

The challenges of developing new scales and spaces for energy generation

A UK perspective

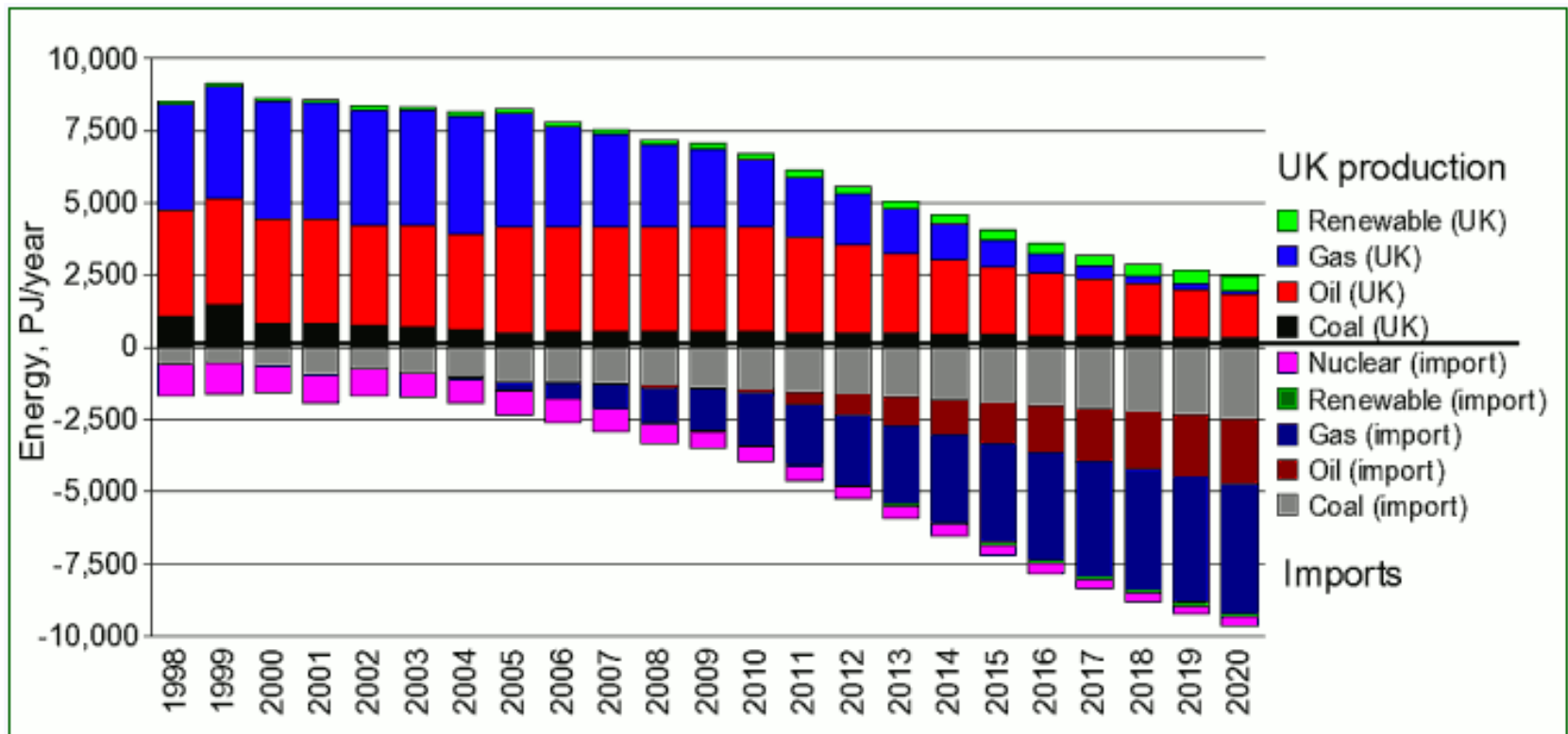
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Content

- Energy system challenges
- The UK energy landscape
- Options, trajectories and lock-ins
- Context of UK renewable energy policy
- Community energy
- Possible Future Pathways

- Energy systems are conditioned by history, with **historical patterns of production and use** reflecting current infrastructures (UKERC, 2009);
- Changes in energy systems have been primarily in **response to economics, followed by technology policy** (Koonin, 2012);
- As energy **technologies are bound by infrastructure**, their diffusion is inherently more difficult than the diffusion of products that do not share this property (Wuestenhagen et al., 2007);
- The replacement timescale for individual infrastructures is **30-65 years** (Grubler and Nakicenovic, 1991);
- A replacement rate of **1%/a** in the US electricity system points towards a large technical system replacement timescale of around 100 years (Koonin, 2012),
- Investments generally **take several decades to pay off** and incumbents are reluctant to take ageing generation infrastructure off the grid as long as it is economically viable to continue operation due to the windfall profits this practice ensures (Unruh, 2000; 2002);
- System incumbency increases the tendency to replace infrastructure on a **'like-for-like'** basis (Vaze and Tindale, 2011);
- Uniform approaches to scale reduce flexibility in investment patterns and increase the **inherent irreversibility** of many energy system investments (Fielder, 1996);
- Low-carbon and renewable technologies in particular are characterised by **high investment costs and low running costs**, thereby increasing the investment risk due to high percentages of sunk costs from the onset of generation (Hvelplund, 2006).

The UK energy landscape



The UK energy landscape

By 2020 the following generation capacities will be decommissioned/ taken off the grid

- 1/3 of coal fired capacity
- 2/3 of oil fired capacity
- 3/4 of nuclear capacity
- amounting to 30% of UK generating capacity

The UK energy landscape

By 2020 the following renewable energy generation targets need to be met

- 15% of energy demand
- 30% of electricity demand

The UK energy landscape

Cost projections for the transformation of the energy sector

- £100bn (CCC, 2011)
- £200bn (Ofgem, 2009)

Options, trajectories and lock-ins

Centralisation

House of Commons (2007: 12): ‘In a liberalised energy market, it may still be easier for the Government to provide incentives for the construction of relatively few nuclear power stations than to change the behaviour of millions of UK households’



House of Commons
Trade and Industry Committee

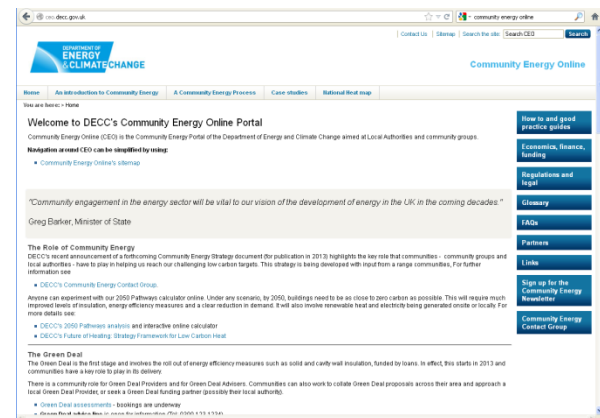
Local energy—
turning consumers
into producers

First Report of Session 2006–07

Options, trajectories and lock-ins

Decentralisation

Greg Barker (2012): 'Community engagement in the energy sector will be vital to our vision of the development of energy in the UK in the coming decades'



Context of UK renewable energy policy

- Various regulatory incentives in place for decentralised renewable energy generation:
 - Feed-in Tariff
 - Renewables Obligation
 - RHI & Green Deal
- General shift towards a more regulated energy policy environment?

Putting UK energy into perspective

	Onshore		Offshore		Density
	MW	Turbines	MW	Number of sites	WTs/ 100sq km
UK	3580	2664	598	9	1.09
Germany	26302	21226	12	3	5.95
Denmark	2851	4675	425.2	8	10.85

Putting UK energy into perspective

	Onshore wind ownership in %		
	Utilities/ corporates	Farmers	Cooperatives
UK	98	1	0.5
Germany	55	35	10
Denmark	12	63	25

Community Energy

We do need active communities not only to help get [FiT projects] through the planning process but more widely than that. We need a local dialogue around energy that we don't have at the moment and community projects are one of the few ways we can embed greater local understandings of energy issues at the local level. (PC)

Community Energy

I think we need to leap frog [the FiT scale] t and get to that kind of situation in Germany where people see it as an income generating assets that is making the full use of resources available and has a kind of structure of ownership that means that people gain from having it in their back yard. (SR)

Possible Future Pathways

How can you have nuclear power and off shore winds compete on an equal footing with small scale decentralised electricity? Very difficult basically. [...] The only way to do that is to simplify the regime so that it recognises that these are going to be relatively small scale compared to the larger centralised system that will always exist, or certainly will exist for the foreseeable future, and enable them to strive and operate in a bit of a niche so the two markets, if you like, can separate the big centralised system from the decentralised system so they can mesh up, but still ensure that there's consumer protection, still ensure that any trading of electricity is viable and companies aren't upsetting the market. (ER)