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# A UK dash for 'smart' gas

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- Energy security
- Affordability: Gas prices
- Environment: local impacts and GHG emissions
- Conclusions



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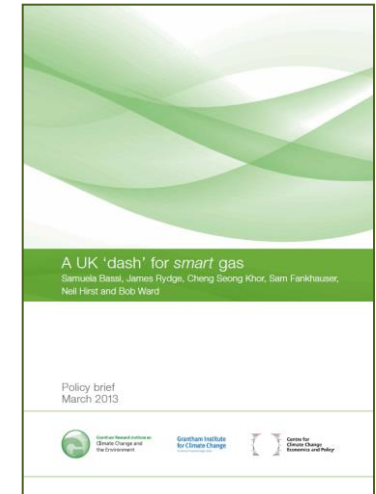


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# Paper overview

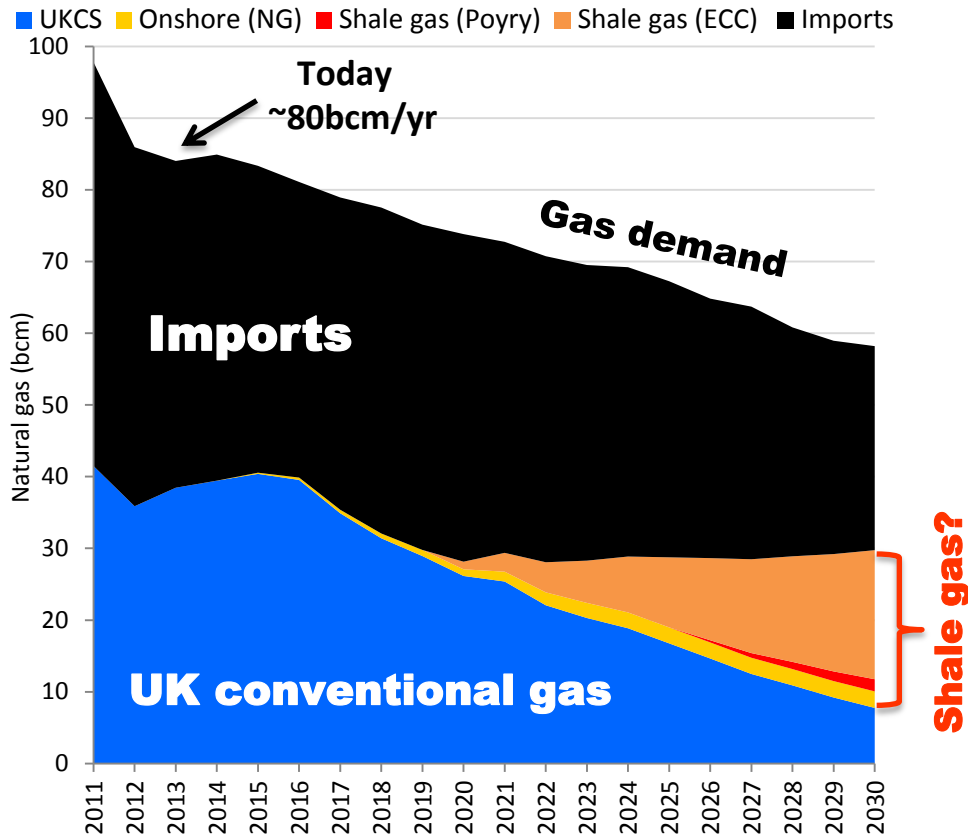
## Abridged version of GRI policy paper: A UK 'dash' for *smart* gas

- **Focus: What role for conventional/unconventional natural gas in the UK electricity sector?**
- **Approach: literature review – impacts on:**
  - 1) **energy security**
  - 2) **affordability (prices)**
  - 3) **the environment**





# (1) Energy security



Source: Based on National Grid (2012) Gone Green Scenario,  
Pöyry (2011) and ECC (2012)

- Domestic conventional gas resources depleting
- UK net importer of gas since 2004 (>40% in 2011)
- **Domestic shale gas** can reduce the need for foreign gas

But:

- Even highest (available) estimates suggest shale gas **at best replacing depleting conventional reserves** → imports likely to remain at current levels



# How much shale gas?

Shale gas is not a game changer

The Telegraph, 10 Dec 2012

150 bcm

200 tcf

Britain has shale gas for 1,500 years, but  
bills won't be lower

The Times, 9 Feb 2013

1,300-1,700 tcf

No shale gas potential in Weald basin,  
concludes British Geological Survey  
The Guardian, 23 May 2014

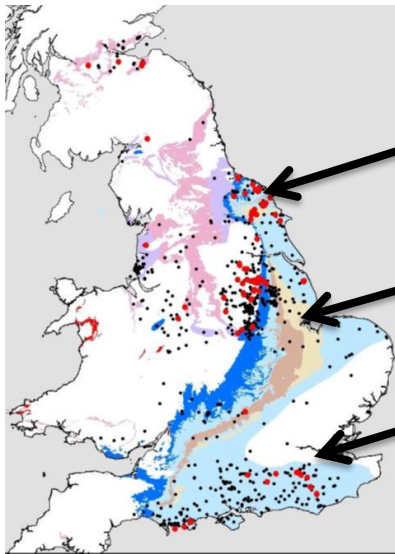
Shale gas firm finds 'vast' gas resources in  
Lancashire  
BBC, 21 Sept 2011



- **Different units:** cubic meters, cubic feet (1bcm = 35bcf)
- **Different indicators:** gas in place, technically recoverable resources (TRR), proven reserves



# Estimated shale gas potential in the UK



	<i>Estimate (bcm)</i>	EIA	Cuadrilla	BGS/DECC
Midland Valley	Gas in place	n/a	n/a	2,270
	TRR	n/a	n/a	n/a
Bowland Shale	Gas in place	2,690	5,660	37,600*
	TRR	540	900-1,200**	80-200
Weald Basin	Gas in place	60	n/a	0
	TRR	30	n/a	0
Total UK	Gas in place	2,750	5,660	39,870
	TRR	570	900-1,200	n/a

Source: DECC (2011)

\* Central estimate (Andrews, 2013)

\*\* Based on Cuadrilla's assumption that 15 -20% of gas in place could be extracted (ECC, 2012).

**TRR:** ~ 10-15% of gas in place (Cuadrilla)

**Proven reserves :** not assessed yet. ~14-18% of TRR (IPCC); 10% of TRR (US)

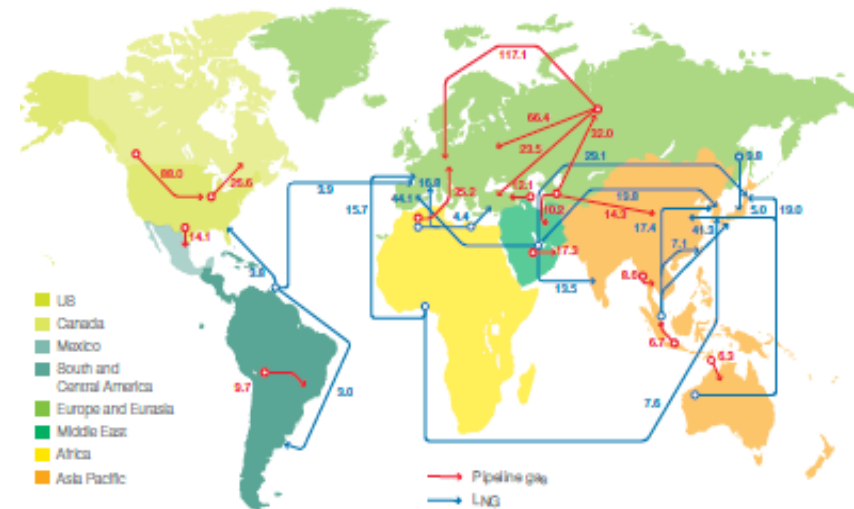
- UK yearly gas demand: 80 bcm
- Proven reserves (Cuadrilla) for max ~ 2-3 years? More?



## (2) Affordability: Gas prices

Future gas prices **are uncertain**

- **Natural gas is a regional market:** prices are set at regional not global level
- **Large uncertainties about effect of global shale gas production on prices**
- **UK shale gas reserves too small to affect domestic gas prices** (influenced by EU prices)
- **IEA does not expect EU gas import prices to decrease** (70-80p/therm in 2035; in 2012 they were ~70p/therm)



Source: BP (2012)



## (3) Environmental impacts

### Local impacts (shale gas):

- Water pollution;
- Earthquakes;
- Traffic and noise etc.

**Limited. Can be mitigated, but need adequate technology and regulation**

### → Issues of social acceptability:

- Higher population density compared to US;
- No royalties to land owners – unlike the US;
- Landscape/visual impacts;

**Careful planning needed, not all areas exploitable**

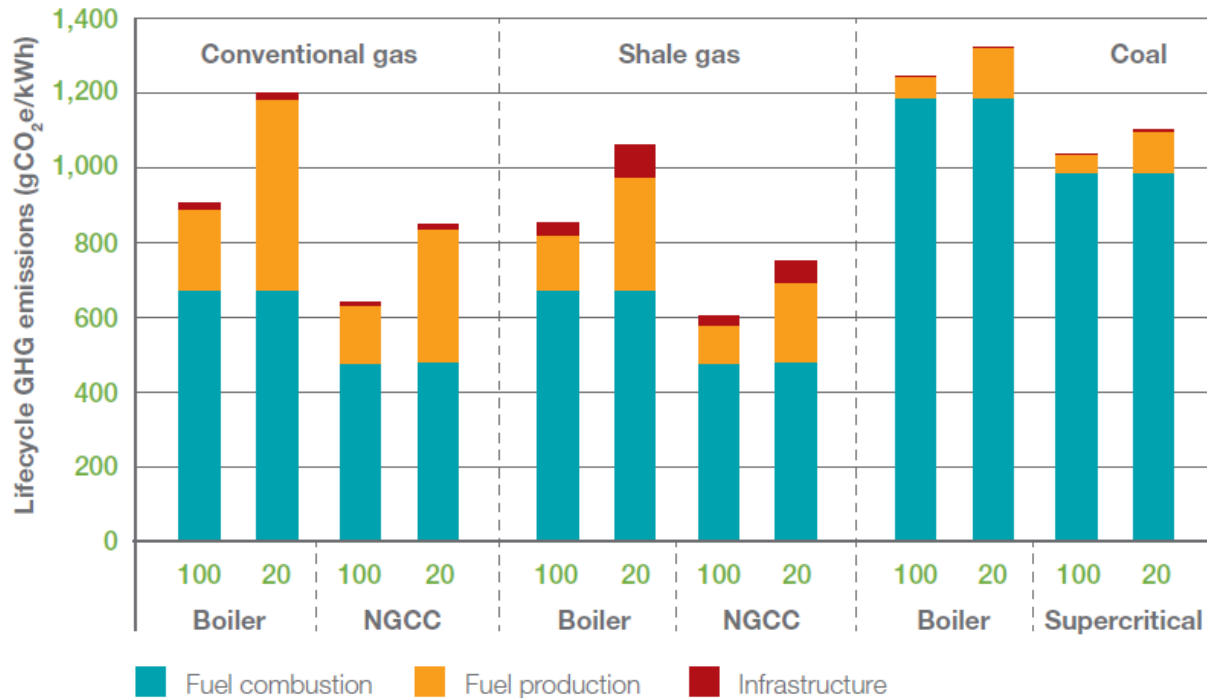




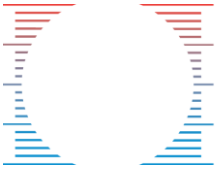


# GHG: fugitive emissions from shale gas

- Conventional and unconventional gas **lifecycle emissions are of similar magnitude (if managed well)**

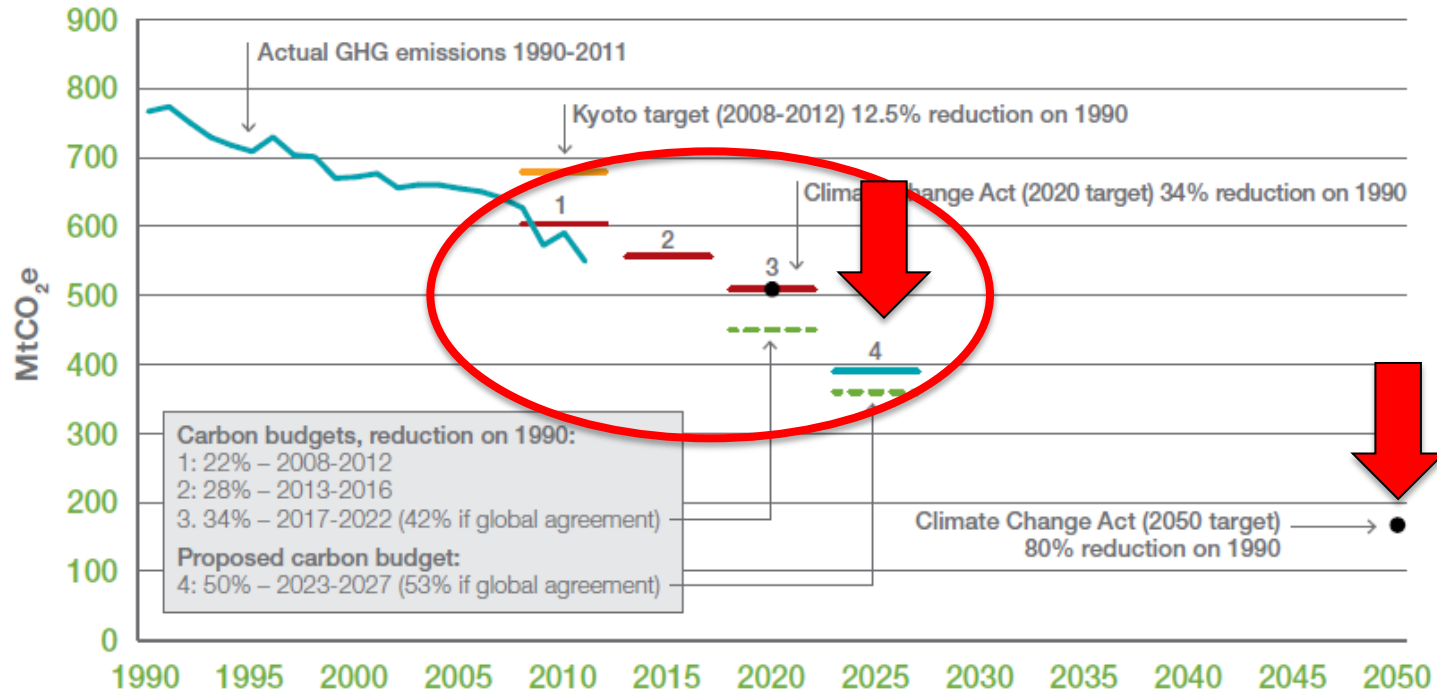


Note: NGCC = Natural Gas Combined Cycle  
Source: Bassi et al (2013)



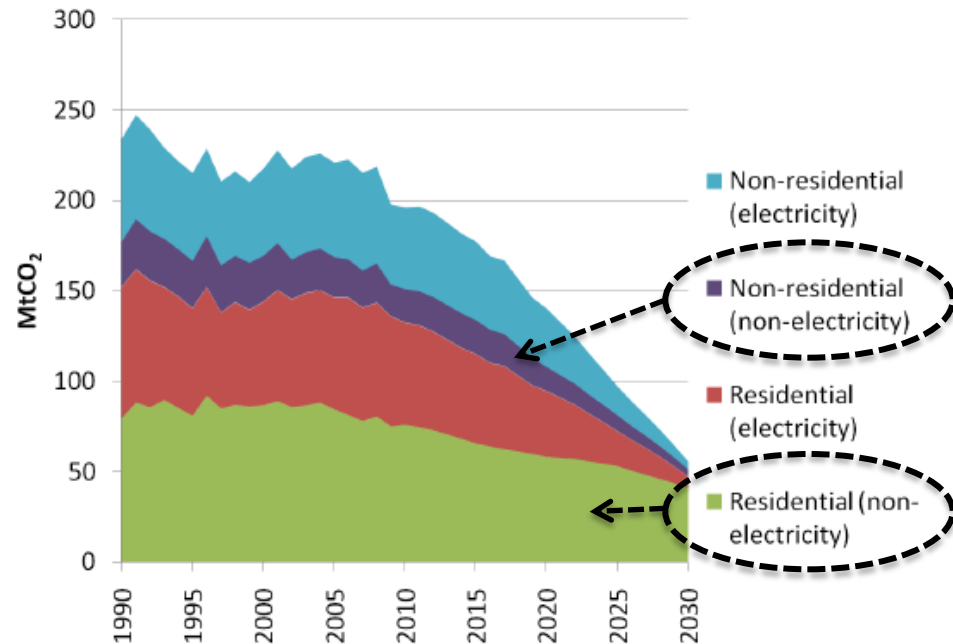
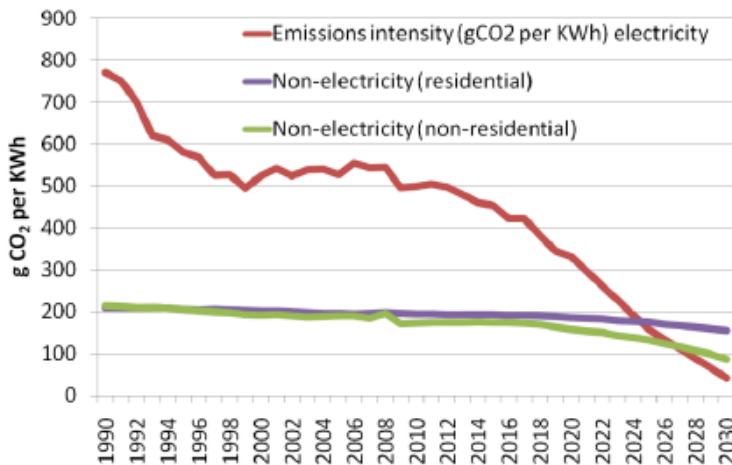
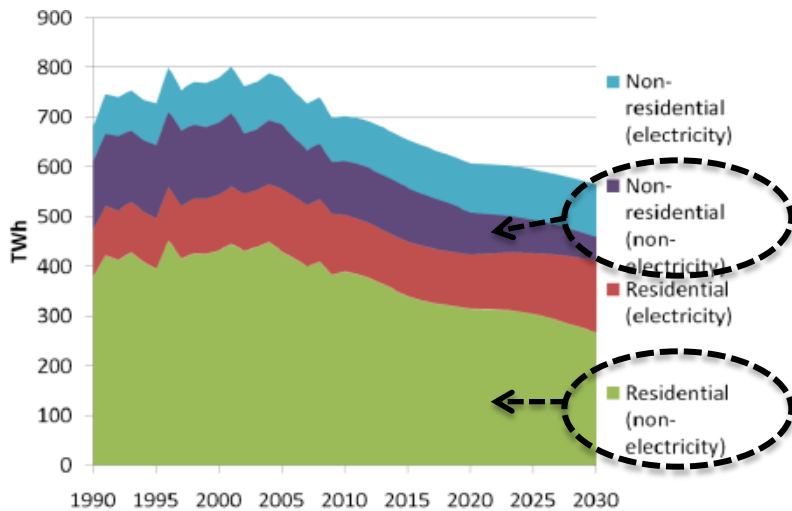
# GHG: The UK climate change targets

- Gas power plants → half the emissions from coal power plants.
- ...but:
- 2008 Climate Change Act: statutory **80% GHG reduction by 2050** (vs 1990)
- 4rth Carbon Budget: **50% GHG reduction by 2025**





# Long run: gas remains significant for heating



- Lower demand (energy efficiency) & slow ramp up of RES
- But gas still significant in **residential sector**



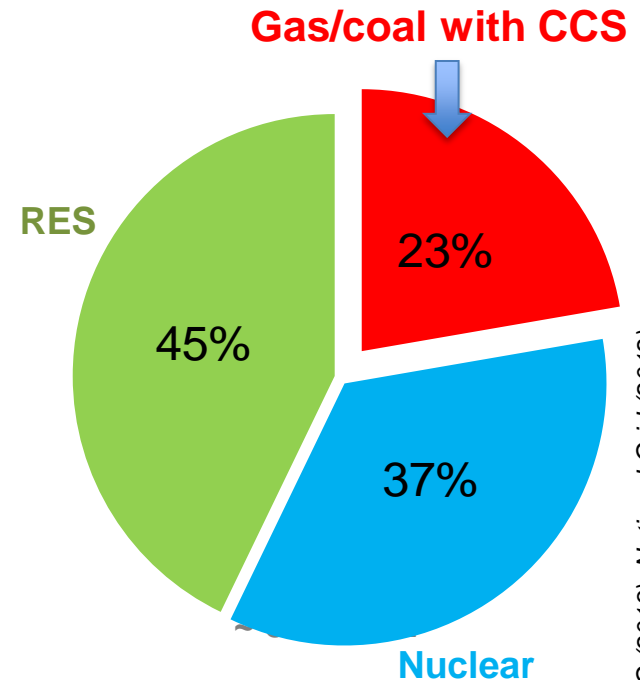
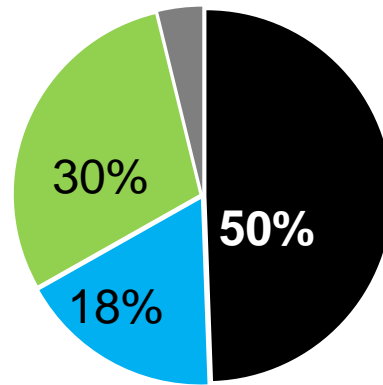
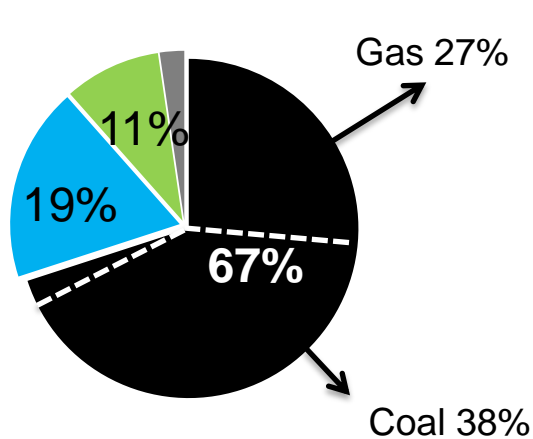
# Long run: Power sector decarbonisation

**2012:** ~4.2% energy from RES

**2020:** 15% energy from RES (EU target)

**2050:** full decarbonisation?

Electricity:



Total supply: ~ 375 TWh

~ 330 TWh

■ Unabated fossil fuels

■ CCS

■ Nuclear

■ RES

■ Imports



## Key findings

- **Scope for gas is in the short term**, as it replaces coal and provides flexibility
- **Shale gas** can help meet demand, but **reserves may be limited**
- Shale gas should be developed **within environmental and social constraints** to minimise impacts and public opposition
- UK shale gas is **unlikely to affect gas prices**.
- In the long term **the power sector needs to be further decarbonised to meet climate change mandatory targets**.
- No single winner → need a **coherent portfolio of energy policies**, including energy efficiency, RES, nuclear, and flexibility measures (e.g. demand management) + **CCS if gas is to remain a player**



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# Thank you

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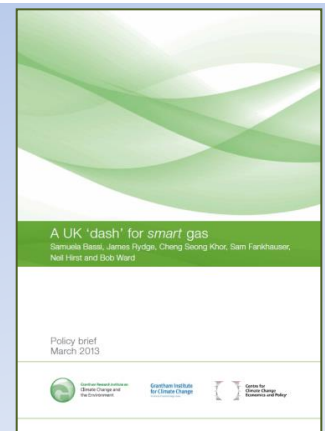
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## A UK 'dash' for *smart* gas

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