

POLICY AND MARKET FOR WIND ENERGY IN THE UNITED KINGDOM

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Abstract

UK energy policy includes a target to obtain 15% of electricity from renewables sources by 2015, increasing to some 20% by 2020. Support for energy RD&D continues, while wind energy has reached the position of commercial deployment supported by a Renewables Portfolio System (RPS) and the Renewables Obligation (RO). Proposed adjustments to the operation of the RO have increased the commercial attractiveness of offshore wind development. With measures to address practical issues including grid connection and planning consenting, the deployment of onshore and offshore wind is accelerating: 2,200 MW of capacity is operational, 1,400 MW is under construction, and some further 7,000 MW is consented or in planning. Round three of offshore wind licensing is expected to result in a further 13,000 MW of capacity. Specialised capabilities to support these developments already represent a new branch of industry.

Key words: Renewables Obligation, Renewables Portfolio System, UK energy policy, wind energy application progress

Abstrak

Kebijakan energi di Inggris mencakup target meningkatkan sistem kelistrikan dari sumber energi terbarukan menjadi 15% pada tahun 2015 dan menjadi 20% pada tahun 2020. Dukungan untuk riset energi, pengembangan dan penyebarluasannya terus berlanjut, sedang teknologi energi angin telah mencapai tahapan komersial didukung oleh sistem penjaminan bagi energi terbarukan (RPS) dan keharusan memanfaatkan energi terbarukan (RO). Penyesuaian pengoperasian keharusan menggunakan energi terbarukan yang dilakukan telah meningkatkan daya tarik komersial dari pengembangan sistem kelistrikan tenaga angin (SKEA) dilepas pantai. Dengan peraturan yang menangani isu praktis, mencakup koneksi grid dan persetujuan perencanaan, maka pengembangan SKEA didarat dan dilepas pantai dipercepat: 2200 MW telah beroperasi, 1400 MW sedang dalam pembangunan, 7000 Mw telah disetujui untuk direalisasikan. Penerbitan lisensi SKEA lepas pantai tahap ketiga diharapkan akan meningkatkan kapasitasnya sampai 13000 MW. Kemampuan special untuk mendukung pengembangan ini sudah menjadi suatu cabang industri.

Kata kunci: kebijakan energi di Inggris, keharusan memanfaatkan energi terbarukan, perkembangan energi angin, sistem penjaminan bagi energi terbarukan.

1. ENERGY PRIORITIES

Energy Supply

The United Kingdom is responding to a number of changing fundamentals in its energy supply. From reliance on gas, oil, coal and nuclear power for 98% of its primary energy in 2005 [1], see **Fig.1**. It is facing:

- an increasing need to constrain carbon emissions, which is particularly relevant to its use of coal,
- maturing domestic oil and gas provinces in the North Sea, with declining future production,
- the consequent need to import gas from more distant sources with attendant uncertainties of costs and security of supply, and
- an ageing fleet of nuclear power stations, with the need to de-commission many of them over the next 20 years.

Energy Source	Mtoe	Share of Primary Energy	Used for Electricity Mtoe
Coal	40	17%	34
Oil	77	33%	1
Gas	93	40%	29
Nuclear	19	8%	19
Hydro	0.7	0.3%	0.3
Renewables & Wastes	3.9	1.7%	3.3
Total	234	100%	

Fig. 1 UK Energy use

Constraint of Carbon Emissions

The UK is a signatory of the United Nations Framework Convention on Climate Change (UNFCCC). It is part of the European Union “Bubble” in its commitments to constrain greenhouse gas emissions under the Kyoto Protocol of the UNFCCC. It supports the operation and strengthening of the EU Emission Trading Scheme [2] as a means of bringing the efficient constraint of carbon emissions into regular commerce.

In 2002, the Royal Society Report on Climate Change [3] found that for climate stability, it will probably be necessary for global emissions of greenhouse gases to be reduced by 60% of the levels of 1990, by the middle of the 21st century. This year too (2007), the Stern Review [4] highlighted the world-wide economic importance of strong early action, internationally to constrain climate change.

Policy Priorities

Accordingly, UK energy policy is designed to address three main priorities:

1. To tackle Climate Change,
2. To ensure Energy Security of Supply, and
3. To maintain Cost-Competitive Energy Supplies

2. CONTRIBUTION OF RENEWABLE ENERGY

2.1. Targets and Aims

A series of public consultations and policy documents [4] [5] [6] has reinforced the importance of these priorities, and recognised the contribution that Renewable Energy can make in addressing them. Policy targets and support mechanisms have progressed as experience has been gained of early implementation, available technologies have moved forward, and the urgency of the policy priorities has become more apparent. The national targets and aims for the constraint of carbon emissions, and the use of renewable energy include:

- The reduction of CO₂ emissions by 60% below their level in 1990; by 2050.
- To obtain 10% of electricity from renewable energy resources by 2010, with an aspiration to reach 20% by 2020.
- To include 5% of biofuels in road transport fuel by 2012.

It is anticipated that the experience and technical capabilities gained in achieving the early targets will inform the approach needed to achieve the more challenging changes in future years.

2.2. Policies to Promote Renewable Energy

Promotion of Renewable Energy includes both direct support for the development of relevant technologies, and the provision of market revenue to reward successful deployment. The resultant phases of bringing new technologies to commercial deployment are illustrated in **Fig. 2**. An assessment of the current states of development of different renewable energy technologies is illustrated in **Fig. 3**. Onshore wind power is assessed as having reached the stage of “deployment”, while offshore wind has reached “early deployment”.

RD&D Support

Government financial support for RD&D is being maintained. In addition to funding support through universities and other research bodies, some £500 million for Research, Development and Demonstration (RD&D) of Renewable Energy technologies, is being made available over the period 2005 – 08. This support is largely in form of grants, and includes funding for:

- the R&D Technology Programme to support early stage development,
- offshore wind energy; early deployment; £117 million,
- bio-energy; £60 million
- Marine deployment; £50 million
- Microgeneration; £80 million

Investment in energy technology development, and including renewable energy, is also being supported in collaboration with industry through the “Energy Technology Institute” project [7].

Market Support

In order to provide for market revenue to reward successful deployment, and to fund future technical developments, the UK operated a Competitive Quota System for renewables technologies through the 1990s (the Non Fossil Fuel Obligation; NFFO. [8]). In 2002 a Renewables Portfolio System was introduced; the Renewables Obligation (RO) [9], and this system remains the main mechanism for encouraging the deployment of power generation from renewable energy sources.

2.3. Renewables Obligation (RO)

The RO places an obligation on the registered suppliers of electricity to account for a specified and increasing portion of power from renewables sources in the electricity that they supply. To do this, suppliers are required each year to obtain and surrender to the Electricity Regulator [10] Renewable Obligation Certificates (ROCS) equivalent to the renewables electricity for which they need to account. If a supplier is short of ROCs, it has to pay a fee for each missing ROC to “buy out” its obligation. The net funds resulting from the payment of all the buy-out fees are re-distributed to suppliers in proportion to the ROCS that they each did submit. The prospect of this re-distribution increases the value of ROCs; and so increases the price at which they are traded. This traded price thus reflects the overall shortage of qualifying renewables capacity and so gives a commercial incentive to invest in more capacity.

The level of the Buy-Out fee was set in 2002 at £30 /MWh of renewables electricity, increasing with retail price inflation (it is £34.3 /MWh in 2007); and set to be maintained at least until 2027. The level of renewables in electricity supply was set at 3% for 2002/03, rising to 10.4% in 2010/11, at which time it will be providing support for renewables through market revenue of some £1 billion pa. The obligation is to increase to 15.4% in 2015 /16, and is expected to be further increased to 20% in future years.

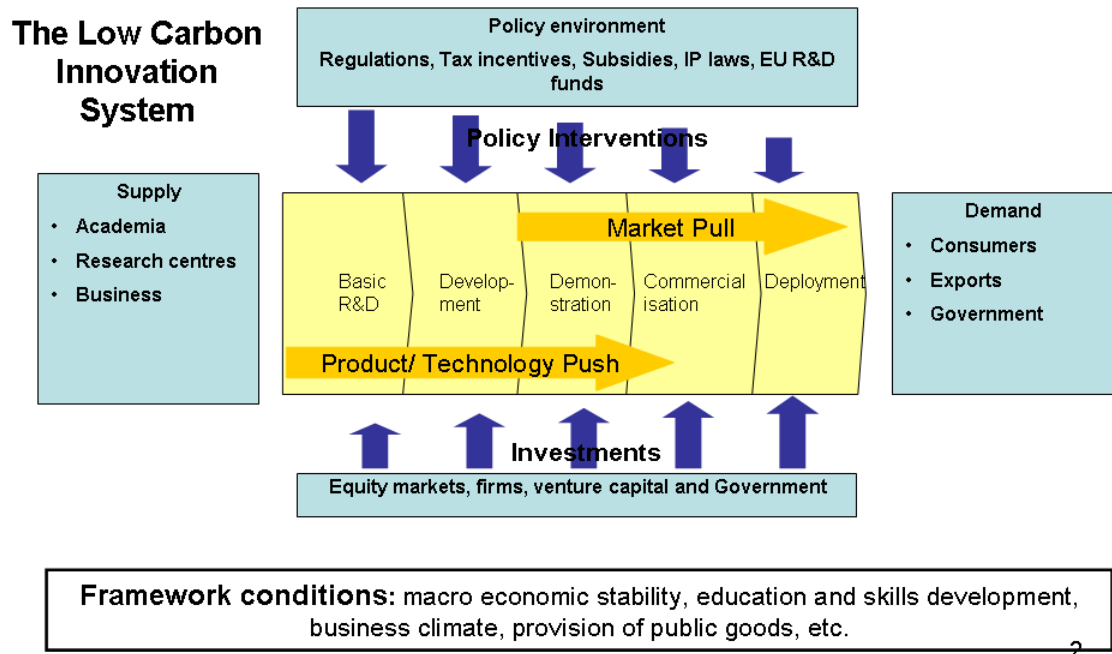
In early October 2007 the traded value of ROCs averaged £49.26, representing a premium of £14.96; and reflecting both a perceived shortage of overall qualifying renewables capacity and a commercial incentive to construct more capacity; to create more ROCs.

Adjustments to the RO

Following a review, and public consultation on the operation of the RO [11], some modifications were proposed to strengthen the RO, and were included in the Energy White Paper of May 2007 [6]. These modifications include:

- Ensuring that there is always a level of “headroom”, with the level of the Obligation maintained above that of qualifying renewables generation capacity; and hence a level of premium above the buy-out fee in the traded price of ROCs. This position will be maintained through adjustments to the level of the Obligation. It is important for maintaining the confidence of investors in the financial returns that they can expect from renewables projects.
- “Banding” of the Obligation to provide greater incentives in support of renewables technologies that are strategically important but still at a relatively early stage of

deployment. Such technologies are typically not yet cost-competitive with more mature renewables technologies, and need a greater level of market revenue from their early deployment. This change will benefit particularly offshore wind energy, Wave and Tidal generation - in which the UK has a world-leading position – and some biomass energy technologies. This position is summarised in Fig. 4.



Source: Adapted from Carbon Trust

Fig. 2 Bringing New Technology to Commercial Deployment

2.4. Other Measures Proposed in the White Paper

Other measures include:

- Changes to the system of planning consenting to provide for quicker decision-making, and in a context that reflects established strategic priorities, including the importance of renewables. For offshore wind development in particular, strategic assessments will underpin future development rounds.
- Work to improve Renewables Grid Connection, onshore and offshore. This work includes establishing an offshore transmission regime for offshore generators to connect to the onshore grid.

2.5. Fiscal Measures; Climate Change Levy

A tax on much commercial energy use, the Climate Change Levy, is levied at £4.4 /kWh for electricity consumption in relevant businesses. The use of power from renewables sources is exempt from this tax, which increases the value of renewable electricity by that amount for those users.

The portfolio of technologies and their current state of development:

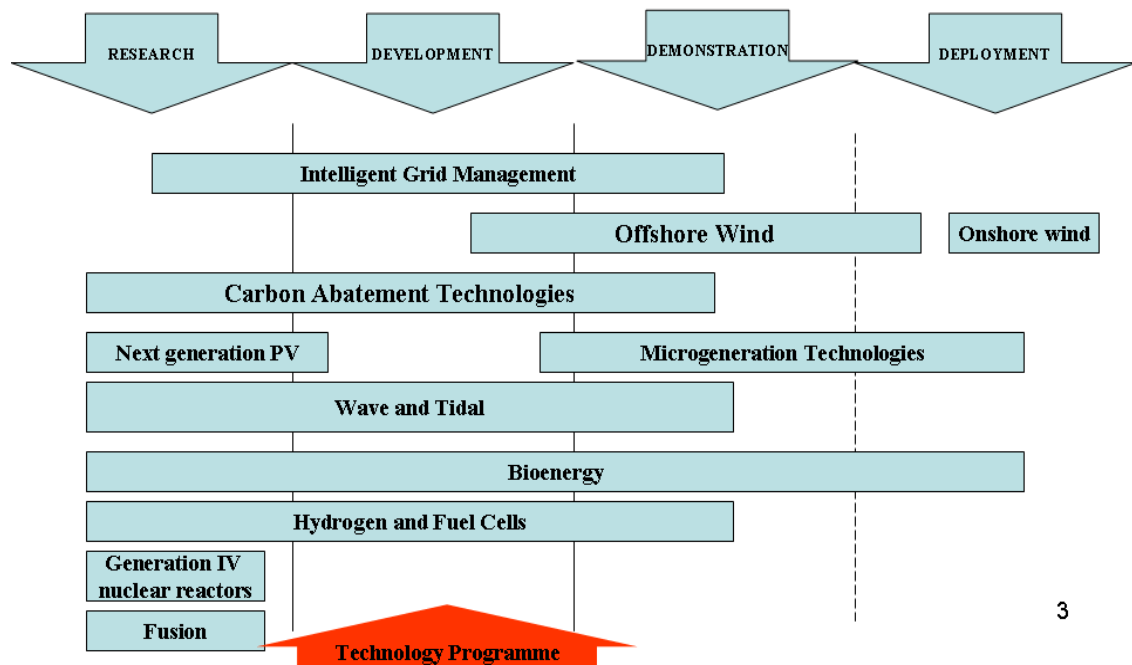


Fig. 3 New Technologies, States of Development

2.6. Renewables Market, and Deployments

Existing renewables electricity capacity in the past has been largely dominated by hydro power, and biomass in the form of landfill gas. This position is illustrated in figure 5. It seems likely that technologies for marine wave and current energy conversion, and for biomass and energy from waste, will develop to the position of making material contributions to renewables power over the next few years. Meanwhile the deployment of wind power is accelerating now, and it is anticipated that windpower, both onshore and offshore will make up the majority of new renewables capacity in at least the next 5-10 years, and that it will continue to perform strongly into the future.

3. WIND ENERGY & WIND FARM DEVELOPMENT.

Confidence in the operation and security of the Renewables Obligation has been strengthening since its introduction, and the modifications identified in the Energy White Paper have contributed further to this confidence. Wind energy in particular is responding with an increasingly strong market prospect, and accelerating construction in the UK. New construction in 2006 was 630 MW, of which 90 MW was offshore. This brought the total operational capacity to 2178 MW, of which 304 MW is offshore. In 2007 there is a further 1399 MW under construction, of which 577 MW is offshore. There is a further 4154 MW already consented, of which 2214 MW is offshore.

The total offshore wind that is currently in various stages of planning and consenting is some 7,000 MW. Round three of offshore licensing is being prepared, and is expected by industry to add some further 13,000 MW to capacity in the coming years. This capacity is expected to be largely offshore England and Wales, with much of the stronger resource offshore Scotland still to be addressed as grid transmission capacity is strengthened, and as available technology makes the more challenging conditions more accessible. Within just a few years, the market for deployment of wind power onshore and offshore the UK is expected to become the largest in Europe.

Captive Power

There is an increasing awareness and demand for renewable energy, and commercial and industrial companies are increasingly seeing marketing advantage through being seen to be “green”. In addition the operation of the European Union Emission Trading Scheme, is making the use of renewable energy increasingly attractive for many high energy consumption companies. As a result, a number of companies are investing in relatively small individual wind developments on their own premises, and this trend is forming a further market opportunity for wind developers.

Band	Technologies	Support Level
Established	Sewage gas; Landfill gas; Co-firing of non-energy crop (regular) biomass	0.25
Reference	Onshore wind; Hydro-electric; Co-firing of energy crops; Energy from Waste with CHP; Other not specified	1
Post-Demonstration	Offshore wind; dedicated regular biomass	1.5
Emerging Technology	Wave; tidal stream; ACTs; dedicated biomass with energy crops; dedicated biomass CHP; solar PV; geothermal	2

Fig. 3 Adjustments through the banding of RO [6]

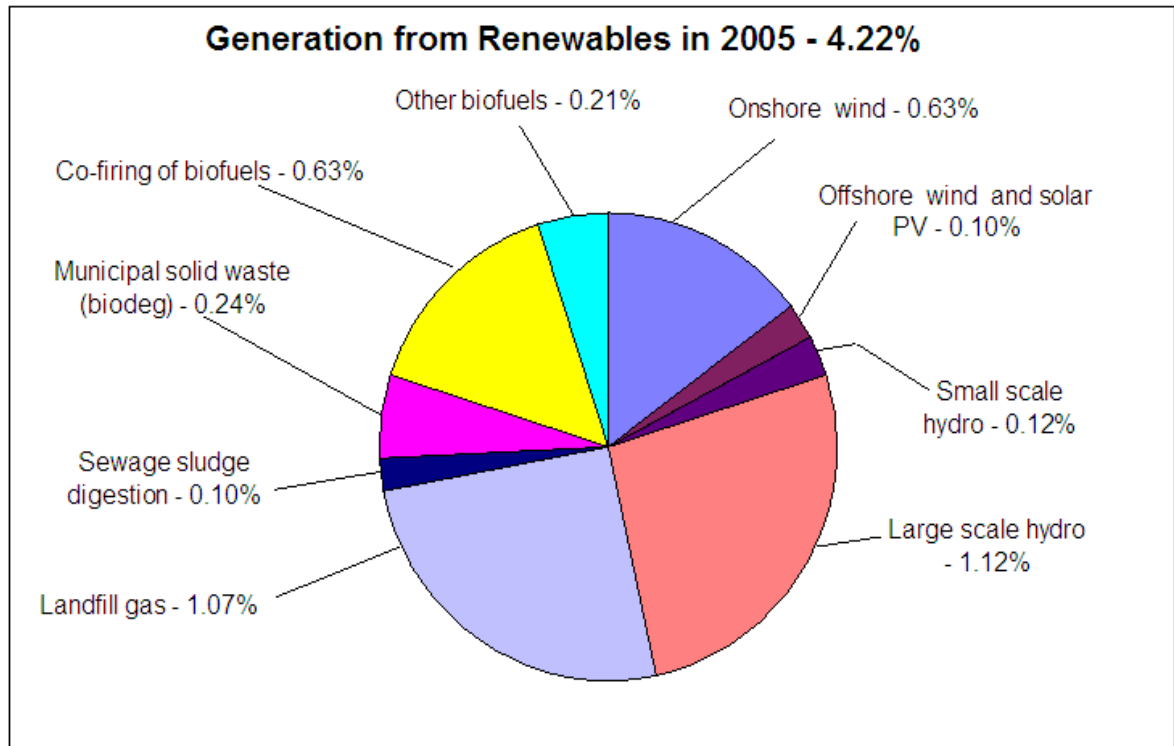


Fig. 4 Existing Renewables Deployment

Wind Energy in the UK 2007 (MW)

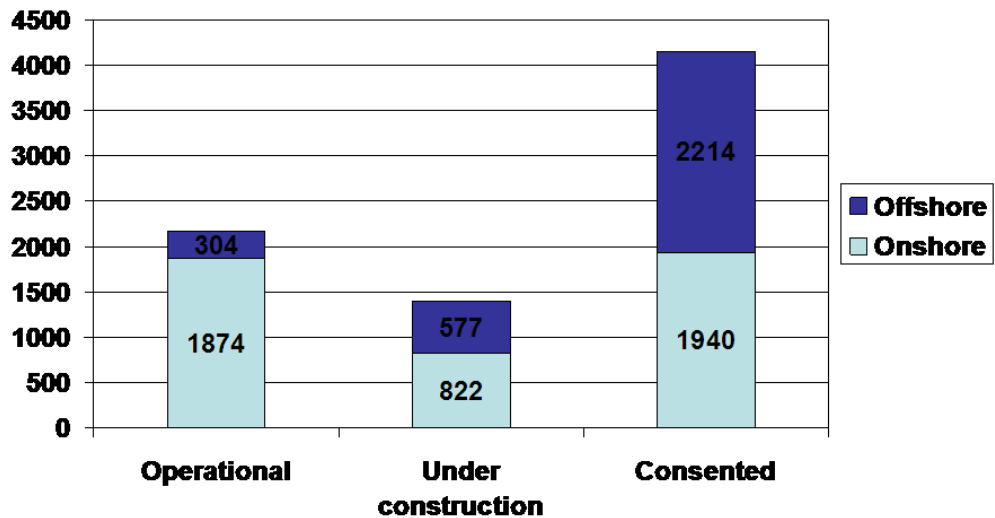


Fig. 5 Wind Power Deployment and Construction

4. INDUSTRY DEVELOPMENT CAPABILITIES

The commercially competitive, yet supportive conditions of the UK market, combined with continuing support for technology development and a good prospect for future demand, have resulted in a strong core of specialist capabilities. Such capabilities include the assessment of environmental impacts, preparation of regulations, resource assessment and wind development planning (large and small), project management operation and monitoring, interaction of renewables projects with the transmission grid, specialist supply chain design and manufacture, finance and insurance, and trading of green energy and carbon emission rights both within UK and internationally.

Capabilities from Offshore Oil and Gas

With the rising importance of offshore wind, much of the experience of the UK's offshore oil and gas industry is finding that it has application here too. Offshore engineering design, construction and operating companies are now increasingly entering this industry.

International Application.

The UK's renewable energy market is open to the involvement of companies internationally. Similarly, UK companies with relevant capabilities are encouraged to make their abilities available internationally.

We are witnessing the emergence of a truly international and very major new industry.

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