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A UK dash for 'smart' gas

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Content

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

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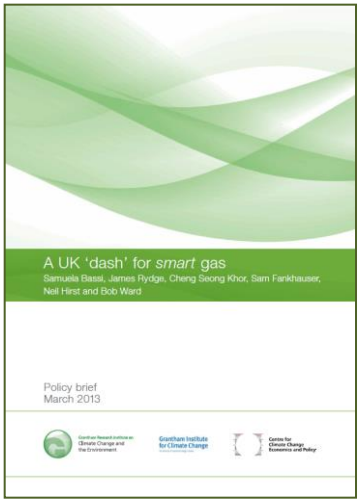
Paper overview

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**



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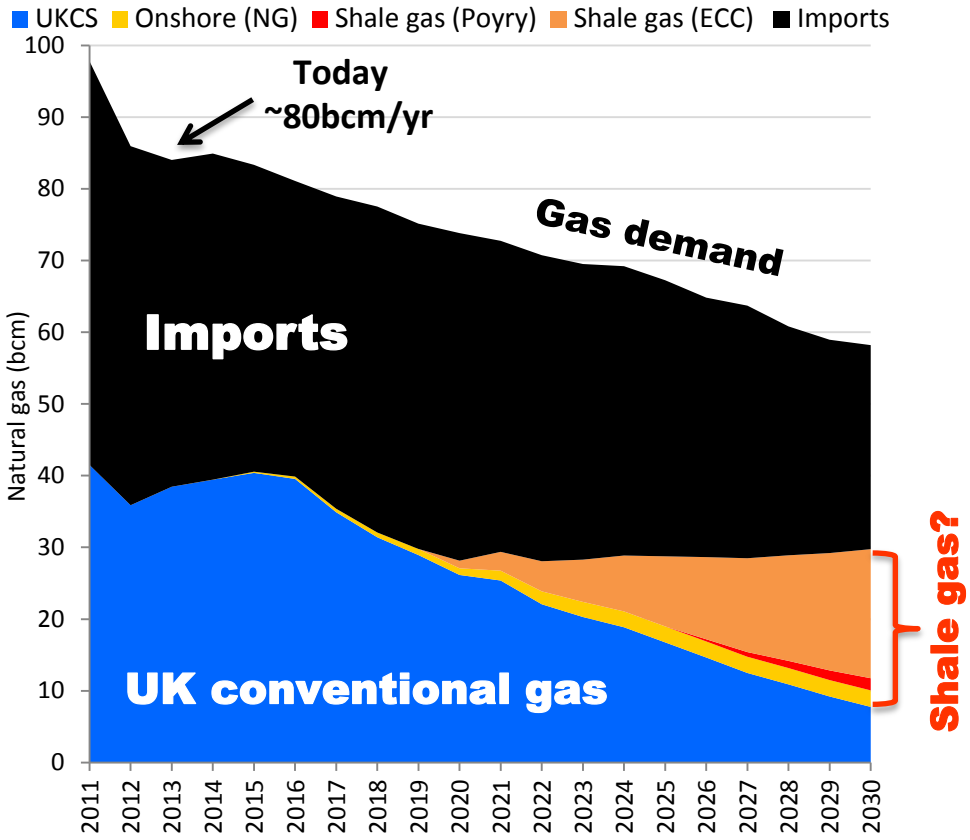
(1) Energy security



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

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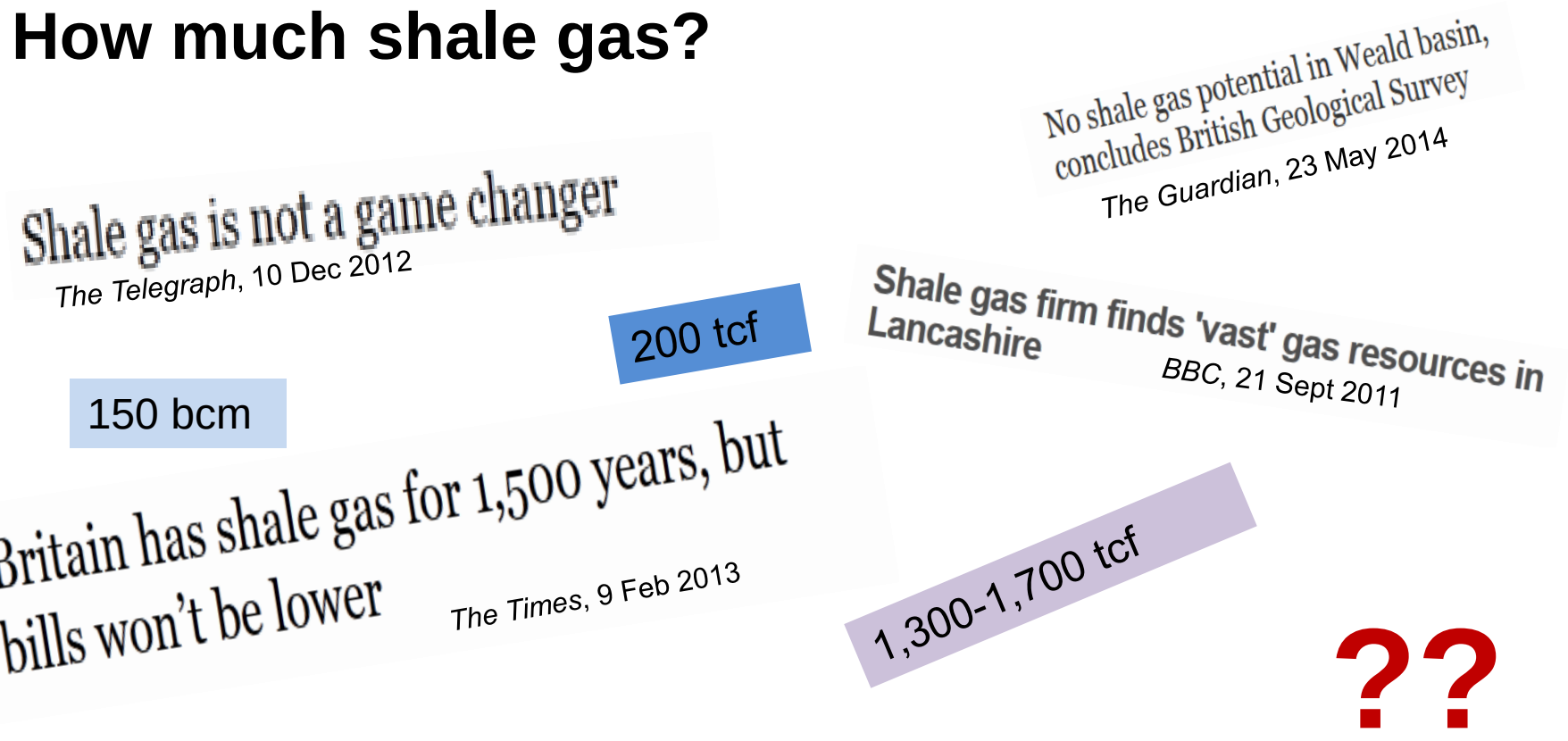
How much shale gas?



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

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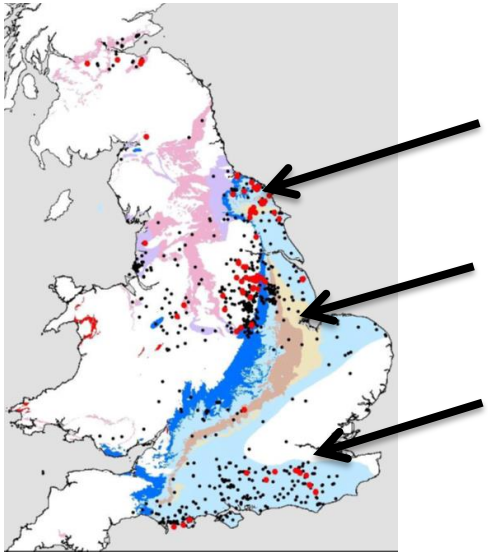
Estimated shale gas potential in the UK



Source: DECC (2011)

	Estimate (bcm)	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

* 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?

Sources: EIA (2011), Cuadrilla (2011), BGS/DECC: gas in place from Andrews (2013, 2014) and Monaghan (2014); TRR from DECC (2012e)

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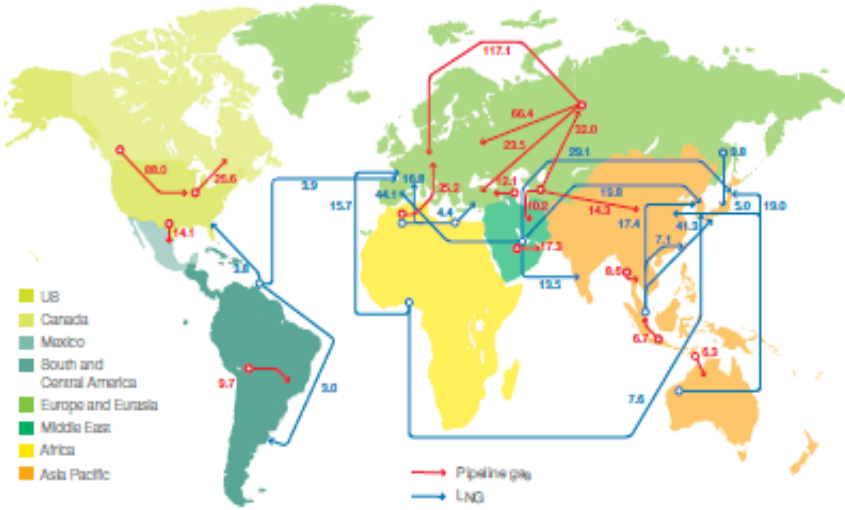
(2) Affordability: Gas prices

Future gas prices **are uncertain**

- **Natural gas is a regional market:** prices are set at regional not global level
- **Large uncertainties about effect of <u>global</u> shale gas** production on prices
- **<u>UK</u> 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)

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(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

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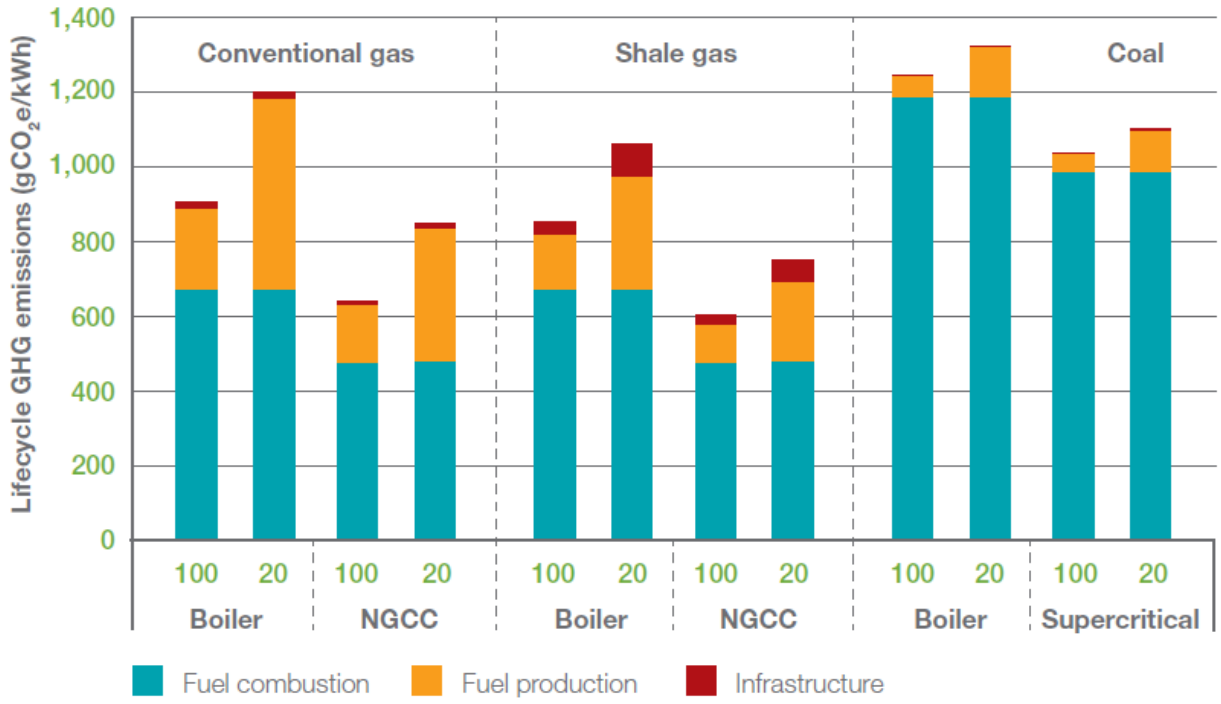
GHG: fugitive emissions from shale gas

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



Note: NGCC = Natural Gas Combined Cycle

Source: Bassi et al (2013)

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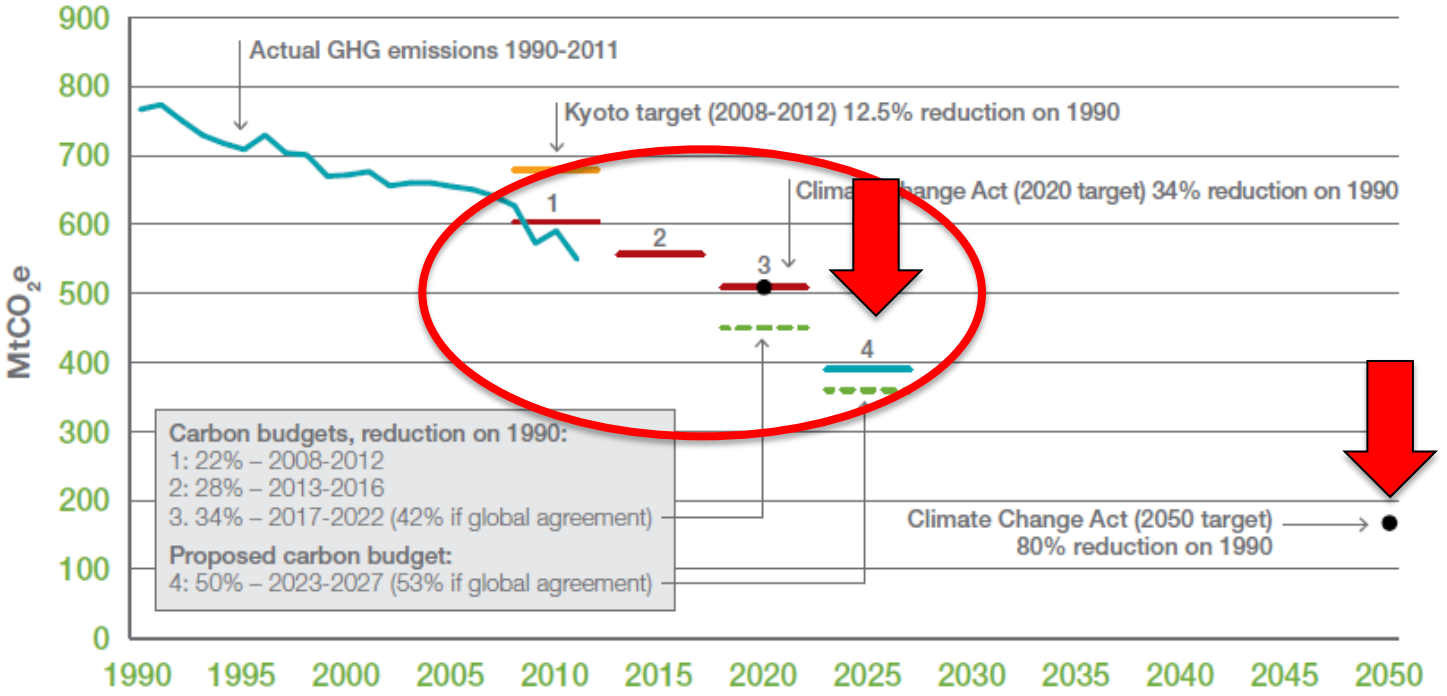
GHG: The UK climate change targets

- 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**



Source: Based on Bowen and Rydge (2011).

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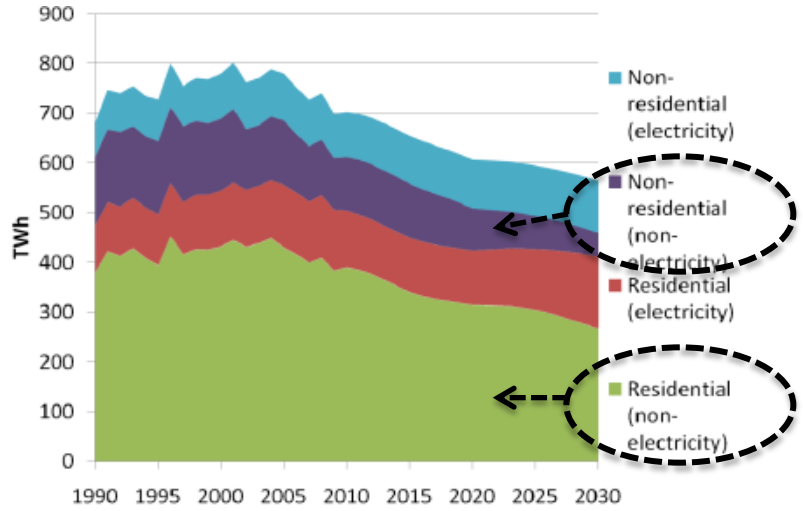
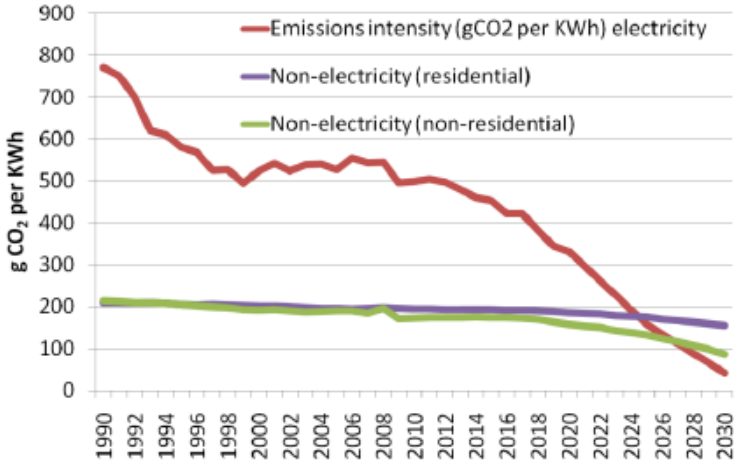
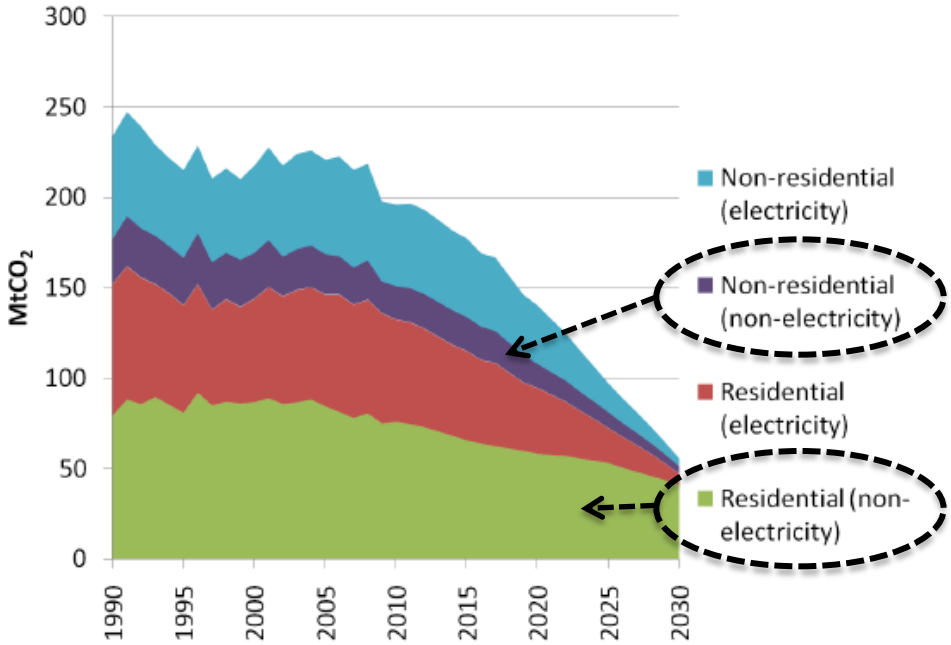
Long run: gas remains significant for heating







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

Source: CCC, 2010

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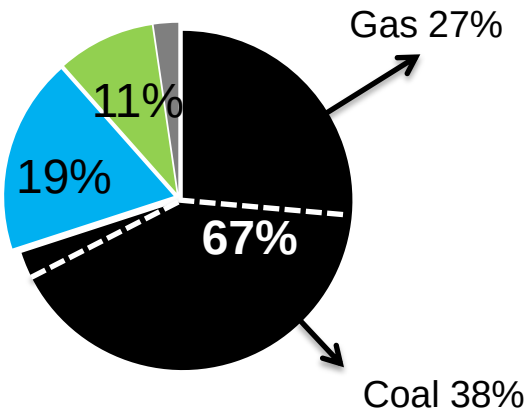
Long run: Power sector decarbonisation

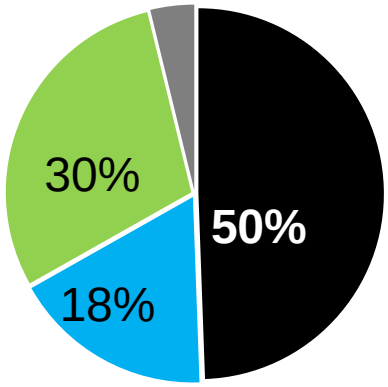
2012: ~4.2% energy from RES

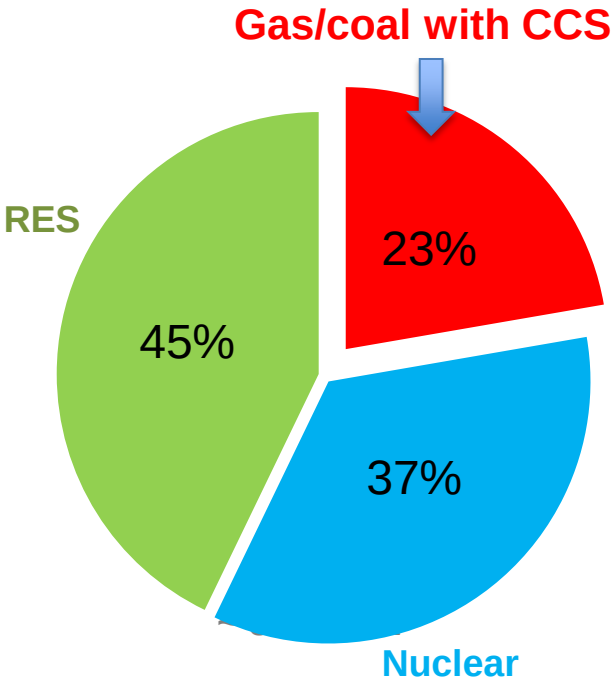
2020: 15% energy from RES (EU target)

2050: full decarbonisation?

Electricity:







Total supply: ~ 375 TWh **~ 330 TWh**

■ Unabated fossil fuels ■ CCS ■ Nuclear ■ RES ■ Imports

Sources: DECC (2013); National Grid (2012)

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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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A UK 'dash' for *smart* gas

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Grantham Research Institute (LSE) & CCCEP, Grantham Institute (Imperial College)

Available at: http://www2.lse.ac.uk/GranthamInstitute/Home.aspx

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