

Wales

Regional RES-e Map: Electricity from renewable energy sources (RES-e)



The region	Wales
Number of inhabitants	2.9 million
Size (in km²)	20,767km ²
Capital	Cardiff

Short description: Economically, Wales has long been associated with agriculture and the extraction of coal, a fossil fuel of which there are large deposits, particularly in the South of the country. With the collapse of the coal industry, new industries have gained a foothold, especially the manufacturing of electronics and machine components. These industries are largely, though not exclusively, concentrated around the main motorway corridor in the South of the country. In the large rural areas of the country, the major employers are tourism, agriculture, public services and forestry. As in the rest of the UK, the service sector now accounts for an increasingly large portion of employment across the whole country. In socio-economic terms, Wales is one of the poorest regions of the UK, although its share of GDP has been increasing slowly.

Share of RES (total primary energy): Unknown

Share of RES-e (total electricity): 3%

Target RES-e: (national or regional): 10% by 2010

The partner organisation: MWEA. Based in Mid-Wales, with 10 employees.

	Number of plants	Total installed capacity (MW)	Typical installation size	Main present funding mechanism	Short-term perspective (2007)	Mid/long-term perspective (2015)	Main barriers
Wind Onshore	20	223.6	Variable	Private with subsidies	25.5MW	800MW+	Grid connections, Local opposition.
Wind Offshore	1	60	2MW	Private with subsidies	198MW	750MW+	Planning, Grid connections
Wood bio-mass	0	0	0	Grant-assisted	200kW	Slow growth	Lack of confidence in technology
Biogas	5	1.13	200kW	Private	Poor	Uncertain	High capital cost, Lack of awareness
PV	100s	400kWp	Variable	Grant-assisted	1MWp	10s of MWp	High cost
Hydro <10MW	25	31.5	Variable	Private	Slow growth	Slow growth	Lack of suitable sites
	(>10kW)						
Tidal	0	0	n/a	Private with subsidies	Nil	60MW	Technological challenges
Wave	0	0	n/a	Private with subsidies	10s of kW	100s of kW	Technological challenges

Wind (Onshore)

The past: Wales has one of the best wind resources in Europe, and since the 1990's it has seen steady growth. This growth has been hampered by restrictive planning regulations, which have been recently altered to require authorities to account for the requirement for increased use of renewable energy.

The present: Total installed capacity is 232.2MW. An additional 32.5MW is under construction. There are many different private operators working in this sector, varying from specialist wind operators to large general-power generating companies.

The main barriers & strategies to overcome them: Planning objections still the main barrier. Wales has an approval rate of 40% and planning applications take 23 months on average. Public opinion is limited to a vocal minority. However, recent community led schemes have helped overcome public resistance. The electricity grid network is a problem, and upgrade is likely to occur in north and mid Wales where new electrical infrastructure is considered vital for a more reliable electricity grid. District network operators in north and mid Wales have proposed constructing new 132kV lines. There is, however, no clear start date for this work to commence.

Short-term perspectives (until 2007): 25.5MW have received planning permission. With the advent of several types of small-scale 'plug-and-play' wind turbines soon to come on to the market, it is likely that the very small scale domestic sector will increase rapidly.

Mid/long-term perspectives (until 2015): 71.6MW has been submitted for planning permission. The Assembly Government has targeted a further 800MW by 2010 and has undertaken a strategic assessment constraining areas within Wales that are capable of accommodating large 25MW+ of wind power developments. The TAN 8 document to be published late 2005 will outline the Assembly's future strategy, but the interim document states clearly that wind power is the only clear and realistic way of delivering the growth in RES-e generation required. This implies that full support from the National Assembly will be available to wind farm developers for the foreseeable future.



Wind (Offshore)

The past: In 2001, the UK Offshore Wind Development programme was initiated and several sites were proposed for development. By December 2002 two Welsh sites totalling 130MW capacity had been given approval. Wales hosts a small number of engineering and consulting companies with offshore wind energy expertise.

The present: North Hoyle, located off the north coast of Wales is currently the only offshore farm and has a total installed capacity is 60MW. An additional 198MW in total has been approved at Rhyl Flats (North Wales) and Scarweather Sands (South Wales).

The main barriers & strategies to overcome them: Extension and upgrade of the electricity grid network, likely to be a greater problem in the future with the development of larger wind farms. Planning permission is also likely to hinder expansion; Environmental Impact Assessments must take into account the coastal and offshore effects of potential wind farms. Many parts of the Welsh coastline and offshore area are designated as protected or environmentally sensitive. Public opinion is currently favourable due to the offshore location and the number of sites. However, size and visibility may become an issue in the future.

Short-term perspectives (until 2007): Planning application for Gwynt Y Mor offshore farm is to be submitted late 2005. The development will consist of 200 turbines with an expected output capacity of 750MW. If approved, Gwynt Y Mor will be the first very large scale offshore development in the UK.

Mid/long-term perspectives (until 2015): Very strong. Wales has very good wind resources. Growth is likely to exceed onshore as the developments will be larger and less constrained. The industry is at an early stage of development, but has the potential to become a global leader. Much of this development is within the UK itself and the UK has design, installation and operations experience.



Wood biomass

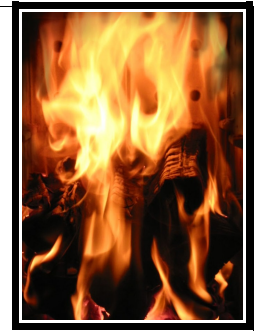
The past: During the 1990s the Non-Fossil Fuel Obligation (NFFO) was set up to encourage Combined Heat and Power (CHP) growth. Funding was awarded for two installations but neither was developed, due to impact assessment (transport and other issues) and economic factors.

The present: There are no commercial CHP plants in Wales that are solely fuelled from renewable sources, and no Welsh companies dealing specifically with this technology, although a number of companies from outside Wales carry out work in the general area of CHP. With the introduction of Renewable Obligations Certificates (ROCs), and the increase in wholesale electricity prices, CHP has become economically viable and current support mechanisms are considered good enough to allow the industry to develop. Biomass-only installations will require specific support in order to come to fruition. Funding mechanisms are grant based, limited to the Bio Energy Capital Grant Scheme, which provides money for electricity generation from biomass, new technology development and the growth of energy crops. The Wood Energy Business Scheme provides grants for up to 2MW for electricity generation in Objective 1 areas, and Powys Objective 2.

The main barriers & strategies to overcome them: There is a lack of confidence in technologies with too much emphasis placed upon new technologies, rather than adopting existing ones. There is also a general caution among financiers, planners and utilities. The absence of market for heat derived by CHP is a limiting factor on growth. Major uncertainties surround the fuel supply for larger scale 15MW plants. Strategies could include the development of a Renewable Obligation for Heat. Slow growth should encourage 1 or 2 sites of different sizes and technologies to showcase the viability of CHP.

Short-term perspectives (until 2007): 2 or 3 small scale-developments of 100kW each. Possible development of a large CHP steam turbine.

Mid/long-term perspectives (until 2015): Likely to see increased development with larger and greater numbers of CHP installations. Energy crops may be grown to meet the increasing demand.



Biogas

The past: Numerous small on-farm anaerobic digestion (AD) plants that developed during the 1970s and early 1980s were closed due to various problems such as technology and expertise limitations.

The present: There are 5 sewage plants producing Combined Heat and Electricity with a total output of 1,129kW. There is one farm located in Mid Wales that has an anaerobic digester producing 30kWth. Plans are in place to increase the installation size and produce electricity within the near future.

The main barriers & strategies to overcome them: History of unreliable performance of plants installed during the 1980s. Capital costs remain high. There is still a lack of awareness among the farming sector. Resources are limited and geographically widespread.

Strategies - need for a showcase plant to demonstrate the economic viability of AD. Financial support would provide greater investment incentives although the sector has been stimulated by Renewable Obligation Certificates. Improving the knowledge of AD amongst the financial community, planning community and international development banks is required.

Short-term perspectives (until 2007): Very poor

Mid/long-term perspectives (until 2015): Uncertain



PV

The past: Historically a low level of activity in PV installations. 400kWp installed, largely grant-dependent. Most of this is grid-connected, but the figures may not include many stand-alone installations which do not show up on official figures.

The present: Continual and increasing growth, almost entirely dependent on grant support. Potential increase in future growth as a result of steady decrease in costs, although this will be almost entirely dependent on a continuation of the Solar Photovoltaics Demonstration Programme, Wales produces a large amount of the total UK PV module production, a strength highlighted by the new Sharp factory in Wrexham which produces more than 20MW a year.

The main barriers & strategies to overcome them: Lack of public awareness that solar is a viable option in Wales. Lack of financial incentive to install. Increasing energy prices and continuation or extension of grants will allow strong growth. The current uncertainty about the future of the grants scheme in the UK, particularly for the small domestic sector, is causing great concern in the industry.

Short-term perspectives (until 2007): Perhaps more than 1MWp installed by 2007.

Mid/long-term perspectives (until 2015): 10s of megawatt (peak)



Small hydro (<10 MW)

The past: With its high rainfall and mountainous topography, Wales has long been exploited by hydropower engineers. It has a history of successful installations stretching back more than a hundred years, and there is presently 31.5MW installed in Wales.

The present: New installations are uncommon. Dulas Ltd is the only Welsh hydropower consultancy, and they are not currently working on any projects in the country.

The main barriers & strategies to overcome them: Planning, abstraction licenses and economics of available sites. Growing domestic demand for water has led competition for river water, with the possibility of increased restrictions in the future.

Short-term perspectives (until 2007): Continuing slow growth in generating capacity.

Mid/long-term perspectives (until 2015): New schemes usually less than 1 MW (abstraction reasons) but continuing. According to the Welsh Assembly Government, most of the opportunities for the generation of hydro-electricity from existing dams have now been realized.



Tidal and Wave

The past: Wales has a relatively exposed coastline of 1340km, and in the Severn Estuary it has the second-highest tidal range in the world. Historically the biggest beneficiaries of this have been the wading birds and surfers, but there is considerable interest in tapping the energy potential of both tidal and wave power. There has been some movement on both these issues over the last few years.

The present: There has been an upsurge of interest in both tidal and wave power. One tidal project of 60MW has been subjected to a feasibility study and received a very positive report. There is also work being performed on a prototype wave generator called the Wave Dragon. This work is underway in Denmark, but the generators will be installed off the Southwest coast of Wales in the next 2-4 years.

The main barriers & strategies to overcome them: The main barriers to both technologies are technical, although large tidal projects also have a potentially massive impact on local ecosystems. It would appear that the best chance to develop these forms of energy lie with the development of successful prototypes, work on which is currently underway in a number of sites around the UK and in mainland Europe. The UK government has recently released £50m to develop wave technology.

Short-term perspectives (until 2007): The outlook is favourable, depending on the outcome of trials of technology. The barriers to wave technology in particular would seem to be smaller than those for tidal systems. There is the possibility of several tens of kW production from wave energy over this period.

Mid/long-term perspectives (until 2015): The long-term perspective is excellent, assuming that the technical challenges can be overcome. It is not unreasonable to suggest that some hundreds of MW capacity might be installed by 2015. The controversial Severn Barrage would be outside this timeframe, not least due to the tremendous engineering challenges, though with the potential to generate up to 8GW at peak flow there is still considerable interest in this idea.



Main market actors:

There are no centrally compiled figures in Wales regarding the number of jobs or turnover in the renewable energy industry. This makes it difficult to estimate the value of renewable energy to the economy of Wales. Further complications are introduced by the large number of players who work in Wales but who are based in Scotland or England.

As wind energy is the principal source of renewably generated electricity in Wales, the biggest share of the market is taken by the large wind farm developers. Some of these are connected to large general power companies; others are specialist wind farm developers.

There are many smaller consultancies and businesses which are more general in their business. Although their share of the total renewables market is relatively small, they account for a significant portion of the employment within the sector in Wales, as the large companies are generally based elsewhere. These include manufacturing and installation companies.

Closely linked to the consultancies and businesses are the energy agencies, some of whom have formed a network (Sustainable Energy Wales) to promote the aims of the renewable energy sector at a national level. There is also a dedicated committee in the Welsh Assembly Government (WAG) called the National Assembly Sustainable Energy Group (NASEG).

On a general level, there are more than 100 active parties involved in the renewable energy industry in Wales, employing several hundred staff, and with a multi-million pound turnover. The following is an indicative list of some of the stakeholders.

1) Most important companies:

Wind Developers	PV Industry
The Renewable Development Company	Sharp Manufacturing Company of UK Ltd
GE Energy	IPC Solar Technologies UK Ltd
npower renewables	
Scottish Power	
United Utilities	
Green Energy	
NWP Offshore	
2) Smaller Consultancies/Businesses	3) NGOs and other institutions
Sundance Renewables	MWEA
Sustainable Energy Ltd	NASEG
Dulas Ltd	Centre for Alternative Technology
Welsh Biofuels Ltd	Severn Wye Energy Agency
Filsol Solar	West Wales Eco Centre
Green Dragon Energy	Conwy Energy Agency
Alternatives Wales Ltd	Awel Aman Tawe Community Energy

Conclusions:

The UK has lagged behind other European countries (notably Denmark, Germany and Spain) in installed wind power, especially considering the extremely favourable wind resource. Part of this has been due to lack of political direction in the past, but this has changed, with a corresponding increase in installed capacity. With community wind schemes becoming increasingly popular and public perception slowly becoming more favourable, allied with positive guidance in planning applications, the future looks promising. Despite the limit on available space onshore for wind farm development, due mainly to grid connection, local opposition, and highly sensitive regulations regarding placements within areas of designated beauty or high population density, there is still potential for a large increase in capacity. Even more favourable are conditions for offshore generation, with the first near-Gigawatt windfarm a real possibility in the mid-to-long term.

MWEA will concentrate on promoting local ownership of single or multiple-turbine windfarms, with the benefit largely accruing to rural, traditionally disadvantaged, areas. This will be achieved by raising public awareness through publicity, local meetings, and also raising awareness of the level of support that exists for such schemes.

The second technology focus will be on large PV installations. With conflicting views about the situation for grants in the under 5kWp sector, and the general prognosis being gloomy, it is reasonable to focus on the >5kWp sector, where the future seems somewhat more secure. Particularly suitable targets for this type of installation are schools, where there are tie-ins with national organisations, and where the educational value will be an additional benefit. Other possible sites will be hospitals, where MWEA already has a good track record, community halls and local authority buildings.



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