

# The United Kingdom – going its own way on nuclear?

Malcolm Key

Oxford Institute for Energy Studies



# Energy and Resource Think Tanks

Top Energy and Resource Policy Think Tanks  
Table 17

1.	Oxford Institute for Energy Studies (OIES) (United Kingdom)
2.	World Resources Institute (WRI) (United States)
3.	Institute of Energy Economics, Japan (IEEJ) (Japan)
4.	James A. Baker III Institute for Public Policy (United States)
5.	RAND Corporation (United States)
6.	Center for Science of Environment, Resources and Energy (Japan)
7.	Energy and Resources Institute (TERI) (India)
8.	Center for Energy and Environmental Policy Research (CEEPR) (United States)
9.	Resources for the Future (RFF) (United States)
10.	Energy Studies Institute (ESI) (Singapore)



# Why is the UK going for nuclear?

Three main reasons:

- Tight, legally binding carbon targets
- Few low carbon alternatives
- UK approach is non-partisan and technocratic, rather than political



# UK framework – the Climate Change Act (CCA) 2008

- 80% reduction in ghg emissions by 2050
- 34% reductions on 1990 levels by 2020
- Targets legally binding - Secretary of State has a duty to introduce policies to meet the targets
- Climate Change Committee advises on setting and meeting carbon budgets for each five year period up to 2050; budgets are also legally binding
- All main parties support the CCA approach



# The Carbon Budgets

- 3,018 million tonnes of carbon dioxide equivalent (MtCO<sub>2</sub>e) over the first carbon budget period (2008 to 2012)
- 2,782 MtCO<sub>2</sub>e over the second carbon budget period (2013 to 2017)
- 2,544 MtCO<sub>2</sub>e over the third carbon budget period (2018 to 2022)
- 1,950 MtCO<sub>2</sub>e over the fourth carbon budget period (2023 to 2027)



# Goals ambitious as well as binding

- UK aims to reduce emissions by 50% on 1990 base during 2023-2027 period
- Consistent with 2050 aim

By comparison:

- EU aims to reduce by 40% by 2030

(ie only half way there 2/3 of the way through the period 1990-2050, with the more difficult challenges to come)



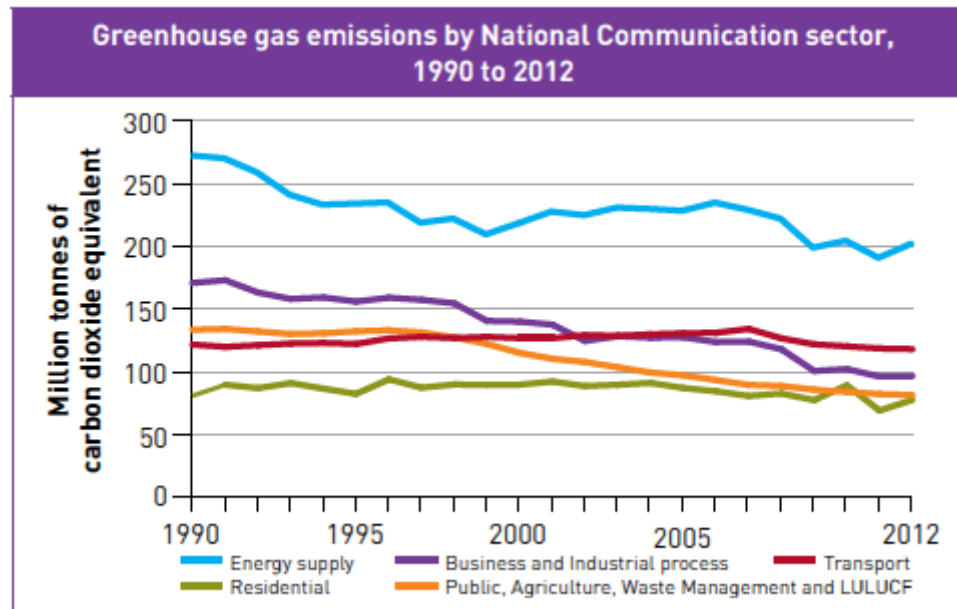
# Climate Change Committee advice: start with electricity

“Any feasible path to a 80% reduction by 2050 will require the almost total decarbonisation of electricity generation by 2030”

(Climate Change Committee *Building a Low Carbon Economy* 2008)

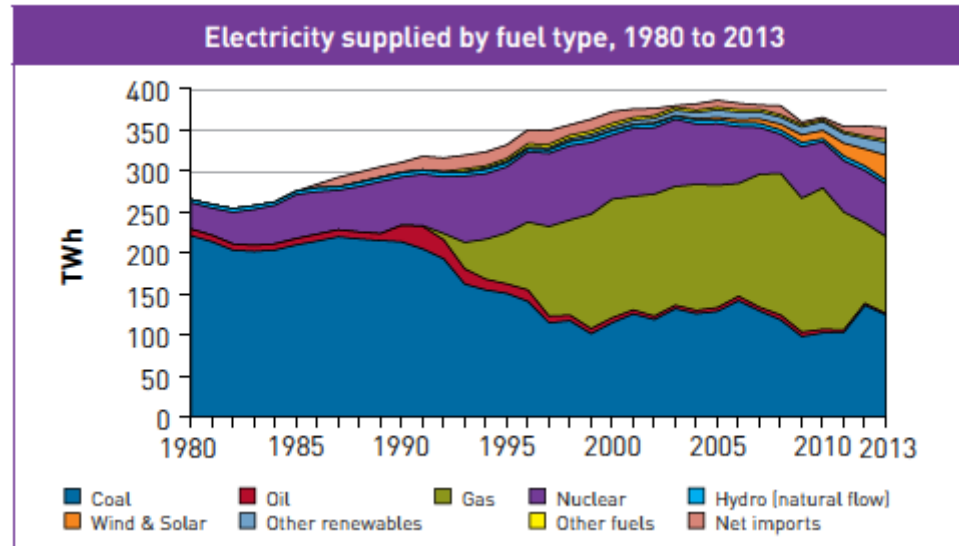


# Where the reductions so far have taken place

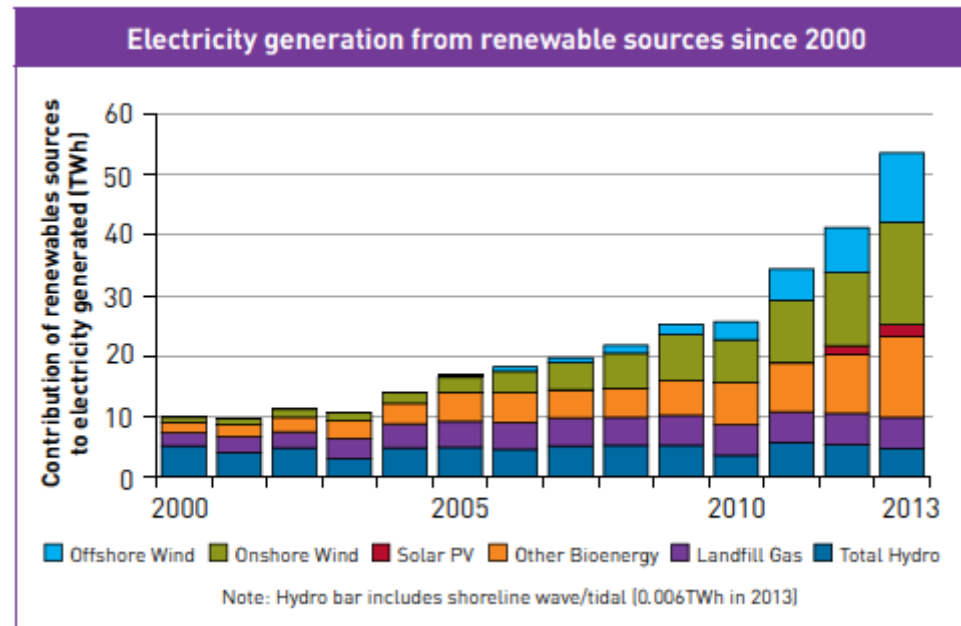




# Change in electricity sources: shift to gas



# Renewables growing, but mainly wind and biomass

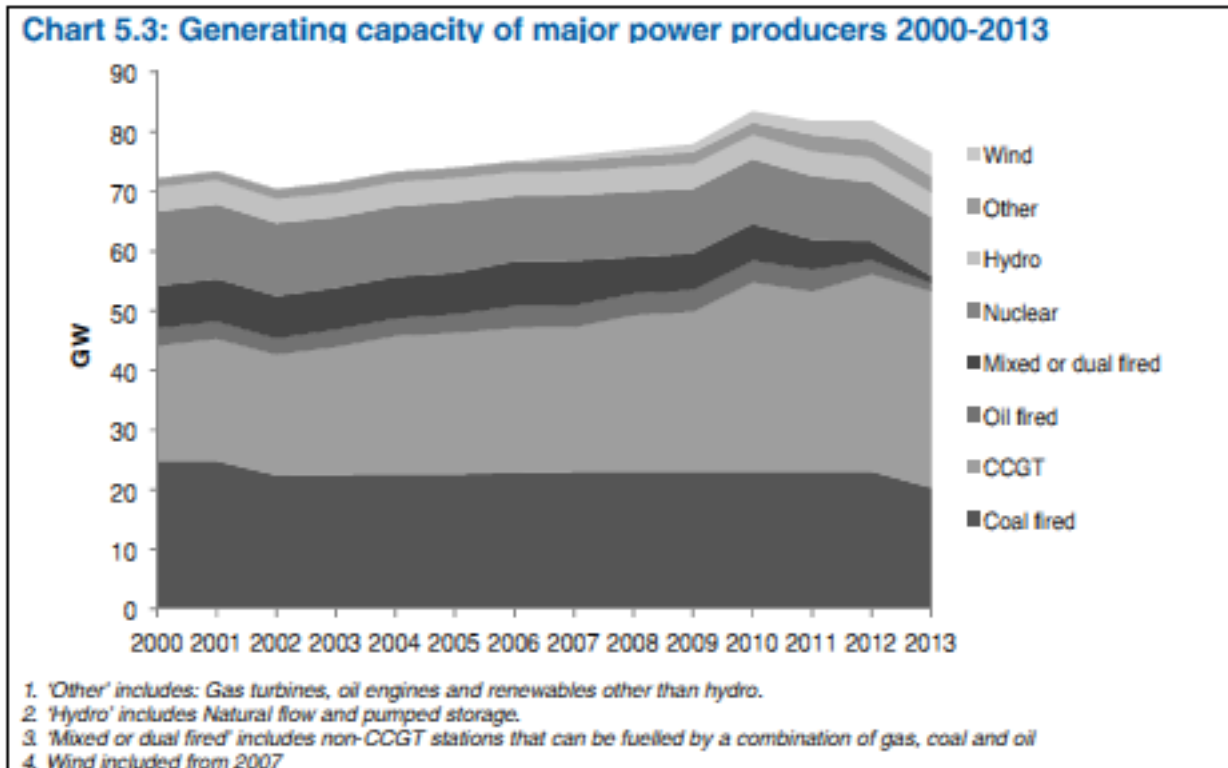


# UK Generating Capacity (GW)

Source	2009	2010	2011	2012	2013
Coal	35	35	34	30	24
Gas Turbines	29	34	32	35	35
Nuclear	11	11	11	10	10
Hydro	1.5	1.5	1.5	1.5	1.5
Wind	2	2	3	4	5
Other renewables	2	2	3	3	4
<b>Total</b>	84	90	89	89	85



# Capacity is declining



# Recent closures

**Table 5C: Major Power Producers capacity closed, converted or reduced (as at end of May 2014), since end-2010**

Site	Fuel	Status	Previous Capacity (MW)	New Capacity (MW)	Year of closure, capacity reduction or conversion
Fife	CCGT	Closed	123	0	2011
Derwent	CCGT-CHP	Closed	228	0	2012
Shotton	CCGT-CHP	Closed	210	0	2012
Kingsnorth A	Coal/Oil	Closed	1,940	0	2012
Grain A	Oil	Closed	1,300	0	2012
Oldbury	Nuclear <sup>1</sup>	Closed	434	0	2012
Wylfa (Reactor 1)	Nuclear <sup>2</sup>	Partially Closed	980	490	2012
Keadby	CCGT	Mothballed	749	0	2013
Kings Lynn	CCGT	Mothballed	340	0	2013
Rosecote	CCGT	Mothballed	229	0	2013
Cockenzie	Coal	Closed	1,152	0	2013
Drax	Coal <sup>3</sup>	Partially Converted	3,870	3,870	2013
Ironbridge	Coal <sup>4</sup>	Converted	940	360	2013
Tilbury B	Coal <sup>5</sup>	Closed	750	0	2013
Didcot A	Coal/Gas	Closed	1,958	0	2013
Fawley	Oil	Closed	1,036	0	2013
Teesside	OCGT <sup>6</sup>	Closed	45	0	2013
Ferrybridge C	Coal <sup>7</sup>	Partially Closed	1960	980	2014
Uskmouth	Coal <sup>8</sup>	Closed	363	0	2014



# – and there are many more closures to come

- Apart from Sizewell B, remaining UK nuclear plants scheduled to close during 2020s
- Coal plants running out of time under LCPD/IED
- All parties agree coal must be phased out

They pledge:

- to seek a fair, strong, legally binding, global climate deal which limits temperature rises to below 2C
- to work together, across party lines, to agree carbon budgets in accordance with the Climate Change Act
- to accelerate the transition to a competitive, energy efficient low carbon economy and to end the use of unabated coal for power generation



# Looking forward: UK Scenarios for 2050

Source	Market	Renewables plus energy efficiency	CCS plus bioenergy	Nuclear
	GW	GW	GW	GW
Nuclear	33	16	20	75
CCS	28	13	40	2
	45	106	36	22

Government implied targets -  
16 GW for 2030; 40+ GW for 2050



# How to get the investment?

## Electricity Market Reform

“[market] reforms are needed to deliver investment  
....[in] low carbon electricity”

Four main elements:

- **Minimum carbon price**
- **Feed-In-Tariffs** - “long term contracts for low-carbon generation”, via Contracts for Difference (CfDs)
- **Capacity payments** (capacity market auctions)
- **Minimum emissions standards** – “back stop” to rule out coal without Carbon Capture





# Some CfD Strike Prices (£/MWh)

Technology	2014	2015	2016	2017	2018
Geothermal	145	145	145	140	140
Medium Hydro	100	100	100	100	100
Onshore wind	95	95	95	90	90
Offshore wind	155	155	150	140	140
Solar PV	120	120	115	110	100
Tidal and wave	305	305	305	305	305
Cf nuclear at £92.50					



# UK generation options simplified

- Coal: unsustainable
- Biomass: imports aren't really sustainable
- **Gas: bridge and back-up**
- CCS: not meeting expectations
- Onshore wind: difficult politically (2 political parties oppose)
- Offshore wind: expensive and intermittent. Load factor just under 40%
- Marine: even more expensive
- Solar: some potential but not UK's strong point and needs back-up

So it's difficult to see how you can avoid **nuclear**



# Nuclear Power –reluctant acquiescence?

- Three main political parties accept nuclear, despite earlier opposition (“last resort”)
- Prominent Green George Monbiot came out in favour – after Fukushima
- Climate change policy consensual – only real difference on onshore wind



# UK Energy Research Council survey

The study found that public attitudes towards nuclear power in Britain have not followed a trajectory that could have been expected after a major nuclear accident. Attitudes to and trust in the regulation of nuclear power have been surprisingly resilient. While nuclear power remained among the least favoured forms of electricity production, public opposition to and concern about nuclear power have dropped substantially after the Fukushima accident. This means that broadly similar proportions of people now support or oppose the use of nuclear power in Britain.



# UKERC findings: 2

Table 2. Overall support and opposition to nuclear power (in %)

	2005	2013
Overall, I support nuclear power	26	32
Overall, I oppose nuclear power	37	29
I am not sure whether I support or oppose nuclear power	32	27
I don't care what happens with nuclear power	3	3
Other/None of these/Don't know	1	9



# Conclusions

- UK is caught “between a rock and a hard place”
- Its decarbonisation objectives are ambitious but its options are limited
- There is no great enthusiasm for nuclear but there is a consensus that it is necessary
- It therefore sees little choice but to buck the anti-nuclear trend that is affecting much of the rest of western Europe

