

# Energy Use and Production in Wales

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In May 2009 the *One Wales One Planet* green strategy was launched by the Welsh Assembly Government, outlining radical plans to ensure the region lives within its resources and becomes a sustainable nation. An important goal of this strategy is that Wales should produce more electricity from renewables than the region consumes "within the lifetime of a generation". This article looks at energy use and production in Wales.

## Energy use in Wales

Table 1 shows the latest estimates of energy use, and emissions of the greenhouse gas carbon dioxide, per head of population for GB regions. These data are taken from the

Department of Energy and Climate Change (DECC) publication *High Level Energy Indicators 2006*. Scotland, Wales, the North East of England and Yorkshire and the Humber were the highest per capita users of energy, and

Wales was the second most polluting region in terms of CO<sub>2</sub> emissions per capita.

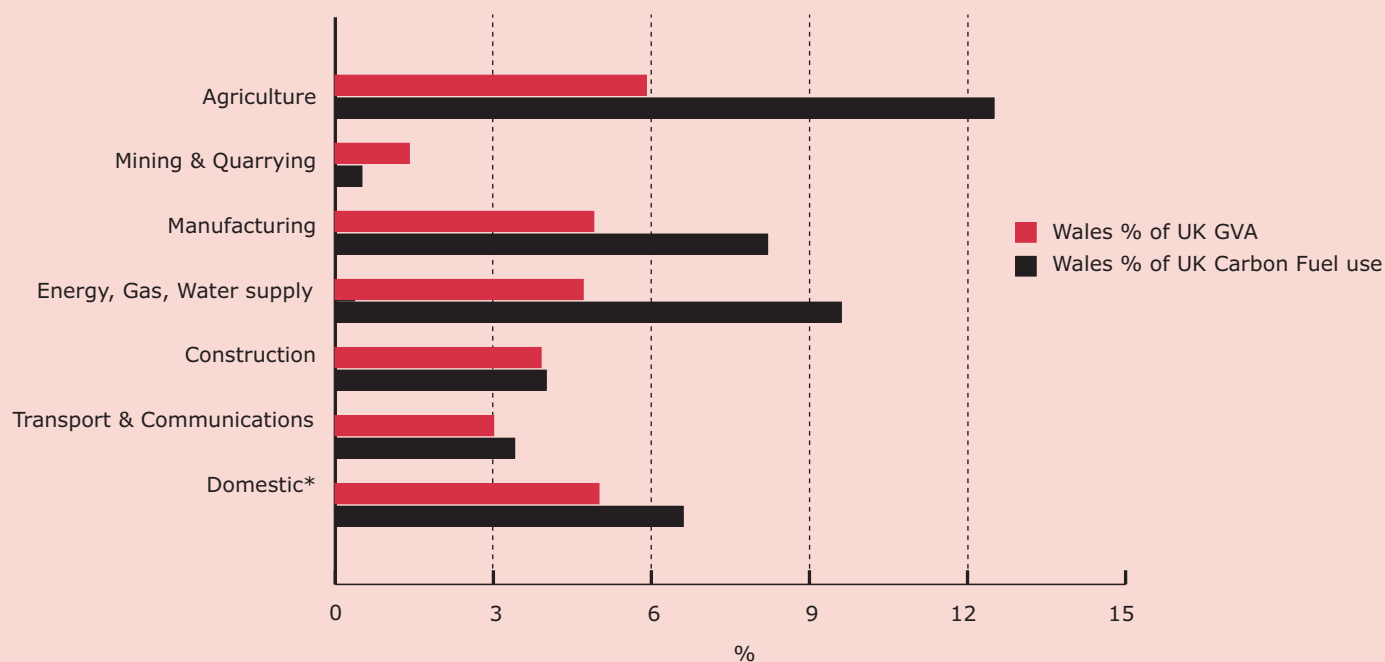
A major reason for the relatively high CO<sub>2</sub> emissions per capita is that the

**Table 1: Per Capita Energy Consumption and Carbon Dioxide Emissions 2006**

	Total final energy consumption per capita (kWh)	CO <sub>2</sub> emissions per capita (tCO <sub>2</sub> )
Scotland	33,600	8.5
Wales	32,800	11.1
North East	32,700	12.7
Yorkshire and the Humber	32,700	10.4
East Midlands	29,700	9.3
North West	29,200	8.7
East of England	27,900	8.1
West Midlands	27,500	8.4
South East	27,400	8.0
South West	25,800	8.3
Greater London	21,700	6.6

Source: High Level Energy Indicators, published Feb 2009, DECC

**Figure 1: Direct use of carbon fuels in Wales: Percentage of UK, & proportion of UK GVA generated in Wales by Selected Industries, 2003**



\* for 'Domestic' category Wales % of UK population is used instead of GVA

Sources:

REWARD project; <http://www.wwflearning.org.uk/scpnet/tools/reeio/>

ONS UK National Accounts, Blue Book 2009;

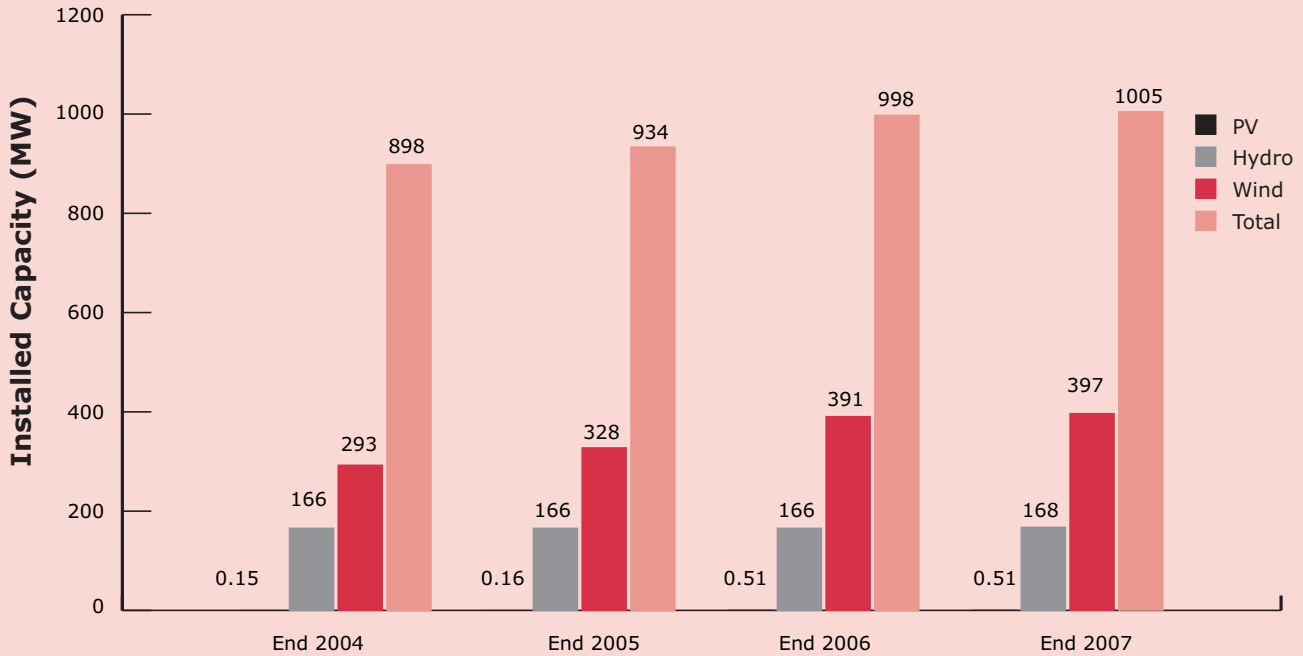
Welsh Assembly Government StatsWales

general economic structure of Wales is more energy intensive than the UK average. Wales has a relatively high concentration of key companies in high

energy use sectors, including: automotive companies such as Toyota and Ford; steel maker Corus; and aerospace multinational Airbus.

The REWARD project (Regional and Welsh Appraisal of Resource Productivity and Development) sponsored by the Assembly, the Environment Agency and

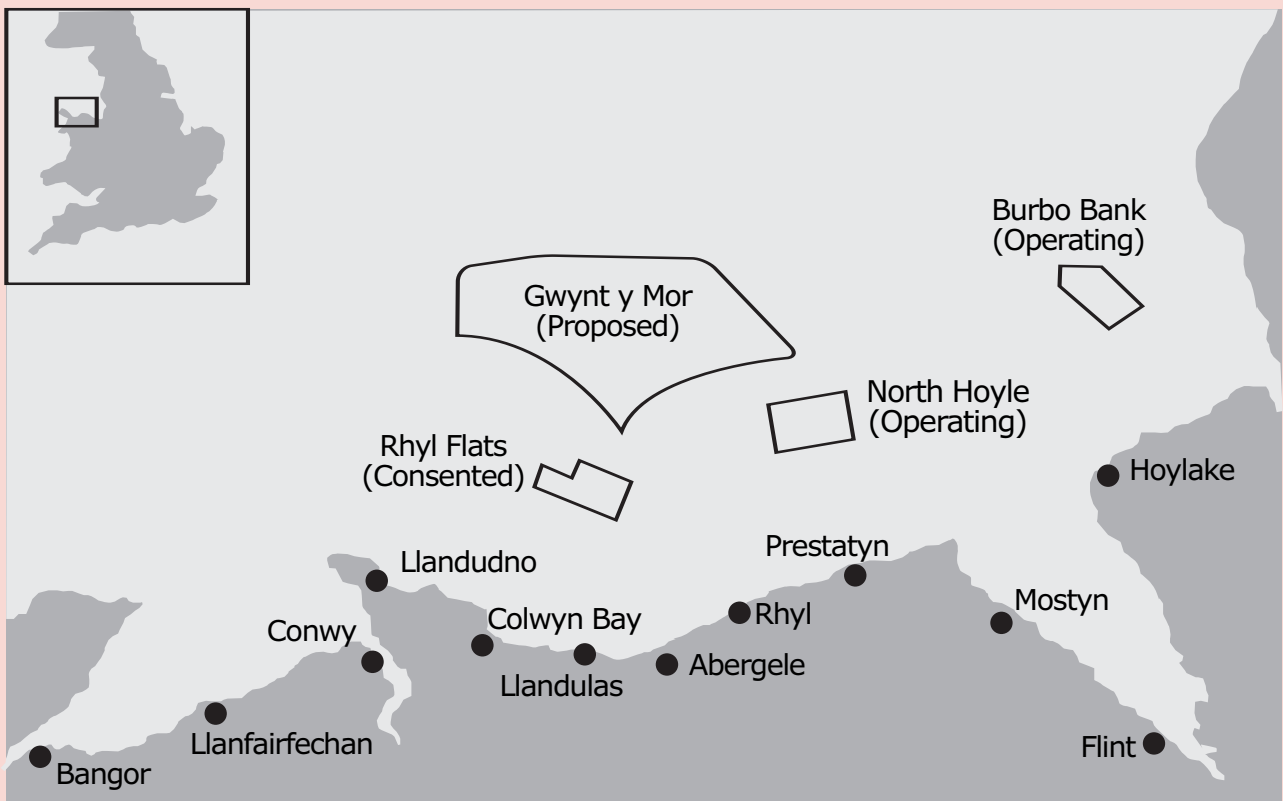
**Figure 2: Installed Renewable Capacity in Wales**



(PV = Solar Photovoltaic)

Source: Scottish Power / Western Power Distribution

**Map 1: Offshore Wind farms in North Wales**



**Table 2: The Distribution of Power Generation by Type 2006: Major Producers plus Wind, Wave & Solar , %.**

	UK	Scotland	Wales	England & NI
Coal	40.4	37.7	29.6	42.1
Oil	0.8	1.9	0.0	0.7
Gas	35.0	18.0	43.7	36.8
Nuclear	20.8	30.5	23.1	19.0
Thermal Renewables	0.8	0.0	0.1	1.0
Hydro natural flow	1.0	7.5	0.7	0.0
Wind, wave and solar	1.2	4.4	2.9	0.5
Total*	100.0	100.0	100.0	100.0
Electricity Generated (GWh)	398,326	53,609	34,914	309,803

\* Total of power generation types shown in this table will not equal total generation due to exclusion of pumped storage and other renewables

Source: Department for Business, Enterprise and Regulatory Reform (BERR)

a number of regional development agencies estimated that in 2003 Wales consumed 7% of all the carbon fuel used by the UK. This is a proportion well in excess of its population share of around 5%.

Figure 1 shows, for selected industries, the percentage of UK gross value added (GVA) produced in Wales and, against this, REWARD estimates of the percentage of UK carbon fuels for that industry used in Wales (both 2003). For each of these sectors the Principality's direct use of carbon fuel was higher than would be expected given the GVA produced. In manufacturing in 2003 for instance, Wales generated 4.9% of the UK GVA total, but was responsible for an estimated 8.2% of UK manufacturing's direct carbon fuel use.

Worryingly, the domestic (household) sector in Wales was also estimated to consume more fossil fuel energy (6.6% of UK) than its population share would suggest (5% of UK). The latest Labour Force Survey (ONS) data shows that a higher proportion of commuting trips in Wales are by private car than the UK as a whole - in 2007Q4 the proportions were 81% and 69% respectively. This car dependence is not limited to work trips with Wales having the highest proportion of all household trips in the Britain that were by car (73% compared to a GB average of 67% in 2005-6, from the Department for Transport *National Travel Survey* figures).

#### Energy production in Wales

The latest available statistics show that in 2006, 8.8% of the UK's electricity was generated in Wales - up 0.1 of a percentage point from 2005 (Digest of United Kingdom Energy Statistics *DUKES* 2007). Table 2 highlights the mix of power generation in the UK by source

in 2006. As a percentage of total power generation, Wales uses less coal but more gas than England and Scotland, and the nuclear proportion is slightly higher than that of the UK.

Wales has a higher proportion of generation of power from wind, wave and solar than England (& Northern Ireland), largely through the proliferation of wind turbines. However, Scotland is substantially ahead of Wales in the proportion of renewable energy generation (combining its long-established hydro-power stations of lochs and rivers with wind generation Scotland creates over 10% of its power as renewable).

Currently, Wales has the capacity to generate more electricity than it requires for domestic and industrial usage - the region was exporting 11.1% of its generated power to England in 2006 (<http://www.berr.gov.uk/files/file43818.pdf>). However, Wales imports around 80% of the raw materials needed to generate this power - with coal from local opencast sites, such as Ffos-y-fran, making up much of the remainder.

In the next decade a number of factors are likely to impact on global energy supply and demand, which will in turn influence the ability of the UK, post North sea gas and oil, to secure fuel for energy generation. Forecasts for the quantities of fossil fuel energy traded on global markets (mainly oil, coal and gas) point to increasing scarcity in the medium term, and with it, upward pressure on prices. Industry commentators are arguing that oil production may have already peaked (see Editorial and The Guardian 29/11/2009 <http://www.guardian.co.uk/environment/2009/nov/09/peak-oil->

international-energy-agency )

Furthermore, there is increasing concentration of the bulk of resources in a few countries, with, for example, natural gas reserves being found mainly in just three countries - Russia, Iran and Qatar. Politically the UK has had challenging relationships with the former two nations in recent years. In Wales the UK government gave permission in 2009 for a new 2000MW gas fired, combined cycle power plant at Milford Haven, to burn liquefied natural gas (LNG) imported from Qatar. This would play an important role in counteracting electricity generating capacity lost from the planned closure of Wylfa nuclear reactor on Anglesey in 2010. Wylfa accounts for around a quarter of Wales' existing energy producing capacity.

With the global hydrocarbon fuel supply situation in a precarious state, increasing energy demands from emerging economies such as China and India, and climate change concerns in burning fossil fuels such as coal, the focus on other sources of energy, such as renewables and nuclear, has increased.

#### Renewable energy in Wales

The Assembly Government envisages, through its *Renewable Energy routemap for Wales* (2005), a substantial increase in renewables to fill the energy gap in the region. In its national policy statement on renewable energy, Technical Advice Note (TAN) 8, the requirements for 800MW of additional installed capacity from onshore wind sources and a further 200MW of installed capacity from off shore wind and other renewable technologies were noted in order to achieve its previous targets (4TWh of electricity per annum

to be produced by renewable energy by 2010 and 7TWh by 2020).

Large scale onshore wind developments are being concentrated in seven Strategic Search Areas (SSAs). Wales became the location for the UK's first major offshore wind farm at North Hoyle, off the North Wales coast, and this may be joined by RWE nPower's large Gwynt-y-Mor (750MW) development. Having been granted planning permission this somewhat controversial site may be operational as early as 2014 (see Map 1). The Assembly Government's renewable energy roadmap highlights the importance of biomass (including from waste), although resistance to the development of a 350 MW plant in Port Talbot burning wood suggests that the 'selling' of widespread waste incineration to local communities will require careful consideration.

Figure 2 highlights the installed renewable capacity in Wales, indicating the prominent role played by wind and hydro power. In the next decade Severn

tidal stream energy generating activities will be more fully investigated and could potentially play an important role in future energy production in Wales.

#### **Nuclear energy in Wales**

Energy is not a devolved matter, so Wales faces many of the same challenges in access to fuel as the UK as a whole. With the existing nuclear energy infrastructure in the UK now ageing, the government in Westminster committed in 2008 to its replacement. Energy Secretary, Ed Miliband, announced on November 9<sup>th</sup> 2009 that 10 sites had been approved for new nuclear power stations, among them Wylfa in North Wales. A new Infrastructure Planning Commission will make a decision on applications received for the sites within a year of receiving them in a bid to fast track construction. The SNP government in Scotland opposes plans for any new plants in their region.

In response to the then Department for Business, Enterprise and Regulatory Reform's (BERR) *Consultation Document*

*on the Future of Nuclear Power*, the Welsh Assembly Government had noted that upcoming investments in fossil fuel and renewables in Wales made new nuclear build here 'unnecessary' in the next 10-15 years (reply of 22<sup>nd</sup> October 2007). This response was based partly on the assumption that carbon capture and storage would become widespread in this period. Here progress has been relatively slow, although RWE nPower, owners of the large coal fired Aberthaw power station, recently applied for planning permission for a demonstrator carbon dioxide capture plant at the site (if granted it will be the UK's largest such project connected to a working power station).

With the growing impetus for a low-carbon energy mix to respond to climate change, support for nuclear power generation appears to be growing within the Welsh government - for example positive support has been indicated by Carwyn Jones, the new First-Minister for Wales.

#### **Selected Sources:**

Welsh Assembly Government, One Wales One Planet

<http://wales.gov.uk/about/programmeforgovernment/strategy/publications/sustainabledev/onewalesoneplanet/?lang=en>

Welsh Assembly Government, Technical Advice Note (TAN) 8

<http://wales.gov.uk/topics/planning/policy/tans/tan8/?lang=en>