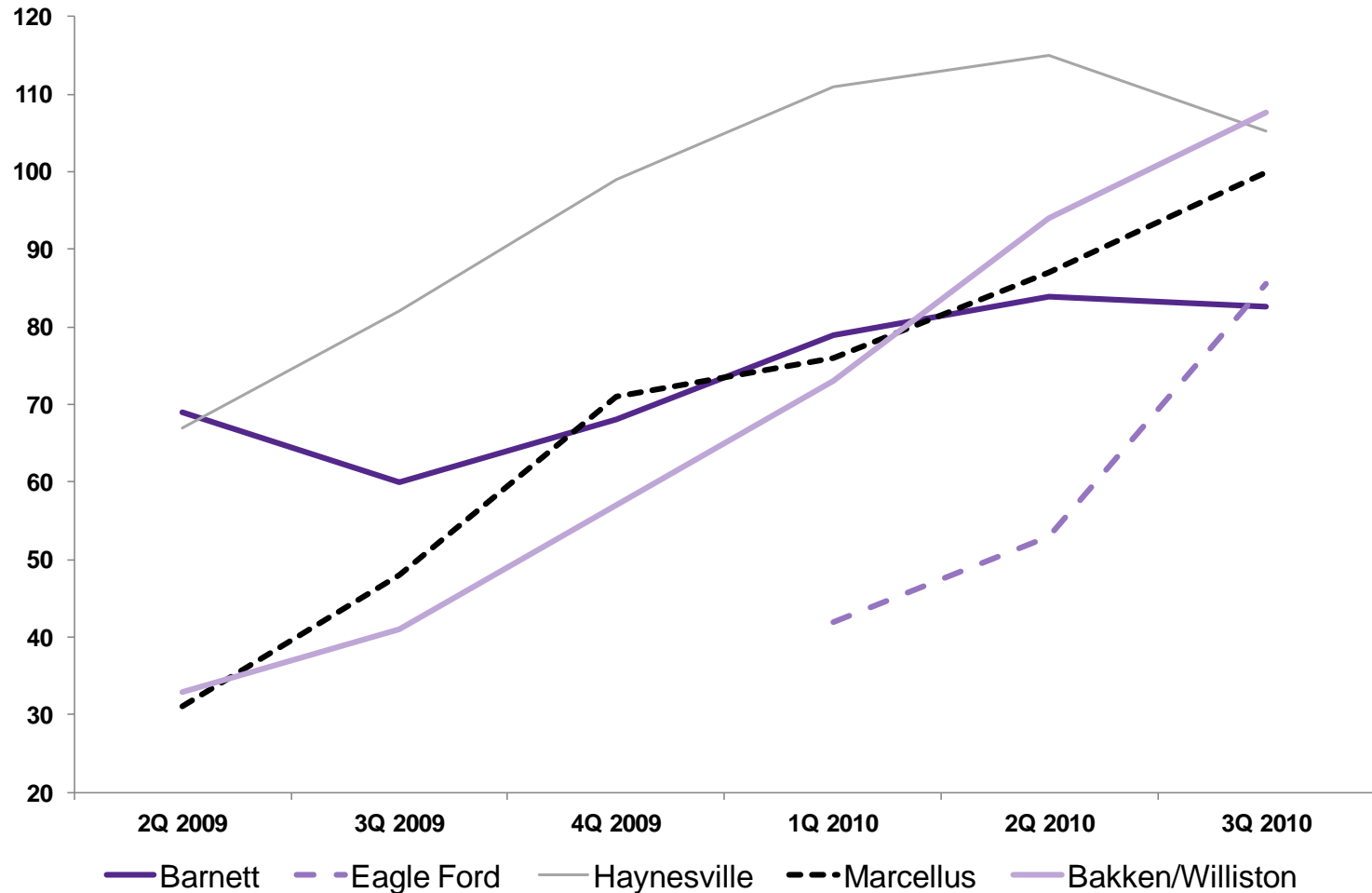
Number of rigs



Source: Bentek.

Rig counts have increased across major shale plays

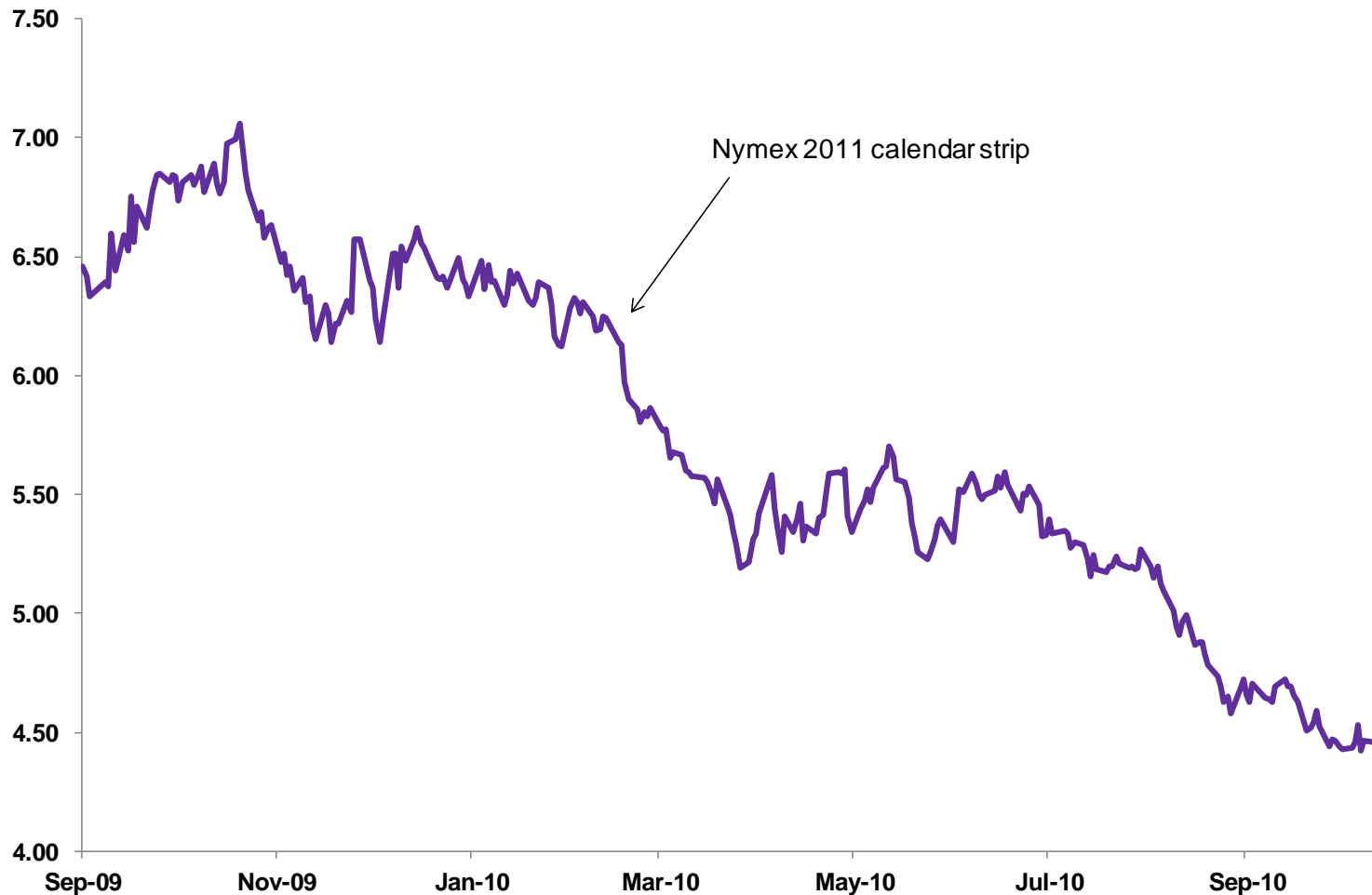
Number of rigs



Source: Landrig Newsletter.

Hedging of 2011 production has become less favourable for E&Ps

\$/mmBtu



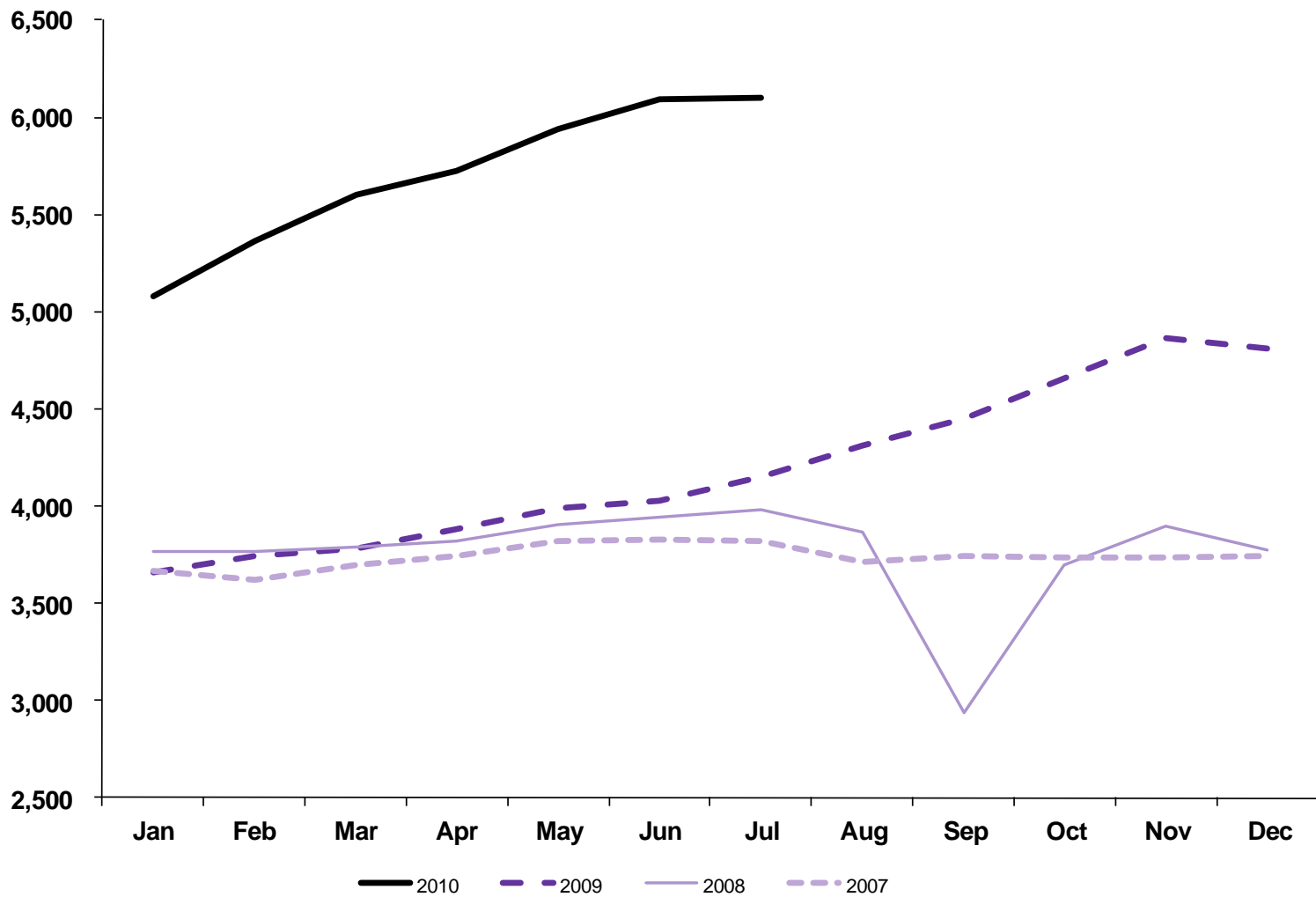
Source: Goldman Sachs Global ECS Research.

However, production has been resilient

1. Leases: Leases for land access often require E&Ps to drill, otherwise they risk losing the lease
2. High NGL prices: Natural gas liquids price closer to the oil complex and can incentivize production that otherwise would be uneconomical
3. JVs: “drilling with other peoples money”
4. Hedges: Until a couple of months ago, producers could still lock in favorable prices by selling forward
5. Cheap access to credit

Louisiana natural gas production has almost doubled

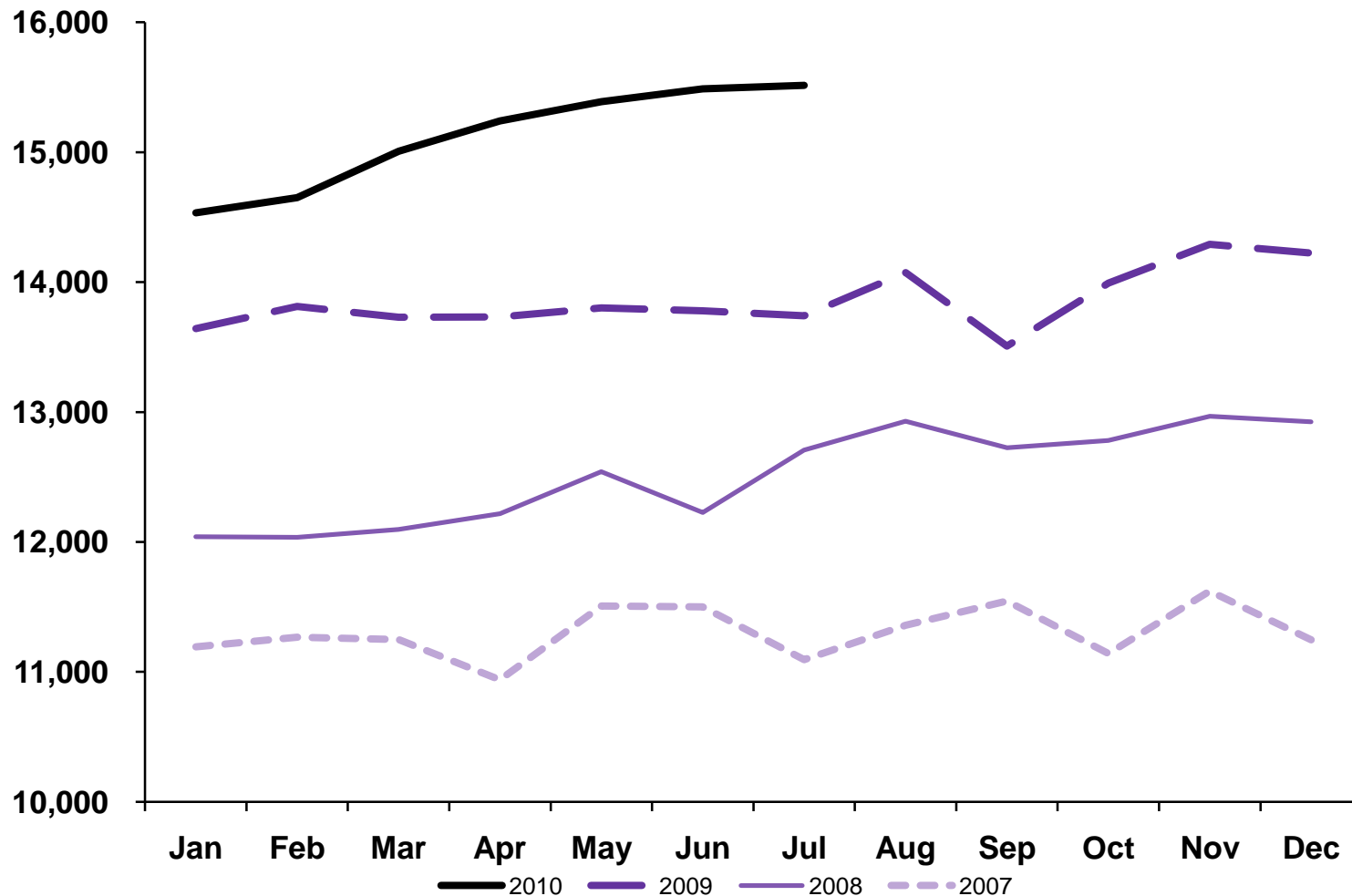
Marketed production in mmcf/d



Source: EIA.

Marcellus production is also booming

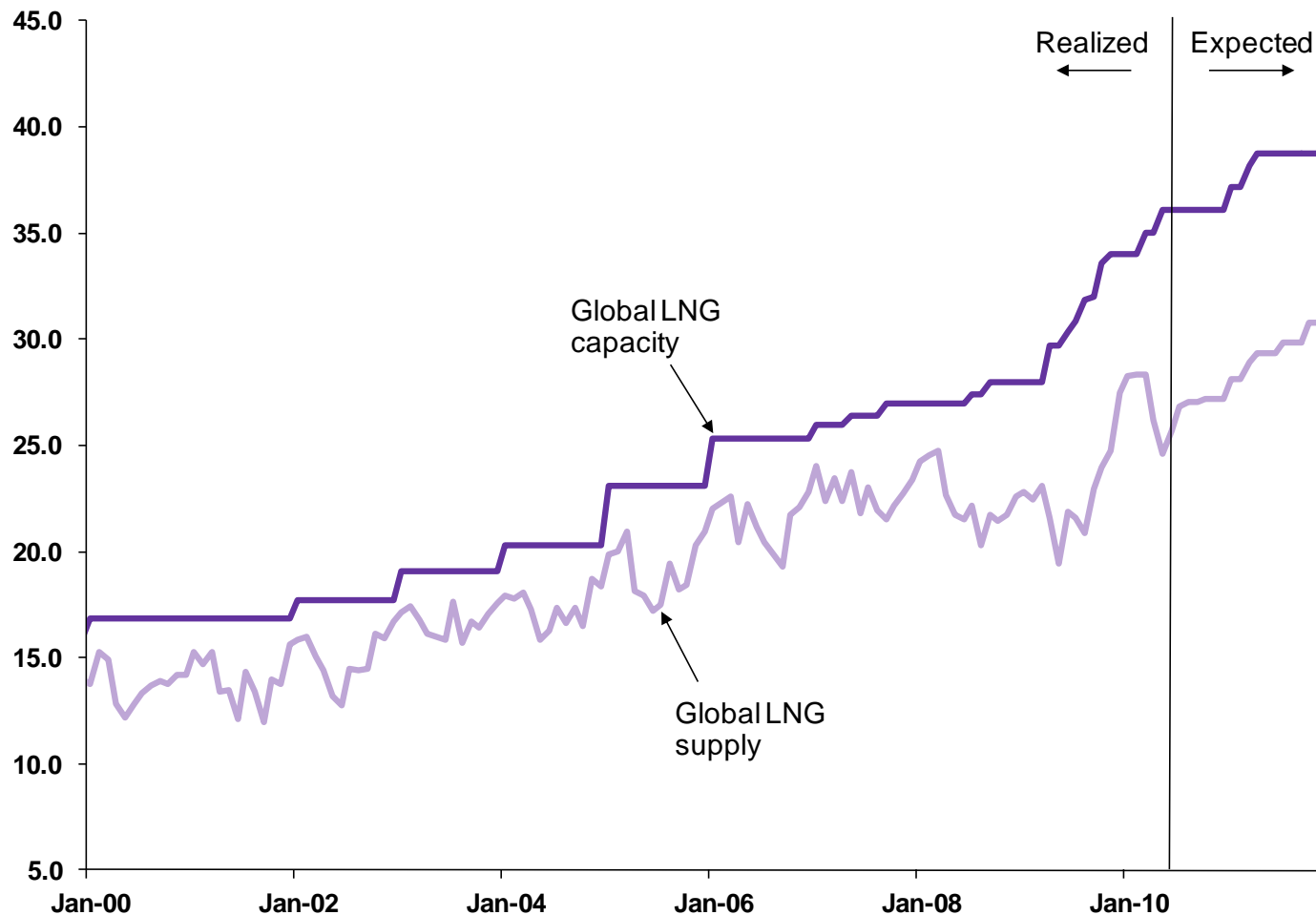
"Other States" (including PA and NY) marketed production in mmcf/d



Source: EIA.

The investment in liquefaction plants has happened. Now, where's the demand?

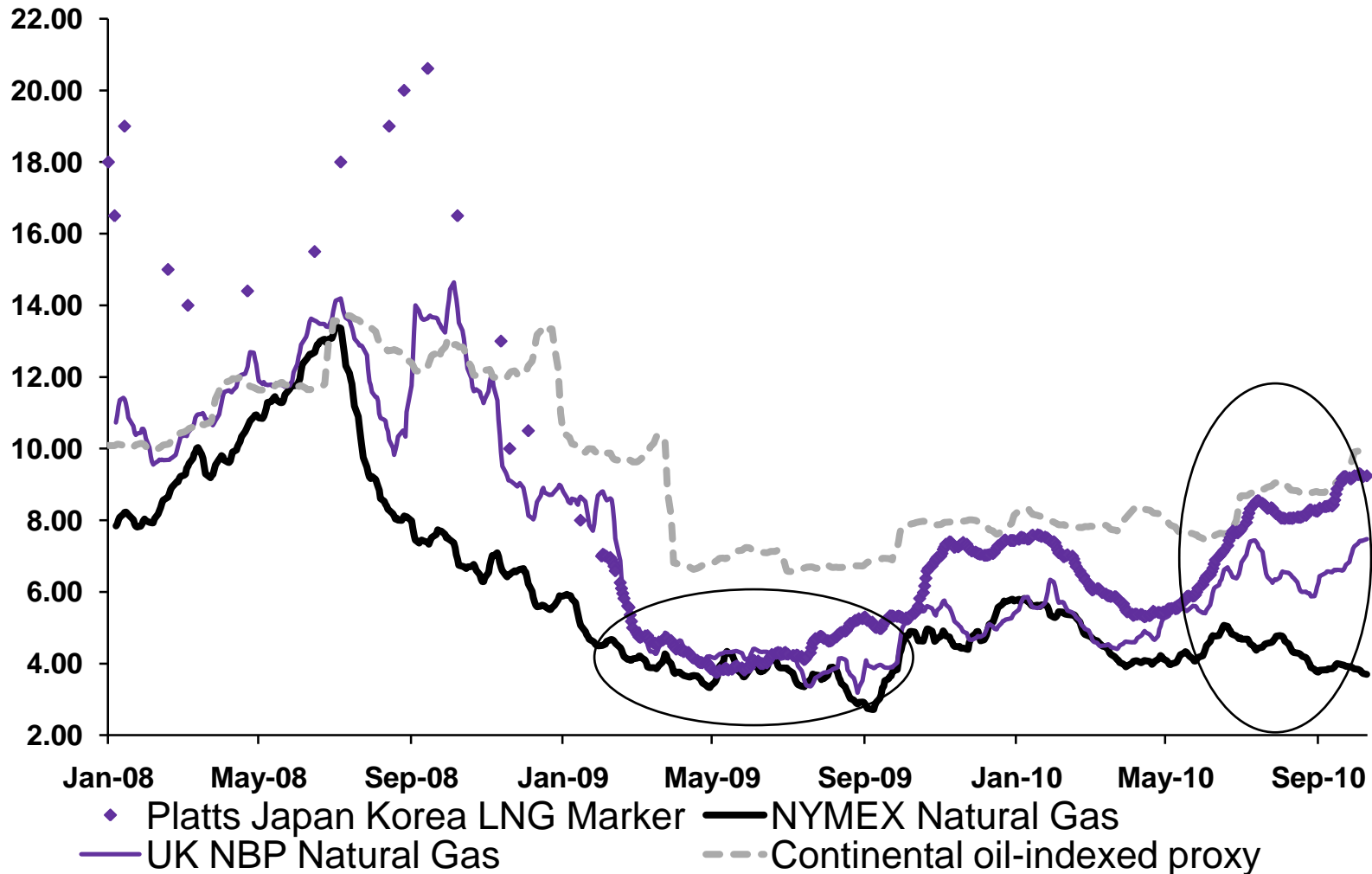
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Source: IEA, Waterborne Energy, GS Global ECS Research.

World spot prices have been under pressure to converge, despite the recent European/Asian break-out

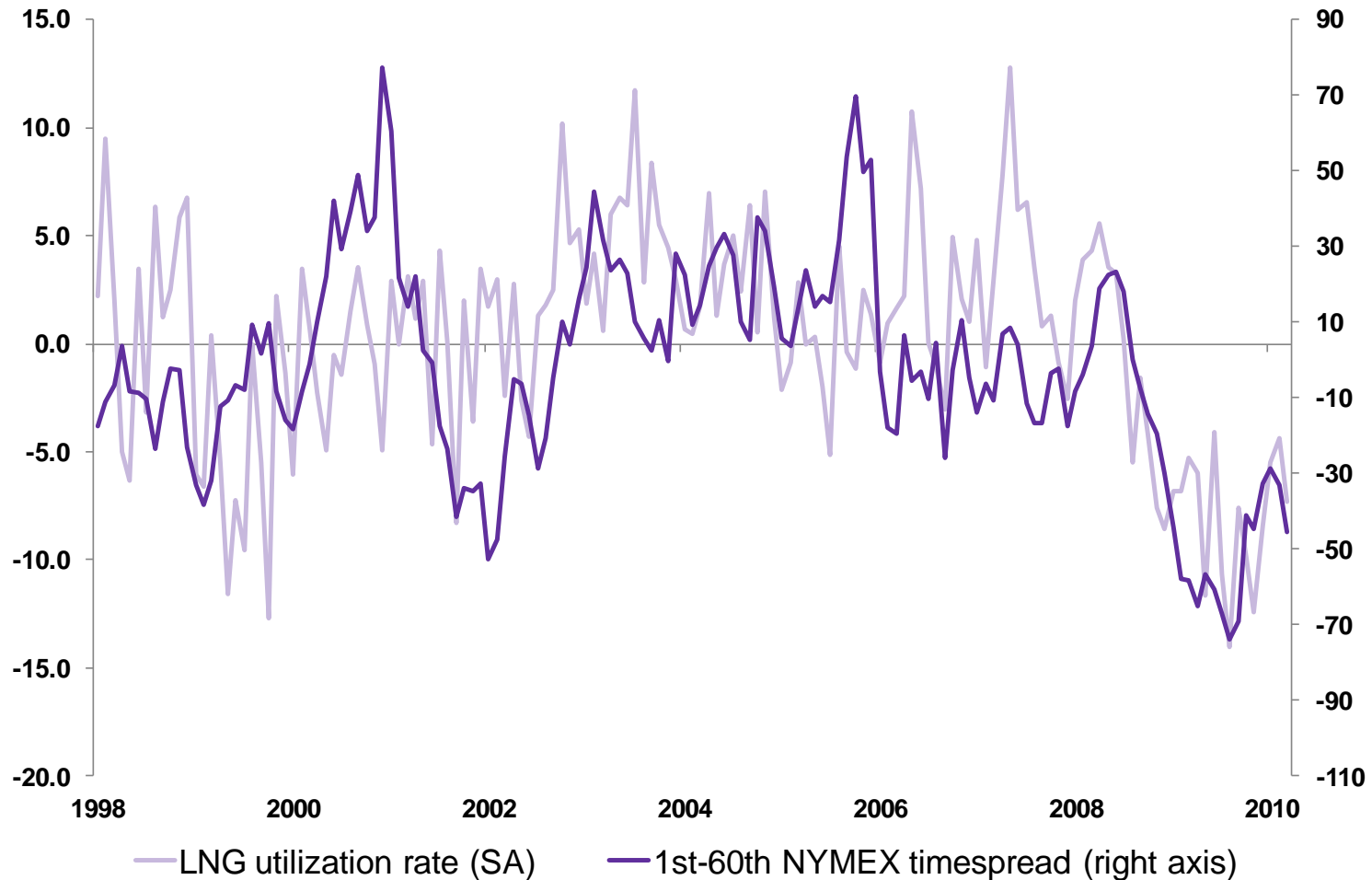
\$/mmBtu, 5-day moving average



Source: NYMEX, ICE, and Platts'.

LNG liquefaction rates have moved with natural gas timespreads over the past decade

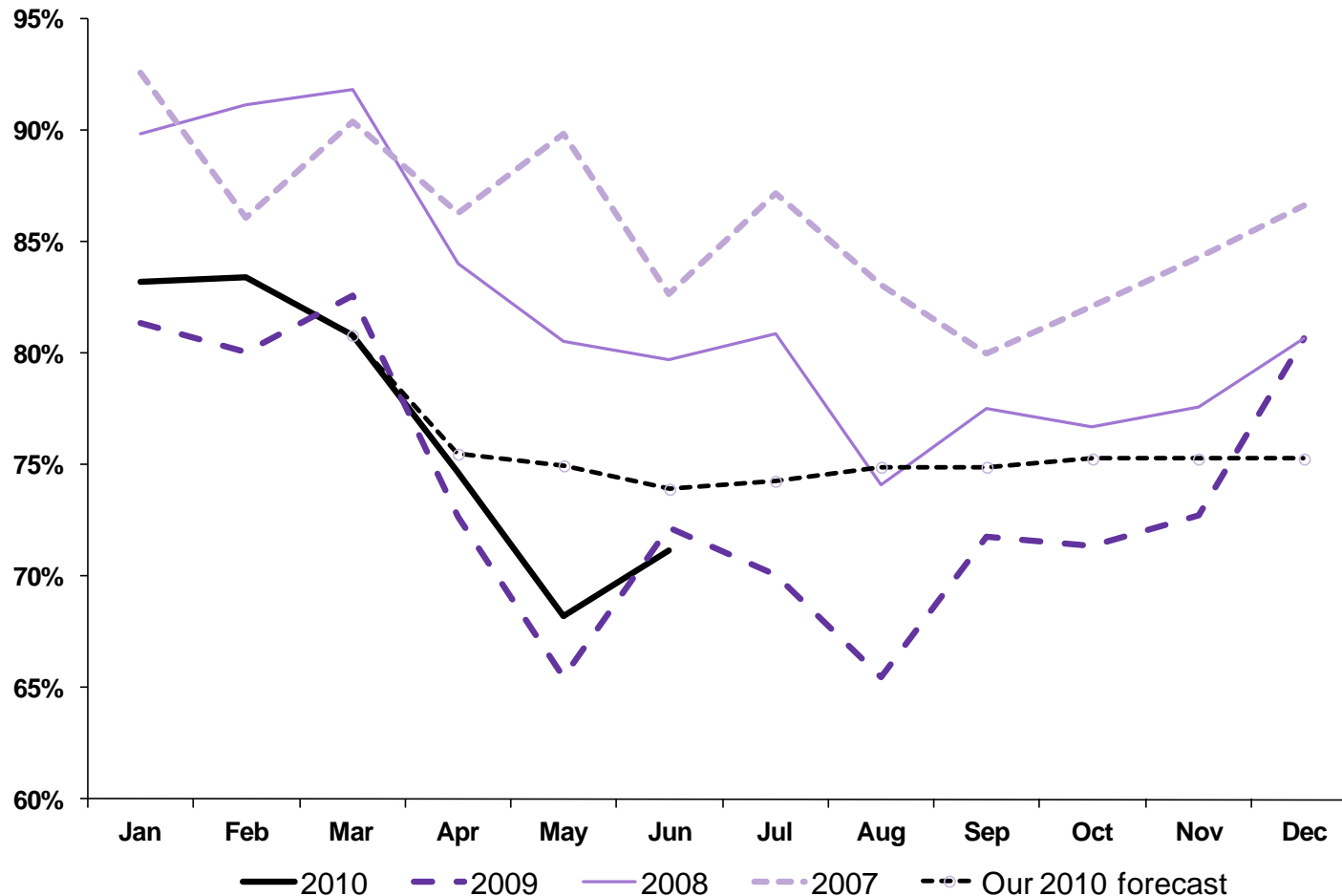
% Utilization (dev from normal left axis); % (right axis)



Source: IEA, Waterborne Energy, NYMEX, Goldman Sachs Global ECS Research.

We expect the global utilization rate in LNG production to balance the market

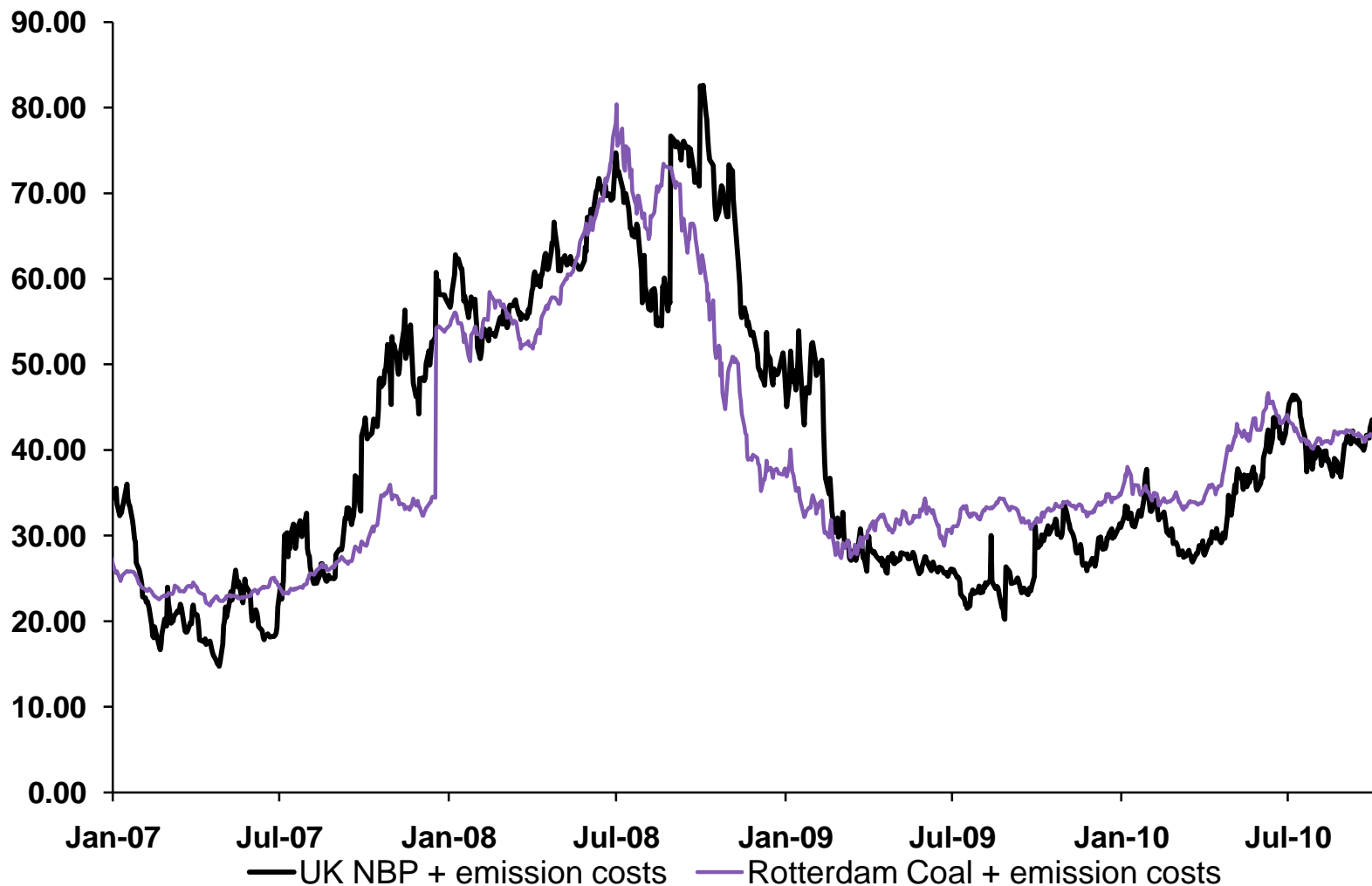
Global liquefaction utilization rate in %



Source: IEA, Waterborne Energy, GS Global ECS Research.

Gas prices in Europe have caught up with coal prices for the moment

Generation costs (including exchange fuel prices, emissions and transport costs) in EUR/MWh



Source: ICE and Goldman Sachs.

We have lowered our natural gas price forecasts this summer

	GS						Forward curve*		
	US (\$/mmBtu)		UK (\$/mmBtu)		UK (p/th)		US (\$/mmBtu)	UK (\$/mmBtu)	UK (p/th)
	Previous	New	Previous	New	Previous	New			
2011	6.00	5.25	5.80	5.75	36.00	32.10	4.50	8.10	51.10
4Q2010	5.70	4.75	5.50	5.25	34.40	35.00	4.00	7.80	49.20
1Q2011	6.00	5.00	5.80	5.50	36.00	32.20	4.30	7.80	49.30
2Q2011	6.00	5.00	5.80	5.50	36.00	30.60	4.30	7.60	47.90
3Q2011	6.00	5.25	5.80	5.75	36.00	31.50	4.50	7.80	49.10
4Q2011	6.00	5.75	5.80	6.25	36.00	34.00	5.10	9.20	58.10

*As of close on October 11, 2010.

Upcoming liquefaction capacity is dominated by two more Qatari trains and the giant Gorgon project in Australia

LNG liquefaction project under construction

Project	Start-up	mn mt/yr	bcf/yr	bcf/d
Risavika (Nordic LNG)	Q3 2010	0.3	15	0.04
Qatargas III, T6	Q1 2011	7.8	380	1.04
Qatargas IV, T7	Q1 2011	7.8	380	1.04
Pluto, T1 (Australia)	Q2 2011	4.3	210	0.58
Angola LNG	Q1 2012	5.2	250	0.68
PNG LNG (Papua New Guinea)	2014	6.6	320	0.88
Gorgon LNG (Australia)	2014	15.0	730	2.00
Total Under Construction		47.0	2285	6.26

Source: Reuters, Bloomberg, Platts, company information.

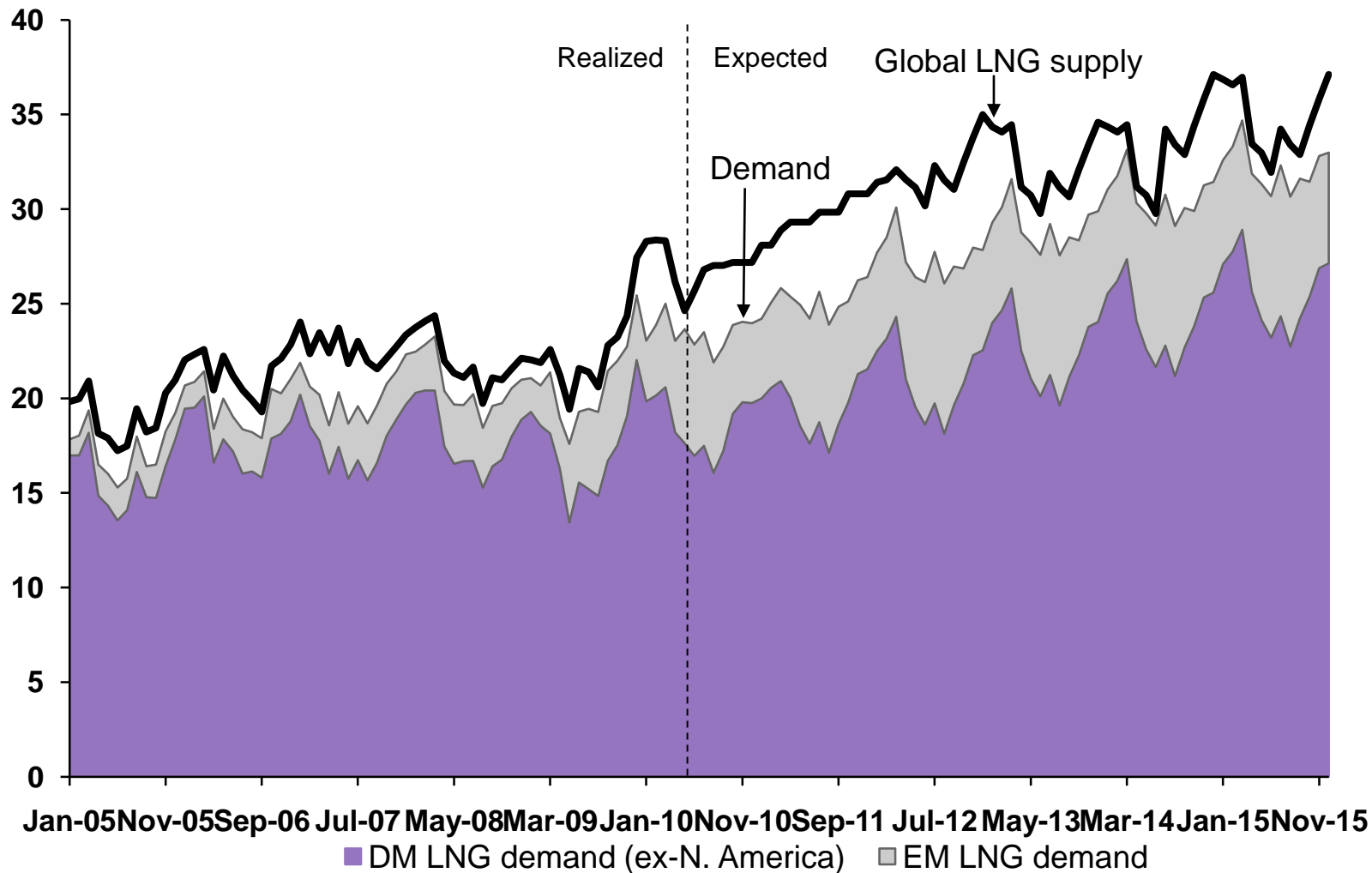
Longer term, EM import capacity expansion is needed to absorb new supply

Regasification capacity under construction				
Country	Terminal	Expected start up	Mmcmd	Mmcfd
Pakistan	GasPort	2008 (delayed)	11.3	400
Total 2008			11.3	400
USA	Golden Pass	2010	56.6	2,000
Dubai	Floating terminal	2010	17.0	600
Total 2010			73.6	2,600
India	Ratnagiri	2011	18.9	667
USA	Bayou Casotte	2011	36.8	1,300
Mexico	Manzanillo	2011	14.2	500
Italy	Offshore Livorno	2011	13.3	470
Netherlands	Gate LNG - Maasvlakte	2011	32.9	1,161
China	Rudong/Jiangsu	2011	13.3	470
China	Dalian	2011	11.3	400
Indonesia	West Java	2011	11.3	400
Thailand	Map Ta Phut	2011	18.1	640
Argentina	Escobar	2011	17.0	600
Total 2011			187.0	6,608
China	Zhejiang	2012	11.3	400
India	Kochi	2012	9.3	330
Total 2012			20.6	730
Singapore	Jurong	2013	12.7	448
China	Qingdao, Shandong	2013	11.3	400
Total 2013			24.0	848
Total capacity under construction			316	11,186

Source: GS Global ECS Research.

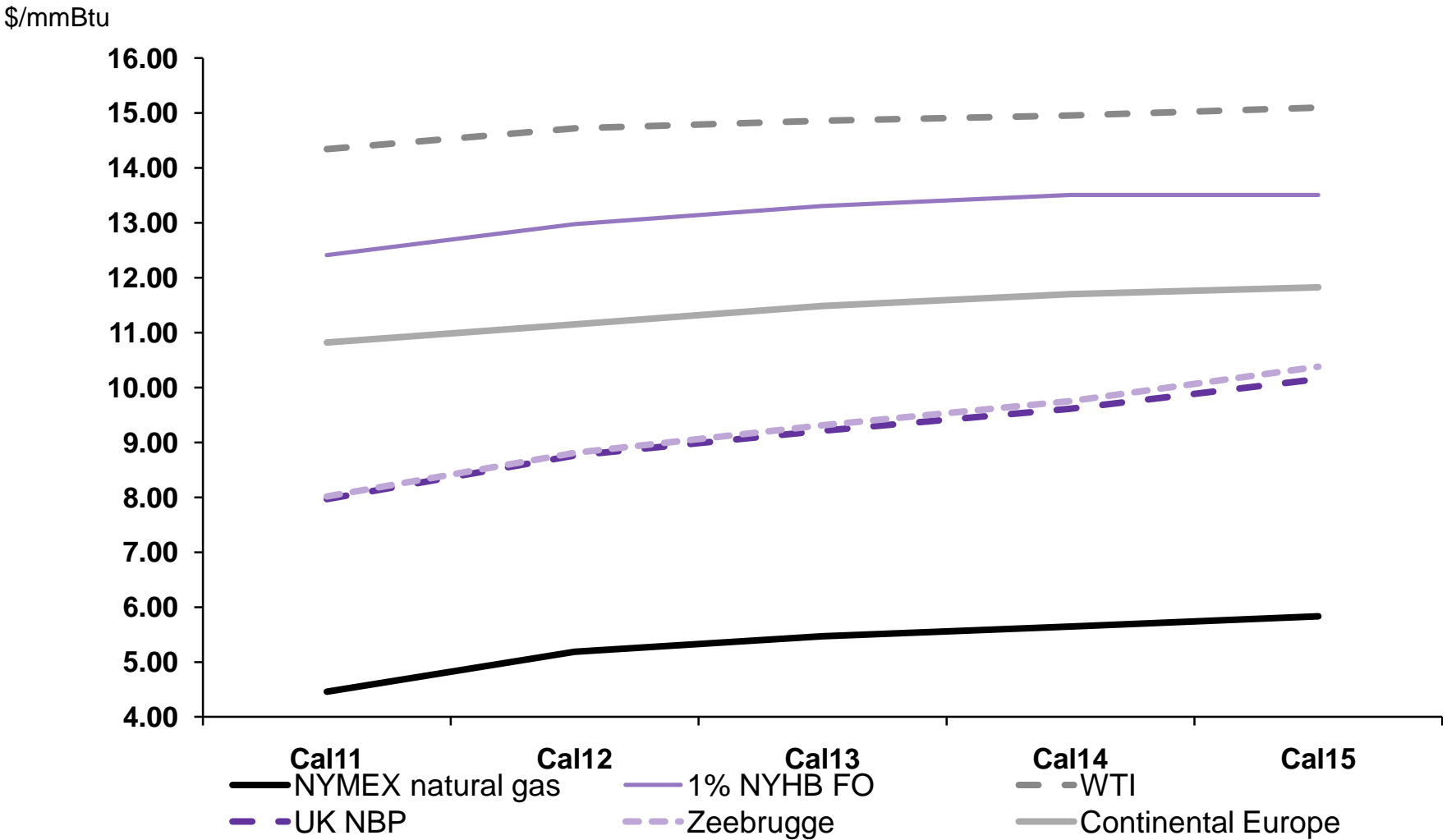
We expect global LNG markets to remain oversupplied through 2013

Bcf/d



Source: IEA, Waterborne Energy and Goldman Sachs ECS Research.

Longer term, we believe the market will find ways to utilize the cheapest fuel



Source: IEA, Waterborne Energy and Goldman Sachs ECS Research.



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