Deutsche Bank

Future Challenges for Electricity Security: Finance

October 2013

Passion to Perform

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Challenges of financing European power generation

— Past evidence on returns

— Fuel choice: market vs policy signals

— Maximising returns or minimising risk: portfolio choice for resilience

— Will market mechanisms be used to pay for capacity or carbon reduction?

— Energy affordability

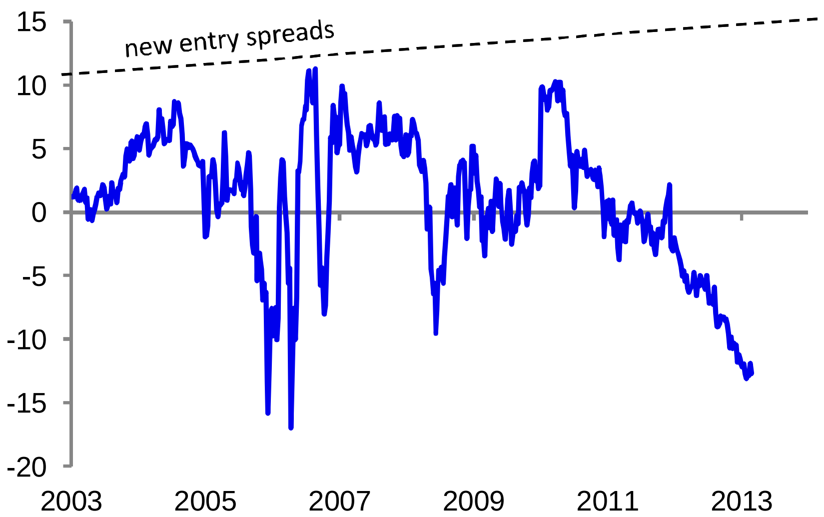
— Getting more capital from fixed bills

Past evidence on returns

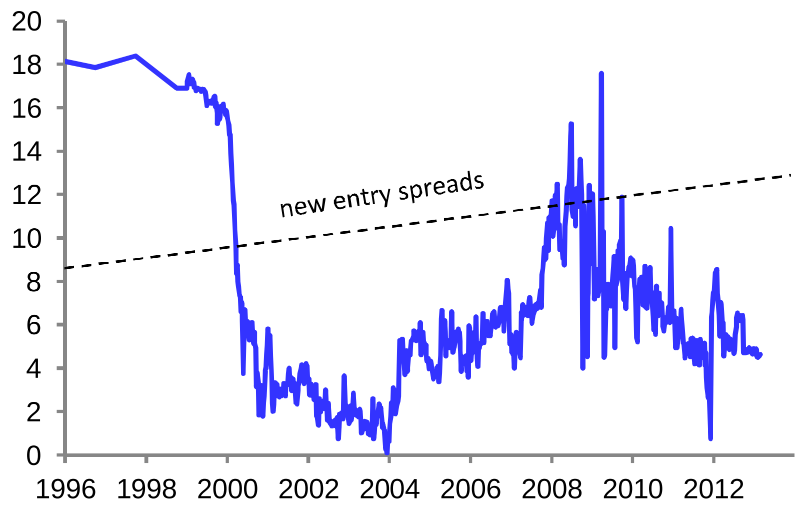
— Merchant generation globally has not earned its cost of capital
  — UK, Spain, Germany, Netherlands, New England, Texas etc

— GDF Suez making
  — c. €130/kW EBITDA on global contracted generation
  — C. €65/kW EBITDA on merchant generation (US, UK, Europe, Australia)

German spark spreads (baseload, €/MWh)



UK spark spreads (baseload, £/MWh)



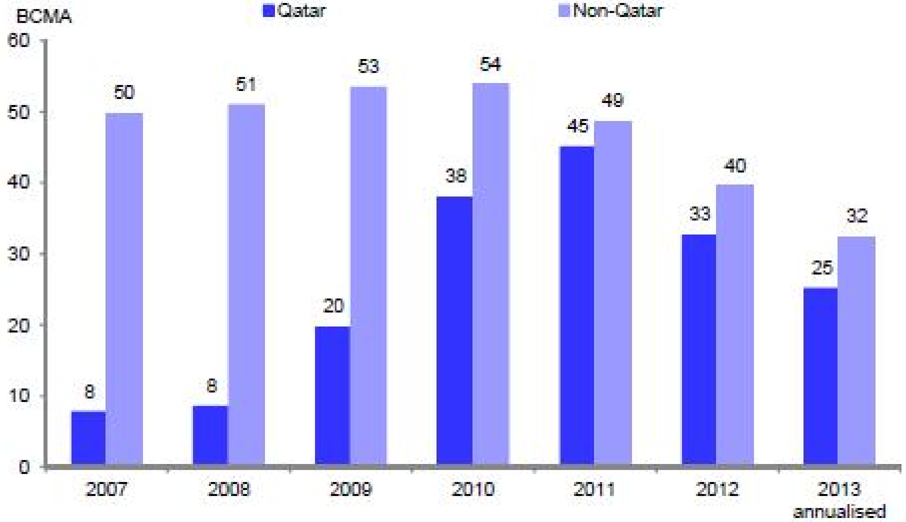
Source: Reuters, Deutsche Bank

Fuel choice: market vs policy signals

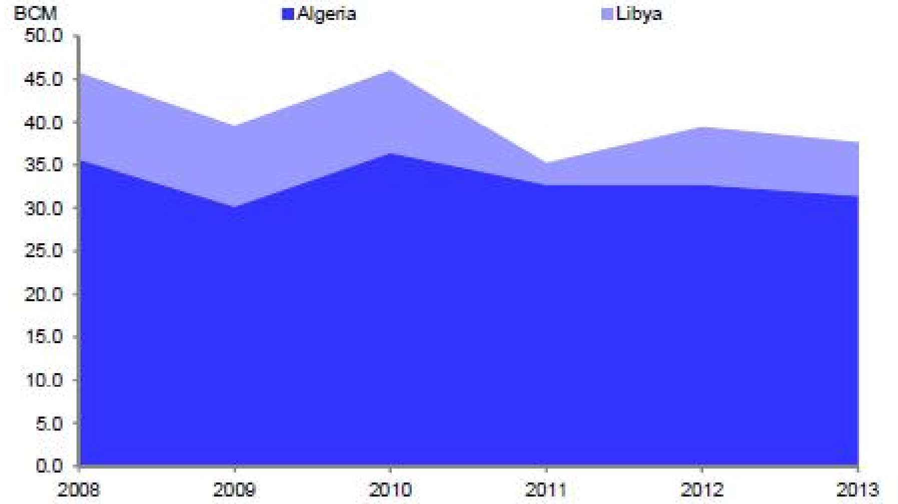
EU gas demand collapse offset by indigenous production drop

BCMA	2008	2009	2010	2011	2012	Change	2013E
Demand - EU27	**548.9**	**517.8**	**560**	**517.8**	**509.7**	**-39.2**	**510.0**
Supply - Indigenous							
UK	69.6	59.7	55.7	43.7	37.3	-32.3	36.0
Netherlands	66.6	62.7	70.5	64.2	63.9	-2.7	65.5
Germany	13.0	12.2	10.6	10.0	9.0	-4.0	8.0
Denmark	10.1	8.4	8.2	7.1	6.4	-3.7	5.3
Italy	8.5	7.3	7.6	7.7	7.8	-0.7	7.2
Poland	4.1	4.1	4.1	4.3	4.2	0.1	4.1
Romania	11.4	11.3	10.9	10.9	10.9	-0.5	11.0
	183.3	**165.7**	**167.6**	**147.9**	**139.5**	**-43.8**	**137.1**
Supply - Other							
Algeria	35.8	30.3	36.5	32.8	32.8	-3.0	31.5
Libya	9.9	9.2	9.4	2.3	6.5	-3.4	6.0
Azerbaijan	7.1	6.2	6.6	6.9	6.8	-0.3	7.5
LNG (ex re-exports)	60.3	70.6	89.2	89.5	65.5	5.2	53.1
	113.0	**116.3**	**141.7**	**131.5**	**111.6**	**-1.4**	**98.1**
Call on Northern pipe	**252.6**	**235.8**	**250.7**	**238.4**	**258.6**	**6.0**	**274.8**
Storage/other	-6.7	-8.7	6.7	-13.0	5.0	11.7	4.4
Russia	160.0	141.0	139.5	150.0	138.8	-21.2	160.0
Norway	99.3	103.5	104.5	101.4	114.8	15.5	110.4
Russia % supply	*29.1%*	*27.2%*	*24.9%*	*29.0%*	*27.2%*		*31.4%*

LNG into Europe has been falling as Asia pulls supply

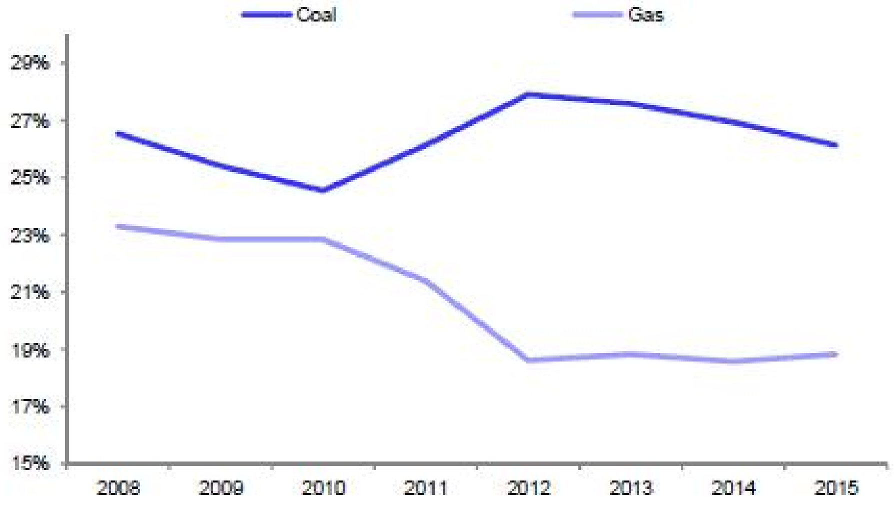


North Africa: civil unrest has limited pipeline deliveries

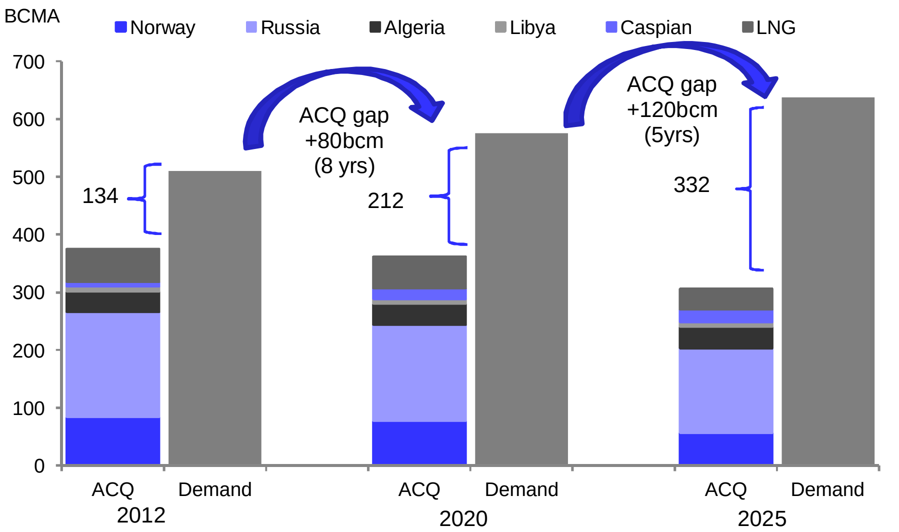


European gas: Russian pipe vs US LNG

No more generation fuel switching available (% generation)



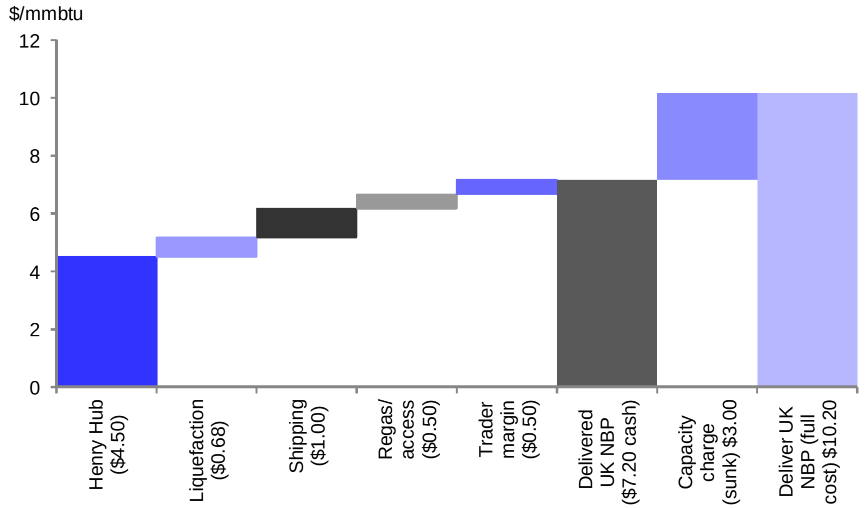
Growing gap of committed EU gas



European demand / supply outlook to 2020: US LNG needed

	Actual	Actual	2020 at growth of		
BCMA	2008	2012	1.0%	1.5%	2.0%
Demand	548.9	509.7	551.9	574.2	597.2
Supply source:					
Indigenous supply	183.3	139.5	109.3	109.3	109.3
Southern pipe	52.8	46.1	65.0	65.0	65.0
Russia (ACQ)	160.0	138.8	165.0	165.0	165.0
Norway estimate	99.3	114.8	115.0	115.0	115.0
Storage/other	-6.7	5.0	0.0	0.0	0.0
Call on LNG	53.5	65.5	97.6	119.9	142.9
LNG Supply					
Ex non-Approved			106.5	106.5	106.5
Europe long/(short)			*8.9*	*(13.4)*	*(36.3)*
Cum non-Approved			139.3	139.3	139.3
Europe long/(short)			*41.7*	*19.4*	*(3.6)*

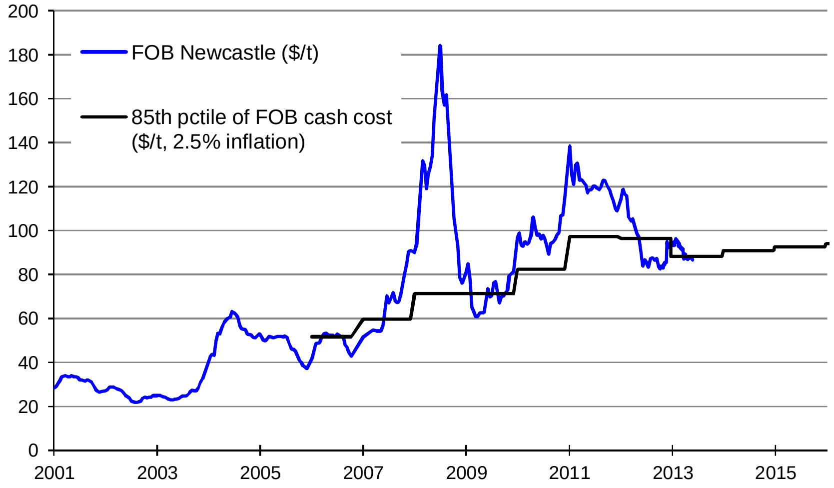
Cash stack for US LNG



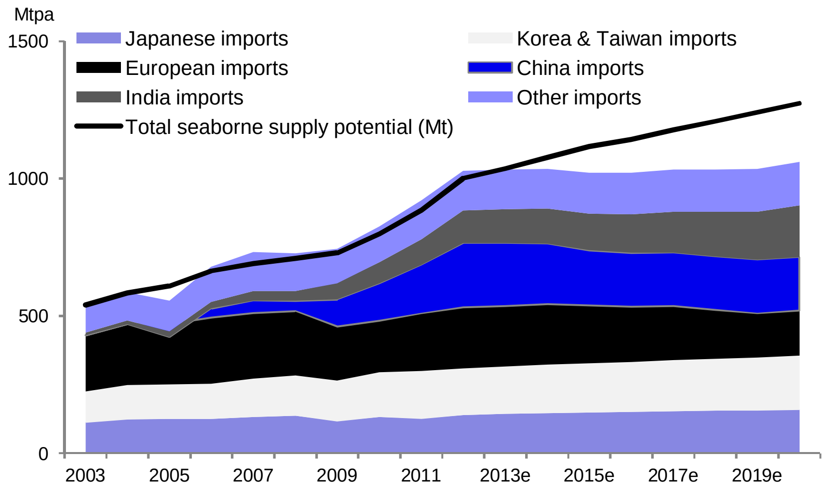
Source: Wood Mackenzie; Deutsche Bank

Global coal: likely to remain weak, China is key

Coal prices now back to cash costs

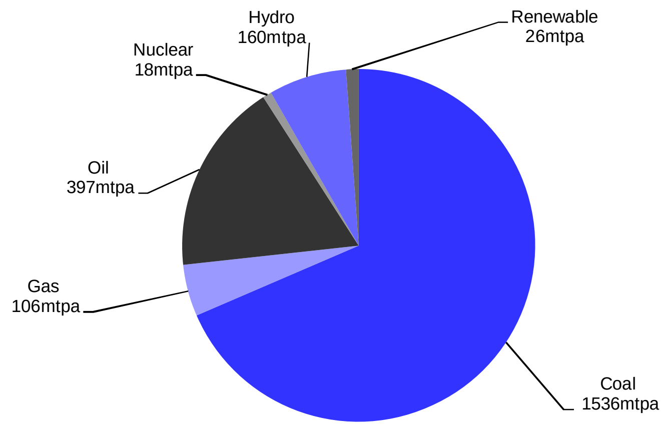


But seaborne supply> demand



China coal consumption growth based on pollution policy shift (Feb 2013)

Chinese coal use is 6x global LNG: 1% shift adds 15mtpa to LNG demand



Source: Deutsche Bank, Reuters

Maximising returns or minimising risk?

— If you believe in liberalised wholesale / retail markets, what would the optimum portfolio of generation / retail be?

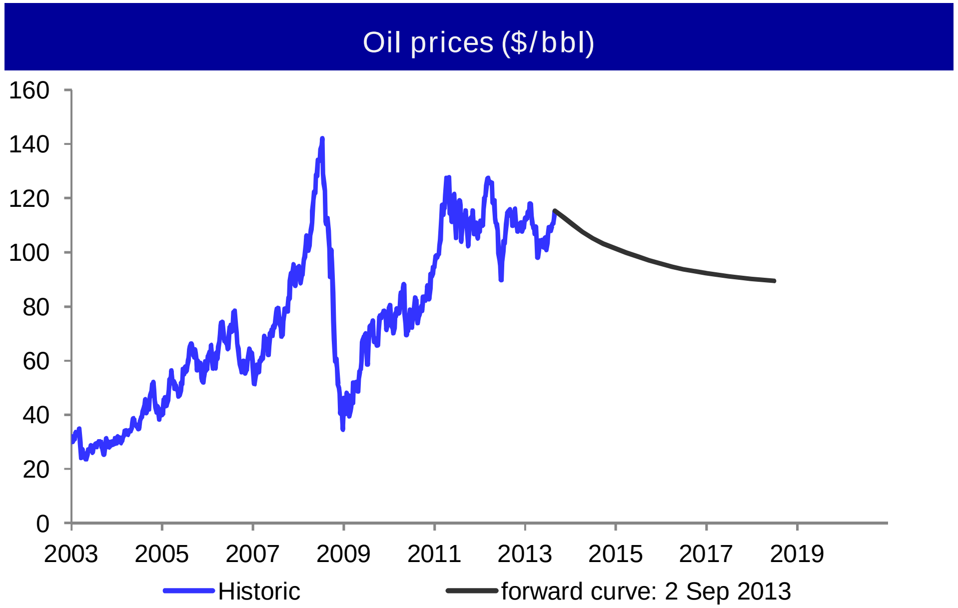
— Crystal ball gazing?

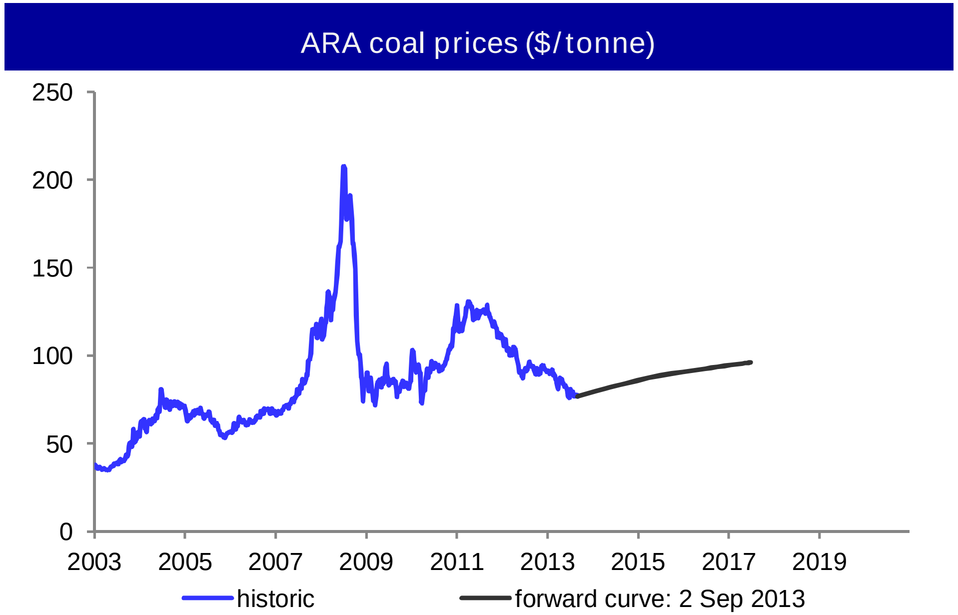
— Backtesting a future portfolio using historic data:

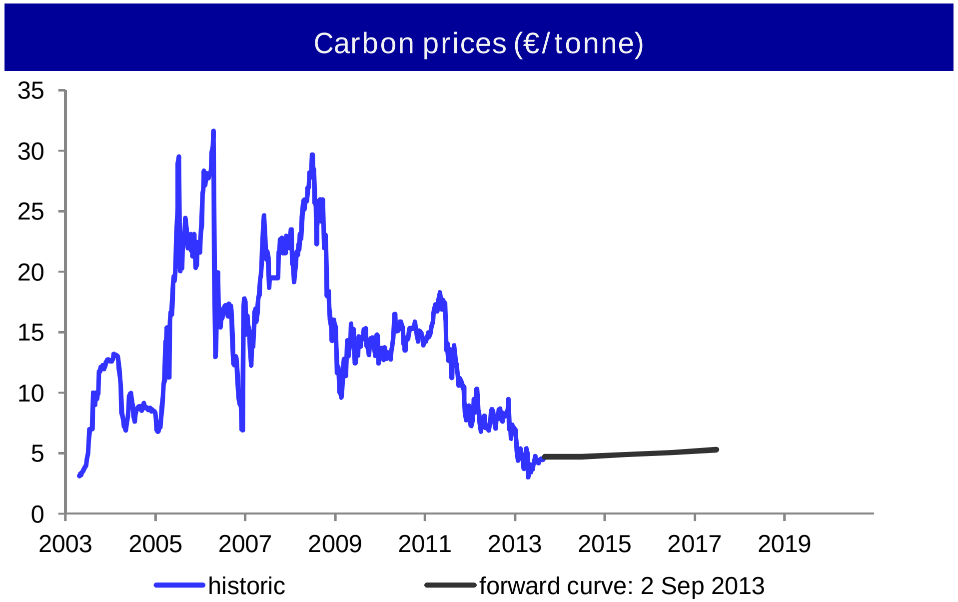
  — If energy prices are as volatile over the next 10 years as the last, which portfolio would maximise resilience?

— The optimum answer includes some fossil, some renewables, some retail

Backtesting: commodity prices



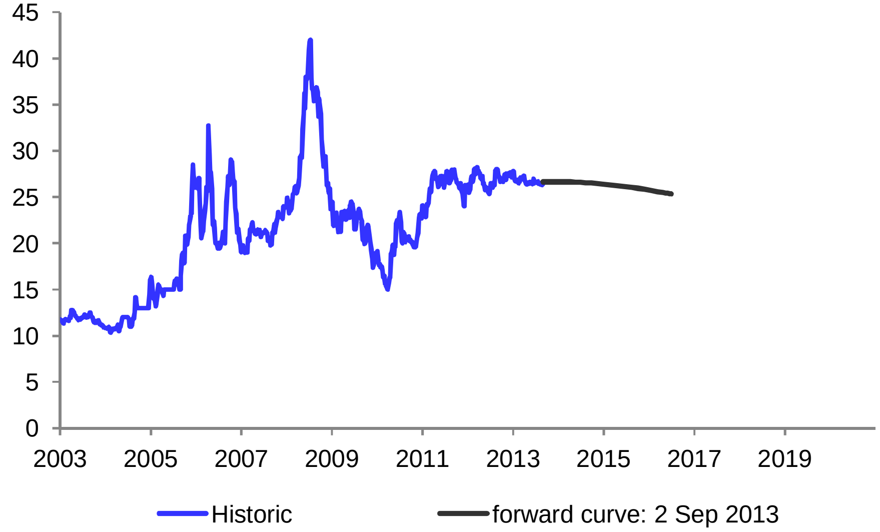




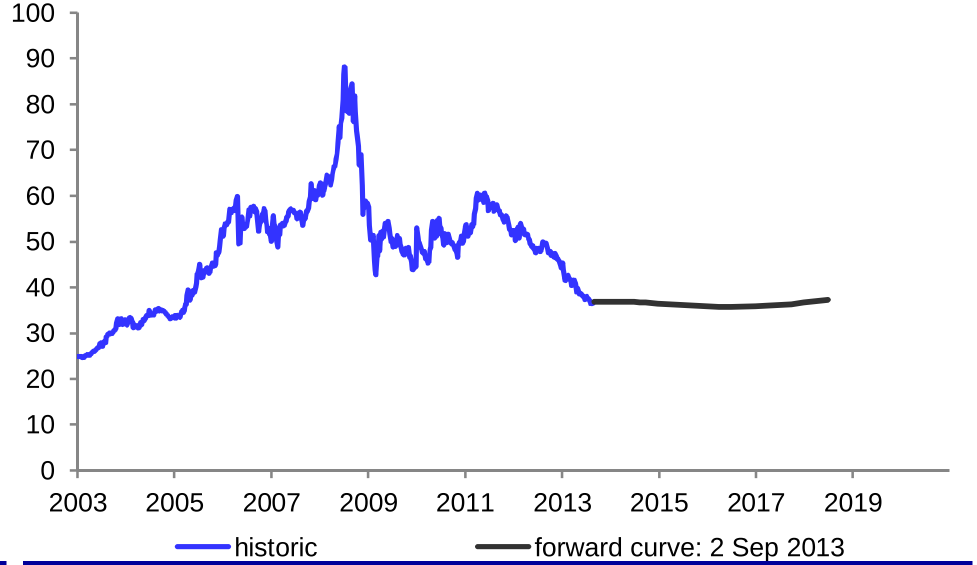
Source: Reuters, DB estimates

Backtesting: German market prices (1 yr forward)

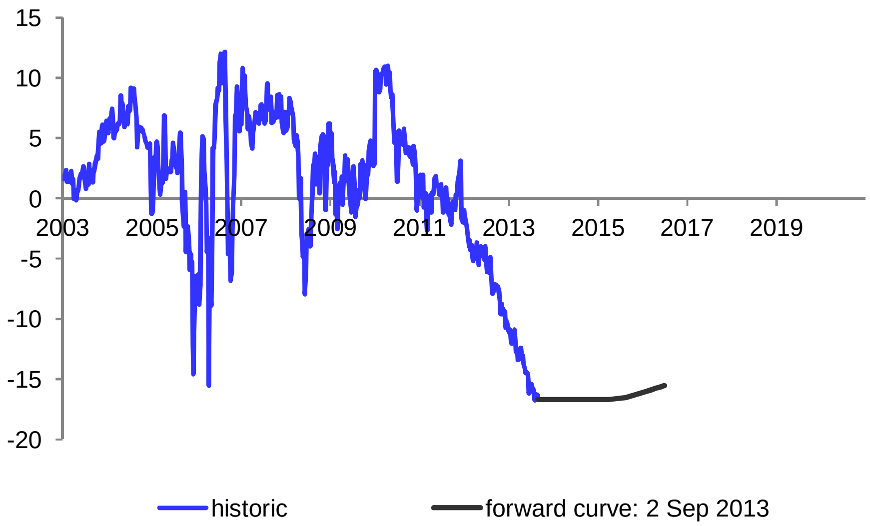
Gas price (€/MWh)



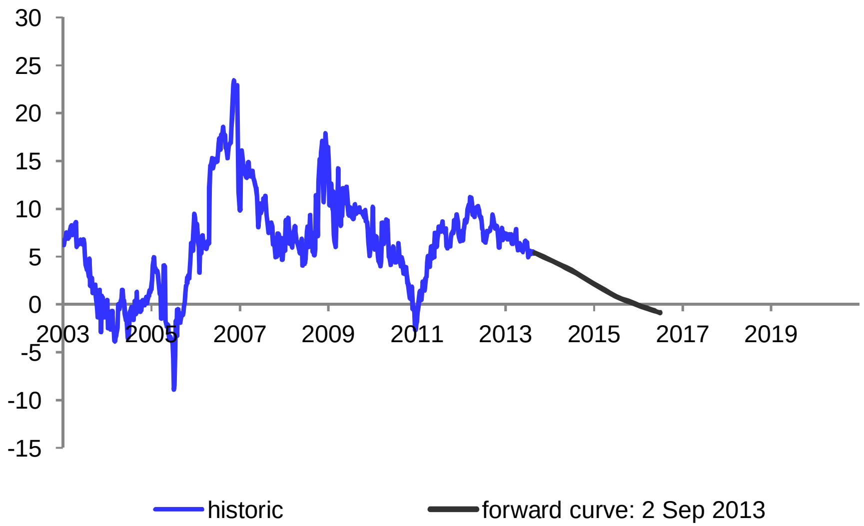
German baseload power (€/MWh)



German baseload clean spark spread (€/MWh)



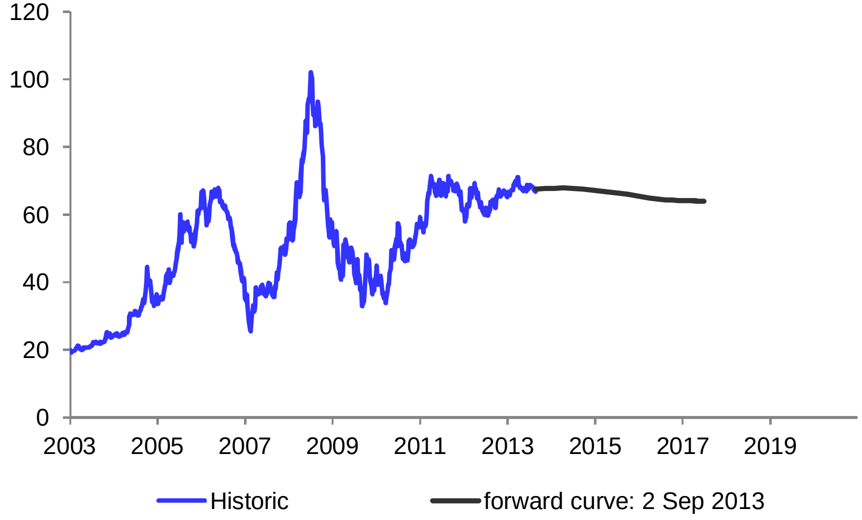
German baseload clean dark spread (€/MWh)



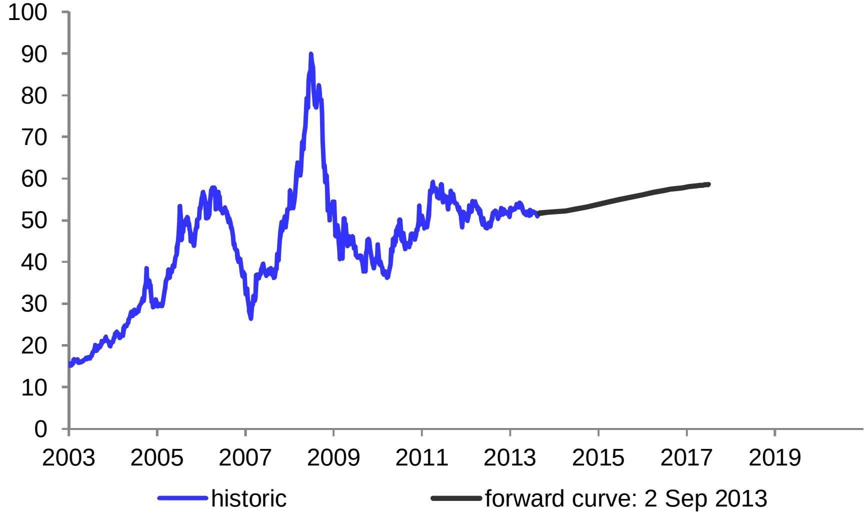
Source: Reuters, DB estimates

Backtesting: UK market prices (1 yr forward)

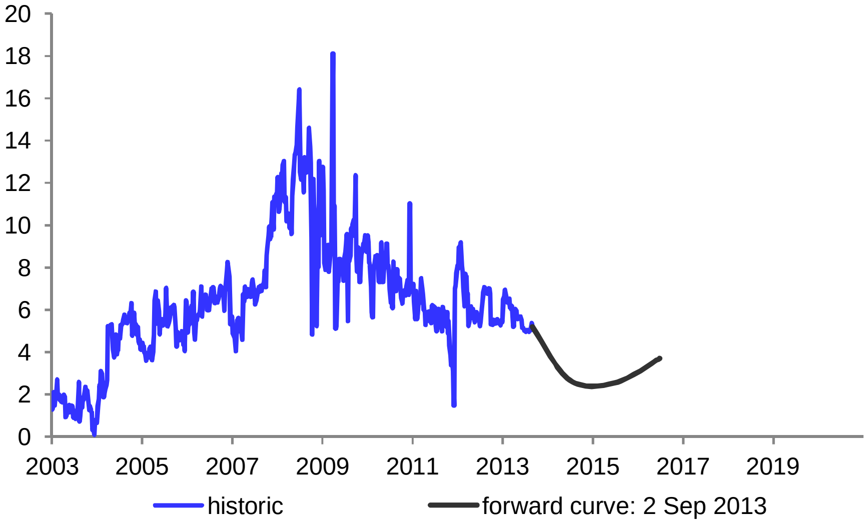
UK gas price (p/therm)



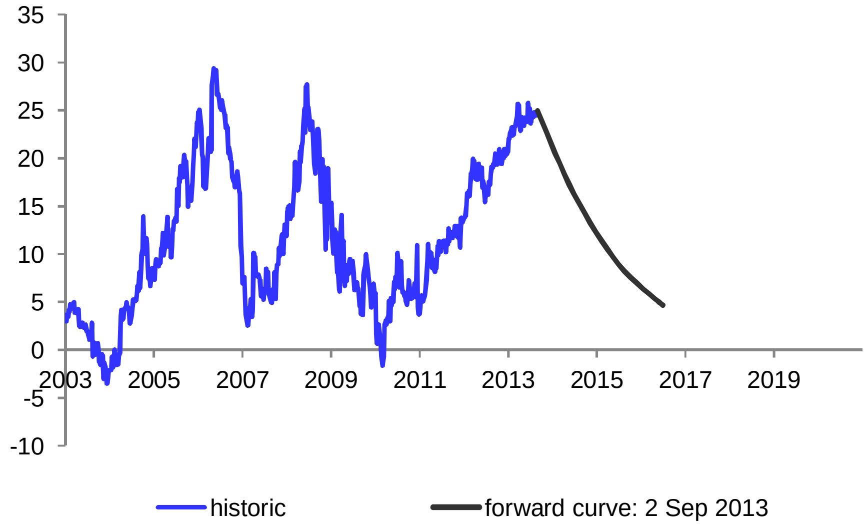
UK baseload power (£/MWh)



UK baseload clean spark spread (£/MWh)

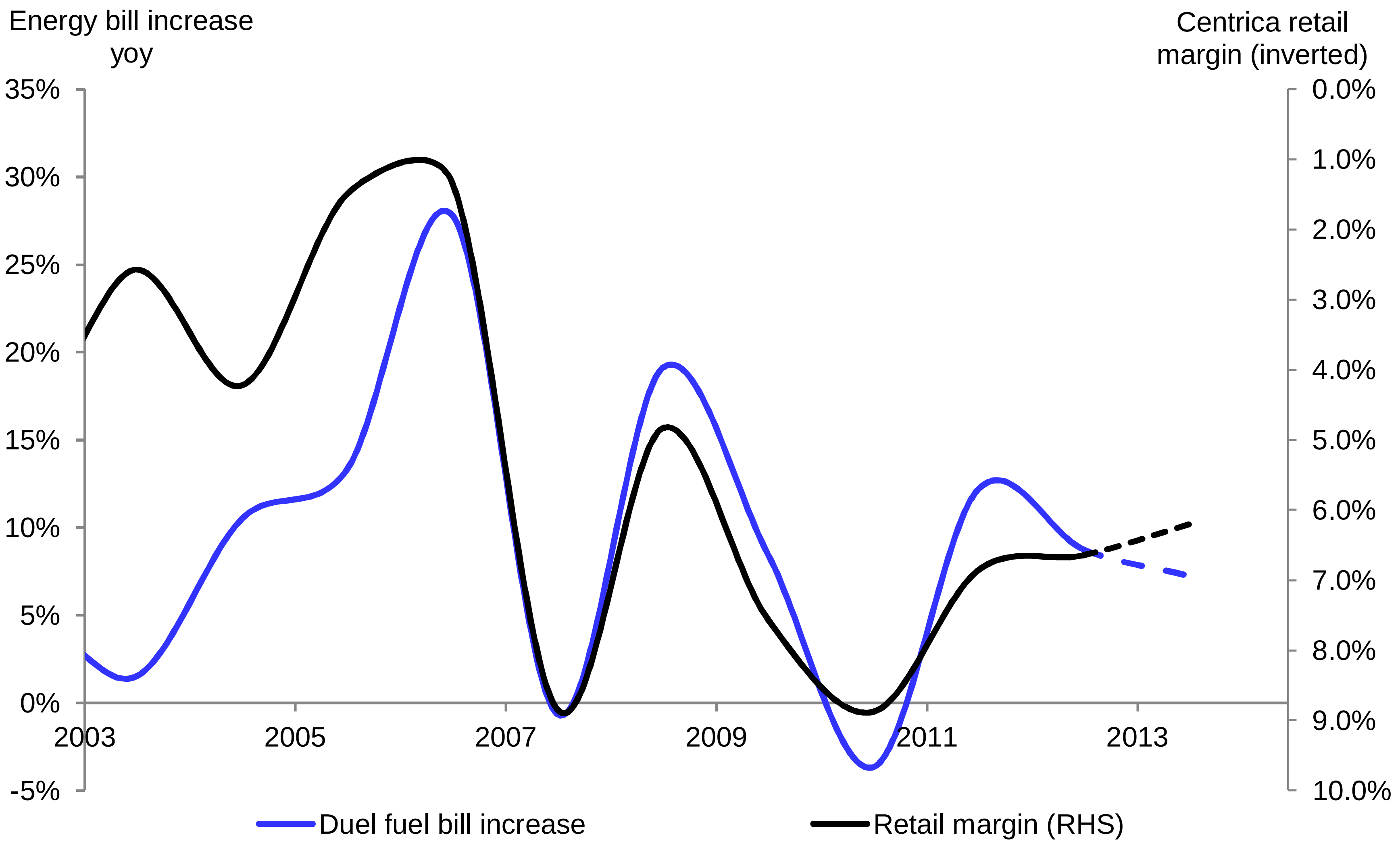


UK baseload clean dark spread (£/MWh)



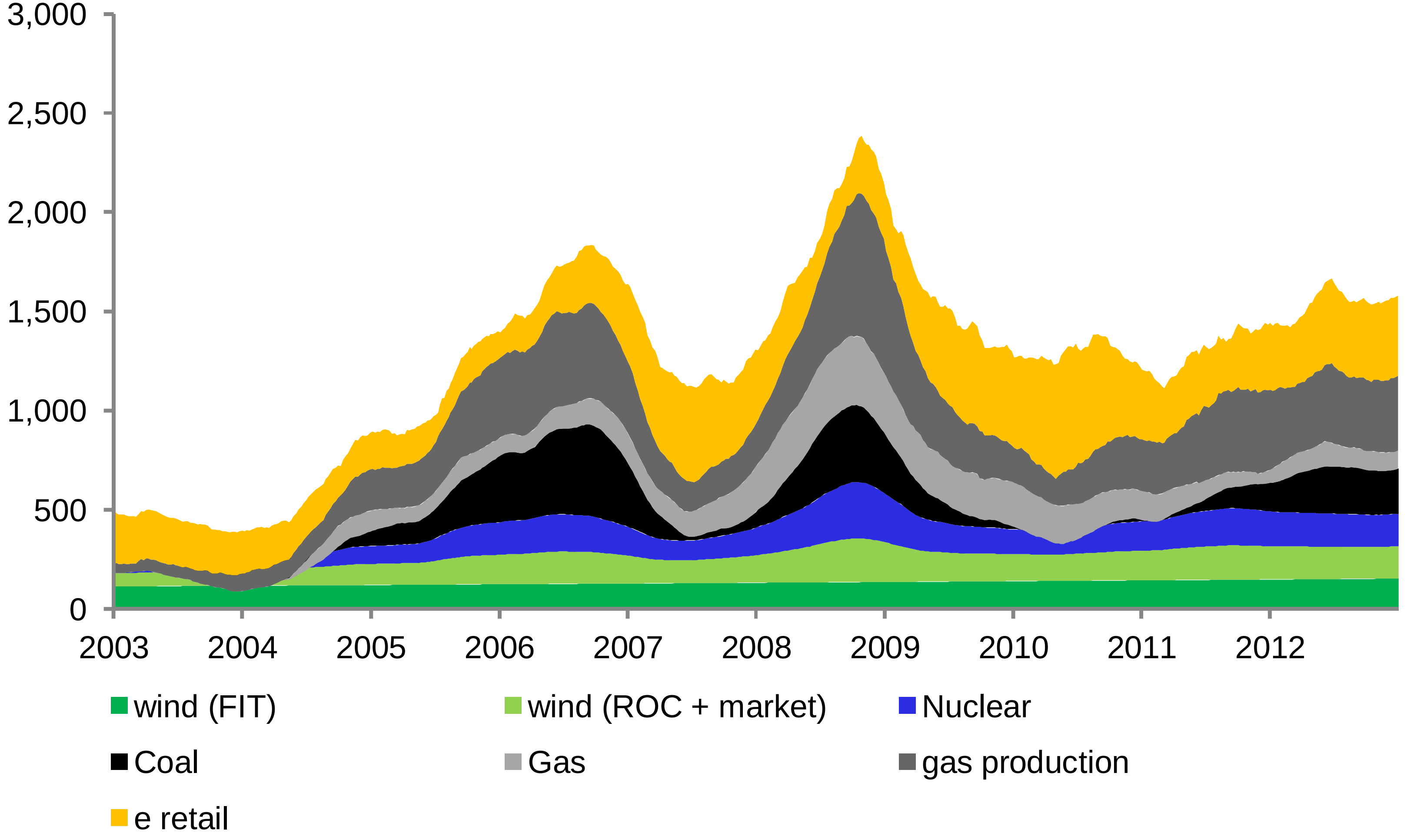
Source: Reuters, DB estimates

Downstream hedging?



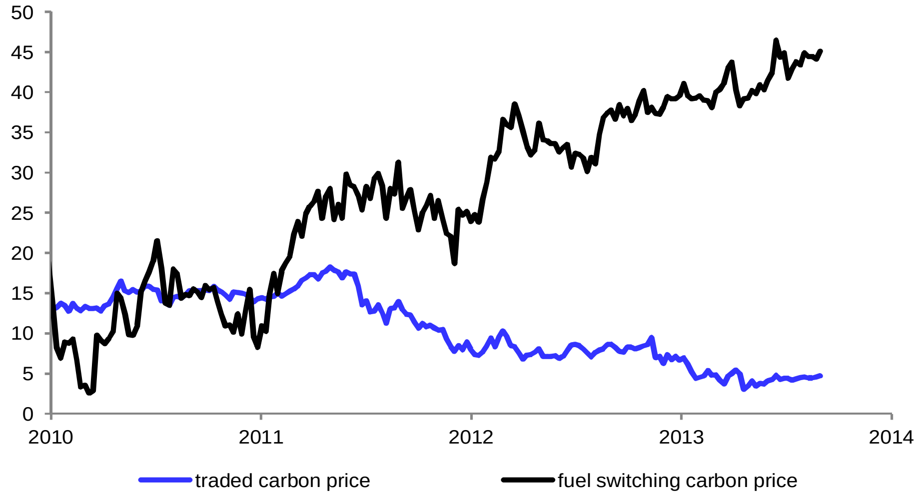
Example of a portfolio

Illustrative EBITDA produced by a hypothetical portfolio of generation and retail in the UK 2003-2012

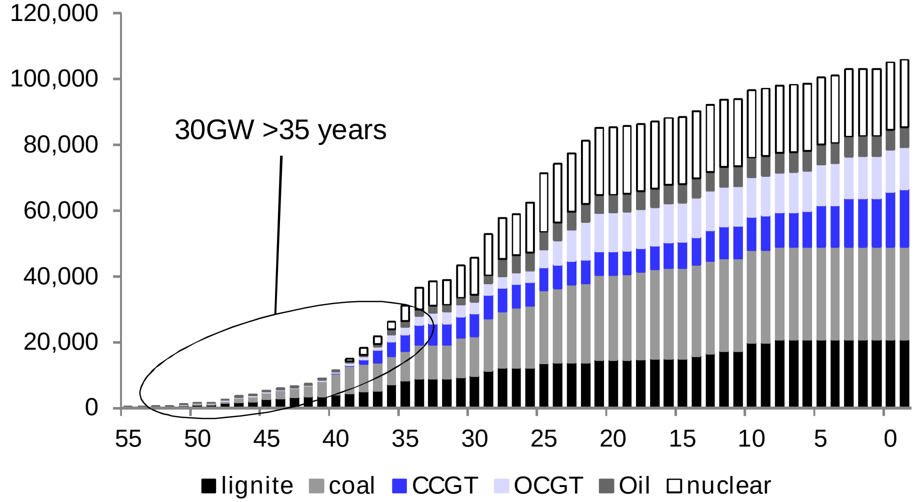


Are market prices for carbon and capacity unaffordable?

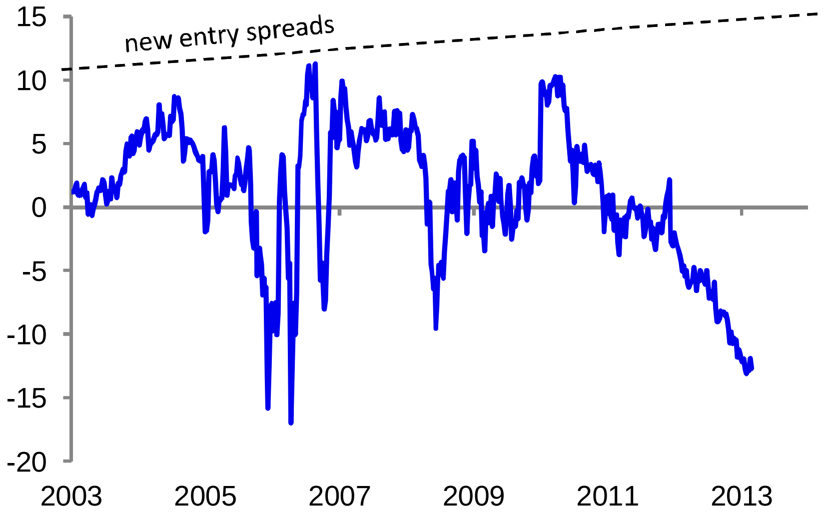
What would happen if structural reform succeeded?
Carbon prices vs switching cost (€/tonne)



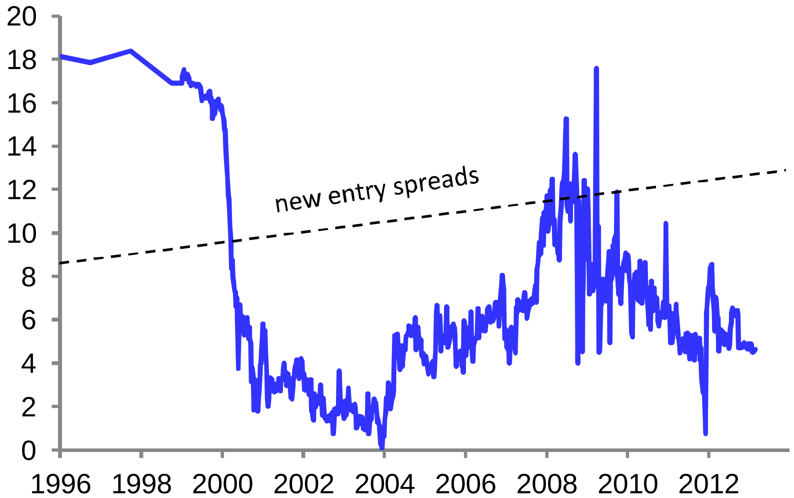
New German fossil capacity likely needed
German thermal capacity (MW) by age (years)



German spark spreads way below new entry costs (€/MWh)



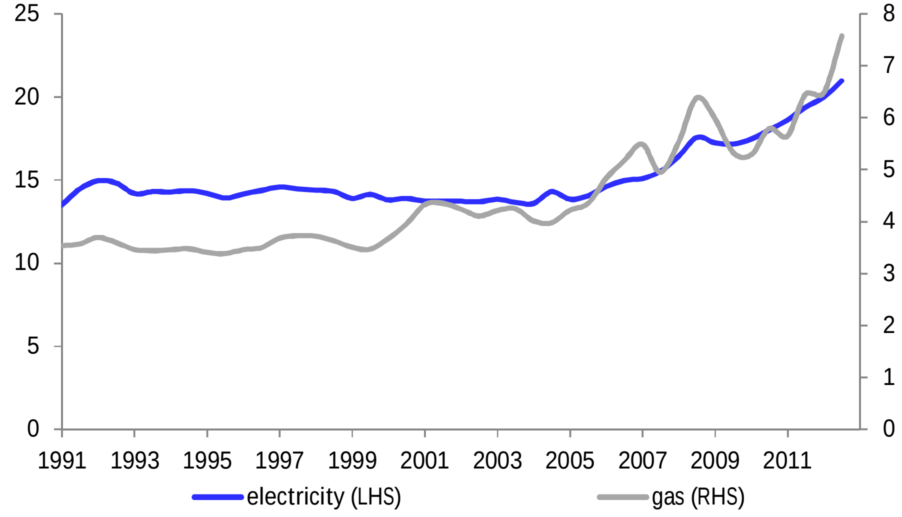
And UK spark spreads too (£/MWh)



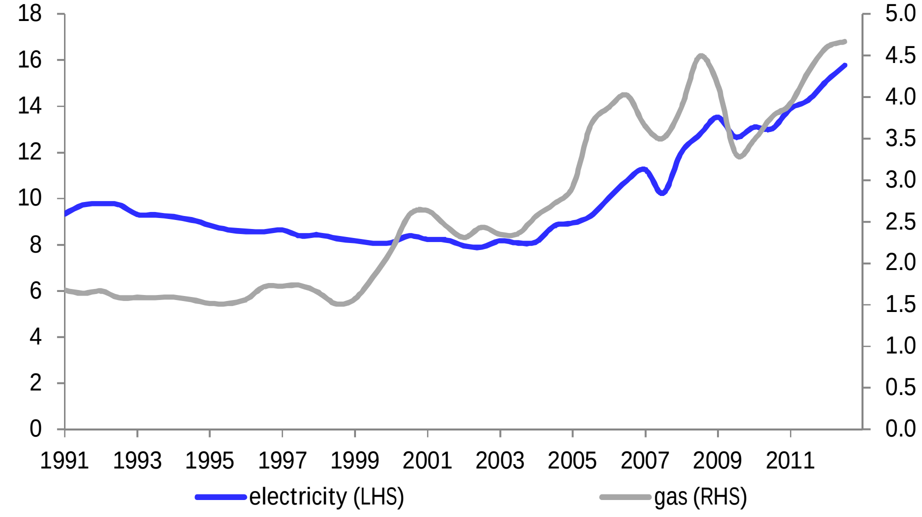
Source: Reuters, Deutsche Bank

Political disruption: European energy affordability

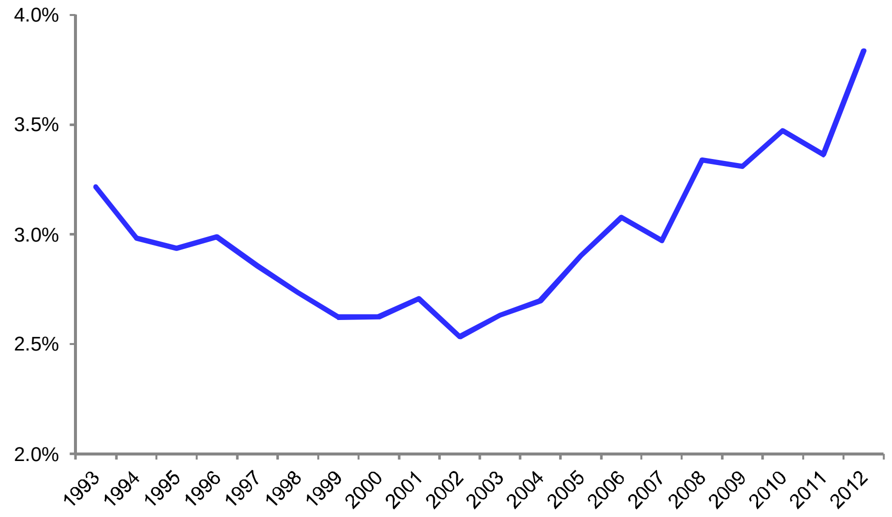
European residential energy prices are rising (€c/kWh)...



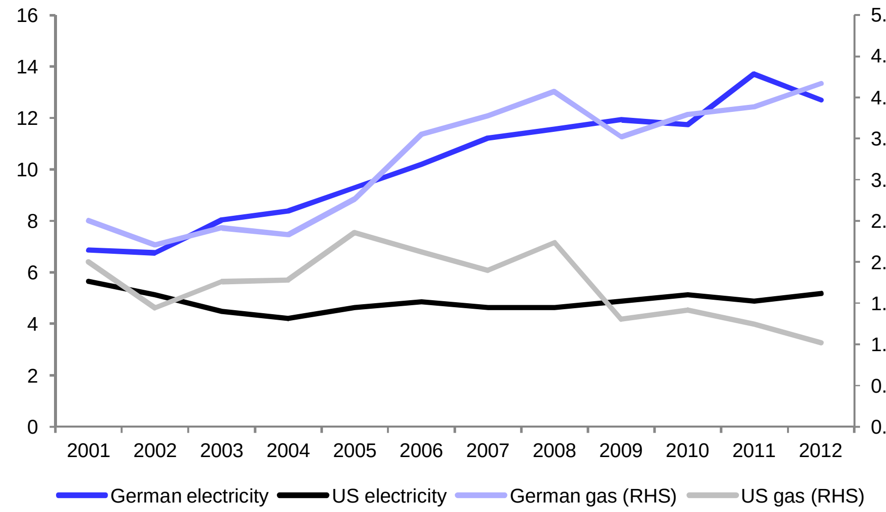
...and so are prices for industry (€c/kWh)



Households spending more of their disposable income on energy



European industry pays more for energy than the US (€c/kWh)

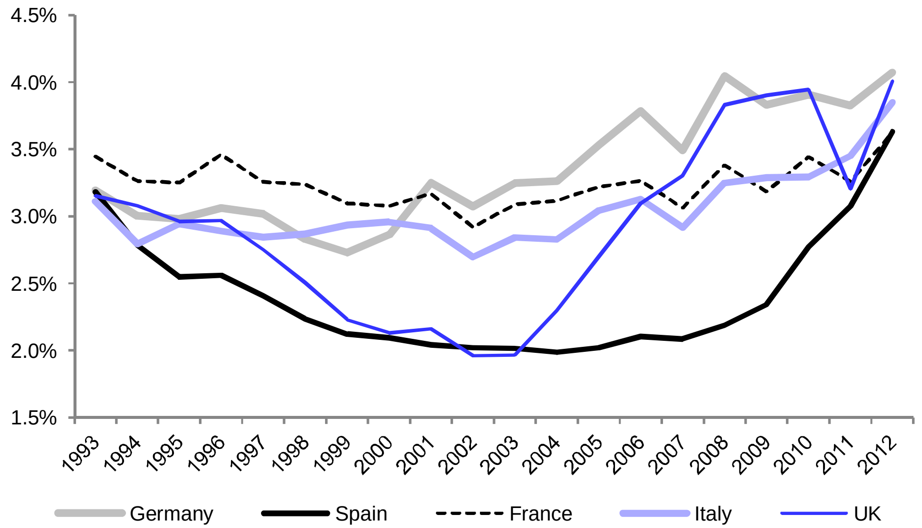


Source: Eurostat, EIA, Deutsche Bank

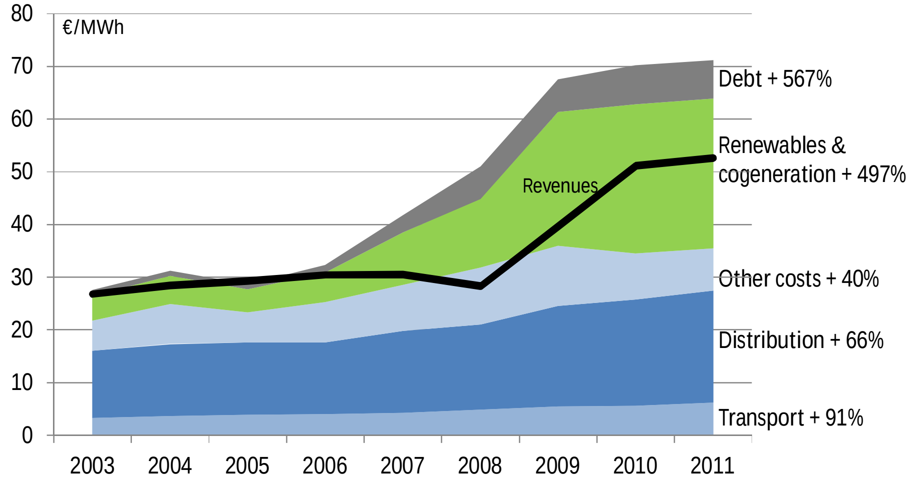
An affordability crunch hit Spain in 2013

Renewables and gas caused Spanish energy costs to surge

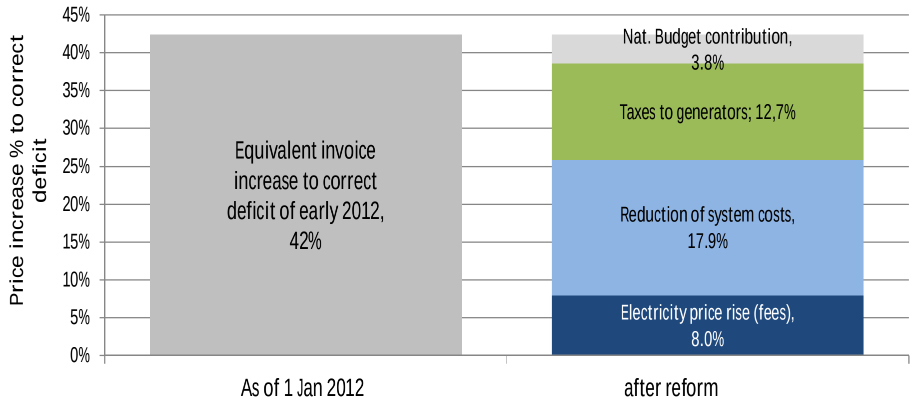
Household spending on energy (share of disposable income)



Bills did not increase enough to cover costs



Power reform impact on the deficit



Govt rewrites the rules to cut returns

— Not willing to push power prices up further to cover deficit

— Fundamental reform of sector pricing

— Cut to feed-in tariffs

— Cut to network returns

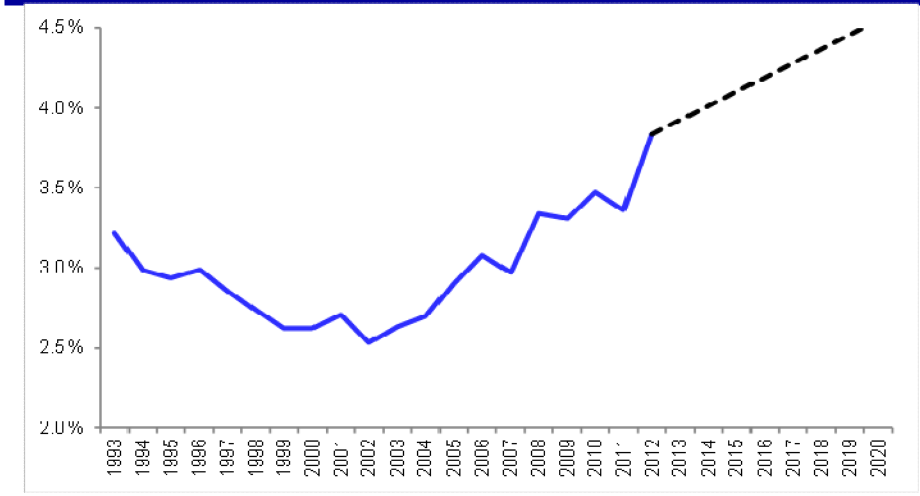
— Cut to capacity payments for conventional stations

— Lower EPS for Spanish power companies

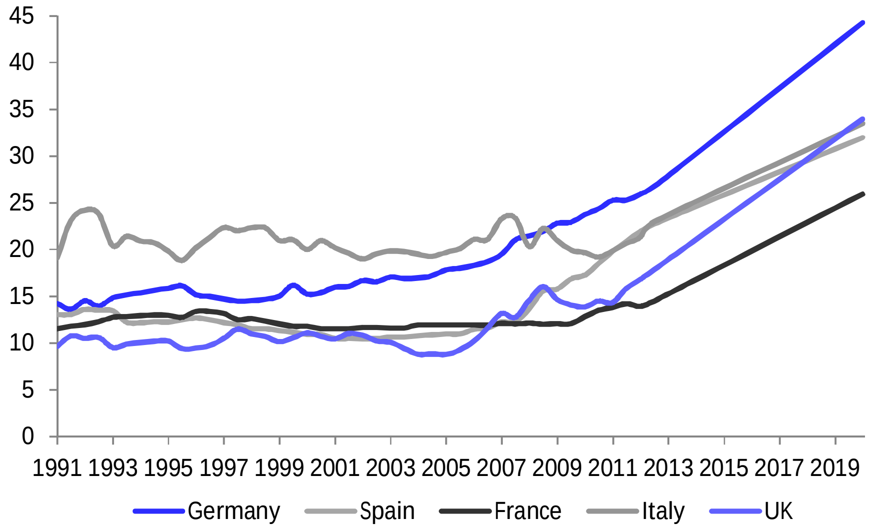
Source: Eurostat, EIA, Deutsche Bank, company data

The affordability problem looks set to get worse

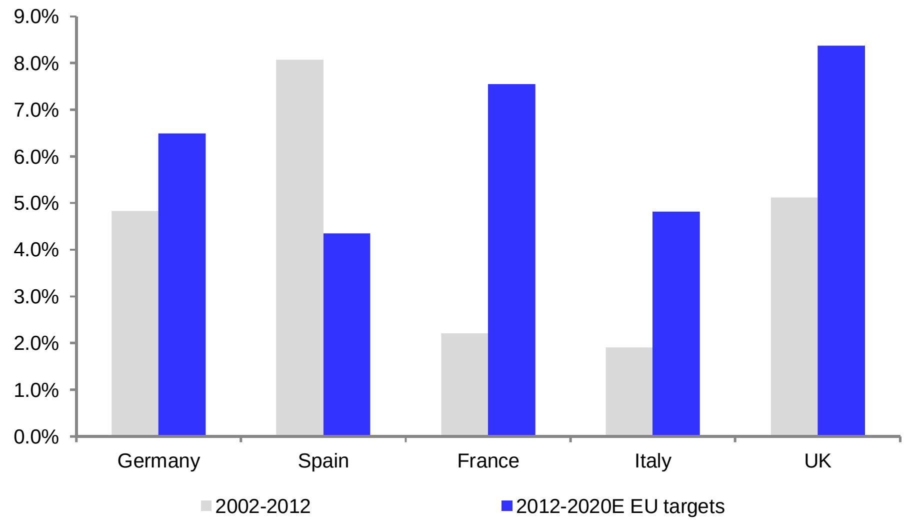
Disposable income spent on household energy if hit EU 2020 targets and allow power market noramilsation



Household electricity price by country (€c/kWh)



Annual household price increases needed to hit 2020 targets



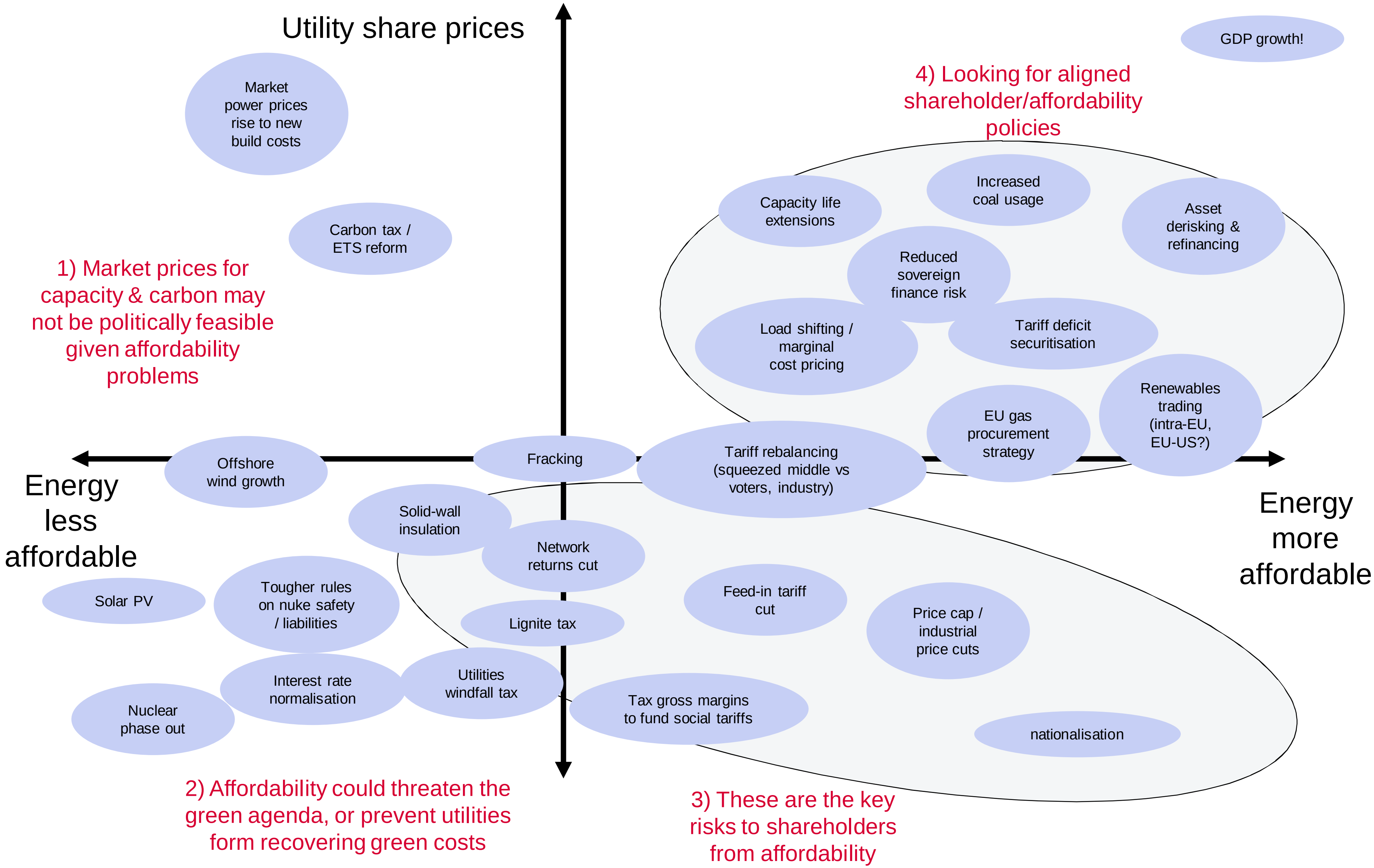
Key drivers based on stated policies

- EU renewables target
- $90/bbl real oil, gas relinking to oil
- Structural carbon market reform and some coal to gas switching
- New capacity needed, driving prices to new build costs
- Nuclear policies including German phase out, French refurbishment capex

Affordability pushback likely

Source: Eurostat, Deutsche Bank

Policy risks and opportunities



Source: Deutsche Bank

Looking for a win-win

— We look for policy measures that could help with affordability, would be consistent with positive shareholder returns and would not preclude moving towards a lower-carbon energy system

Asset derisking & refinancing

— credible guarantees on return & amortisation of sunk investments may allow them to be refinanced at close to the govt cost of debt, with benefits potentially shared between companies and customers. Frees up capital for more investment.

Renewables trading

— Market mechanism to build renewables (wind solar etc) where it is cheapest. Eg onshore wind in Ireland, solar in S Europe. Possible LT trading between US & EU (eg US onshore wind more expensive than shale gas generation but cheaper than European renewables)

Load-shifting and marginal cost pricing

— Smart meters allow peak load to be shifted, increasing load factors for required capacity, helping with balancing of intermittent generation.

Capacity life extensions

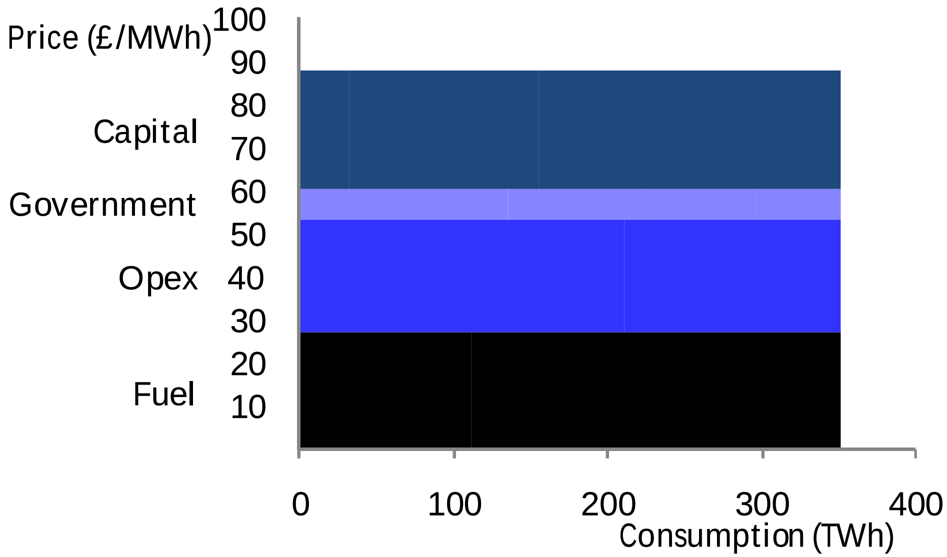
— Cheaper to pay old fossil stations to stay open as back up than build new peaking capacity to cover intermittent renewables.

EU gas procurement strategy

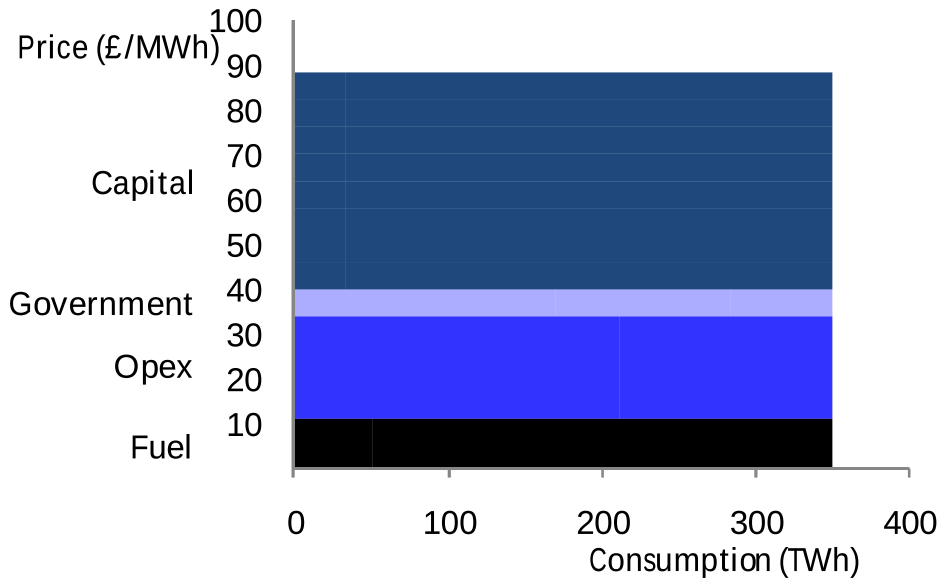
— Could an EU strategy help avoid the risk of a European gas procurement crunch?

Getting more capital from fixed bills

UK electricity sector revenues 2008



Illustrative low carbon revenues



£25/MWh x 350 TWh = £9bn pa for capital

£9bn @ 7% WACC + 8% depreciation funds £60bn capital

£50/MWh x 350 TWh = £18bn pa for capital

£18bn @ 1% WACC + 4% depreciation funds £360bn capital

Source: UK DUKES, Deutsche Bank

Local finance – ‘the right to buy’

— Co-operative efforts to buy local utilities

— Direct finance of solar in Germany

— Not all customers are credit-constrained borrowers

— Disconnect between returns on savings and utility finance costs

— Opportunities to tap customer finance

— Benefits from local participation or threat from management disruption

— Sidestepping utilities in finance, asset creation, strategy

— Utilities need to remain relevant to policy makers

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