

# Renewable Energy – Where are we now?

Vattenfall AB, Lillgrund Wind Farm Sweden.

**R**ENEWABLE ENERGY seems to have been a staple diet for the popular media especially over the last three or four years. Specifically wind turbines and photovoltaic panels (PV) which have had significant column inches with reference to subsidies, the effects of a dearth or surplus of wind and sunshine, reliability and of course government policy decisions. They and other renewable generation have been heralded as the panacea of all our future energy needs and we have been subjected to evidence that is both well documented and proven but much that is heresy and premature. In this short article we aim to summarise the current energy situation within the UK and in particular the impact of renewables on meeting the demand for energy.



Dong Energy And Centrica, Barrow Offshore Wind Farm.

The UK's energy needs are broad and varied, but can perhaps be best put into two distinct categories, power and heat. From businesses to hospitals to consumers to transport everyone has a need for both. So how do we meet these needs? Well many of us are aware of the most common current ways of supplying energy, through nuclear, coal and gas power stations, wind turbines, PV and hydro. Heat is the single biggest reason we use energy in our society. We use more energy for heating than for transport or the generation of electricity and around 80% is met by gas alone and as a result heat is responsible for around a third of the UK's greenhouse gas emissions. This is as we now know unsustainable and at the Paris climate conference (COP21) in December 2015, 195 countries adopted the first-ever universal, legally binding global climate deal. The immediate result of which has added to the speed of energy policy changes already announced by the Department of Energy and Climate Change (DECC) since the general election in 2015.

<b>DECC Energy Policy announcements 2015</b>	
30/5/16:	The Conservative Party Manifesto pledge to "halt the spread of onshore windfarms"
18/6/15:	DECC announces early closure of the RO for onshore wind
8/7/15:	Summer Budget announcements on the Climate Change Levy (CCL); while OBR publishes figures on the amount of funding left in the Levy Control Framework
10/7/15:	HMT Productivity Plan Fixing the Foundations announces scrapping of Zero Carbon Homes
22/7/15:	DECC announces cuts to RO for solar PV and biomass and FIT accreditation
23/7/15:	DECC ends funding for the Green Deal Finance Company, ending the Green Deal
19/8/15:	Consultation on changes to Feed-in Tariff accreditation closes
27/8/15:	DECC publishes consultation on a review of the Feed-in Tariffs scheme
2/9/15:	Consultation on changes to financial support for solar PV closes
8/9/15:	Impact Assessment published on closure of RO for onshore wind
9/9/15:	DECC announces decision to end pre-accreditation for new participants in the Feed-in Tariff
23/10/15:	Consultation on review of the Feed-in Tariff scheme closes
18/11/15:	Amber Rudd reset speech
25/11/15:	Autumn Statement and £1bn CCS competition cut
17/12/15:	Solar FITs decision announced

The recent closure of a number of coal fired power stations, along with the failure to bring forward new generating capacity and problems with uneconomic fossil fuel plants, has raised fears of a looming energy supply gap. Recent energy industry and indeed media focus has therefore been on the ability of the UK to have sufficient generating capacity to meet demand. As a result, last month the UK government moved to allay fears of an electricity supply crunch by unexpectedly bringing forward key reforms to the energy market. An auction of contracts to supply electricity is to be brought forward a year, to January 2017, and will cover the supply of power for the winter of 2017 to 2018.

So how will renewables solve these challenges? Well in the short to medium term they can contribute a significant amount however the quantity and timeliness depend significantly on the weather. The biggest challenge we have is ensuring that the country has sufficient baseload to meet demand when the wind and sunshine don't align with the frequency demand of users. National Grid are tasked with ensuring that there is sufficient capacity in the electricity supply system to meet the demands of users and perhaps as we have had a consistent

reliable supply for a number of decades the presumption by users is that this will continue. There have however been a number of high profile industry reports that have identified potential shortfalls of power at times of peak demand specifically on very cold still winter days. In addition the loss of generating capacity from coal-fired power stations has several causes, including the poor economics of running coal plants at present compared with gas, and the government's announcement to phase out unabated coal by 2025, while cancelling a planned £1bn investment in carbon capture and storage technology a system seen as key to ensuring that the UK meets its COP21 targets. Therefore the question of whether base load generation can be addressed by renewables in the short to medium term is unlikely.

Renewable energy and more particularly low carbon energy is what the UK and all the other countries, which signed up to COP21 in Paris, require. Low carbon therefore includes nuclear power, which has other issues, but maybe a significant part of the solution for the carbon reduction targets to be met within the agreed timescale. So how and when will renewable energy fill the gap and supply the all important baseload that the UK requires?

**WIND POWER** will continue to be built with the majority of future developments focused offshore and on the reduction of costs involved in developing and operating them. Onshore developments, in the UK at least, will slow down due to the closure of the Renewable Obligations, reduction in Feed in Tariff, planning restrictions and increased local objections. There still of course continues to be the challenge of matching large quantities of generated power with demand peaks and troughs.

**SOLAR ENERGY**, which like wind will rely on cost reduction however, this 'micro-generation' could be a major player in supplying households with power especially if installed along side storage. The access to suitable knowledge and easily obtainable technology is resulting in consumers beginning to take an interest in looking after their own energy needs and making the decision to invest both time and money in controlling their own power and heat.

**WATER ENERGY** includes hydro, wave and tidal. The Meygen tidal array in the Pentland Firth will be the largest in the world, showing that Scotland is leading the way with research and development, which is now moving into a commercially viable solution. On the other hand, wave technology has had a somewhat chequered history over the last eighteen months with two high profile developers going into administration leaving wave development, at least in the UK, somewhat in a limbo. However the UK still has a technology lead with The European Marine Energy Centre (EMEC) Ltd which is the first and only centre of its kind in the world to provide developers of both wave and tidal energy converters with a suitable purpose-built, accredited open-sea testing facility.

**GEOTHERMAL ENERGY** using high and low temperature geothermal energy comes from thermal energy generated and stored in the Earth and is already being used with great success in many countries including

plants or plant-derived materials. As an energy source, biomass can either be used directly via combustion to produce heat, or indirectly after converting it to various forms of biofuel.



Campbell & Kennedy, Glasgow, Solar Power.

For the majority of consumers, understanding the energy market can seem overly complex due to the range of technology, the level of investment required and the political influence it suffers from. For the energy professional it is also complex because the industry needs to understand the market it works in, the legislative changes that seem to constantly involve energy and how they can ensure their businesses survive in an ever changing marketplace.

Innovation is the key to finding the best solutions and although politics can seem to be the main driver, it is individuals and teams in universities and commercial organisations that will meet the challenges head on. Refining existing technology and discovering new solutions that are driven by market conditions will be key. What is evident is that we will not see wholesale change overnight; it will be a gradual move to renewables albeit driven by legislative and consumer demands. The UK is very much at the vanguard of a number of these renewable technologies and we have seen many times over the years how we rise to the challenges that have been set. Skills, innovation, entrepreneurship and the will to succeed are hugely important to achieving a low carbon society for the future. A clear long-term UK energy policy is what is required so that proper levels of investment can be made resulting in a balanced solution which uses a number of suitable technologies to balance the energy trilemma of security of supply with low carbon at affordable cost. The energy industry will rise to the challenge and will produce the solutions that the market needs.

### UK Energy Mix - first quarter of 2016

Gas (CCGT) provided 35.4% of the country's electricity at 29.68TWh (13.7GW),

Renewables at 22.4% which generated 18.78TWh (8.7GW)

Nuclear at 19% and generating 15.98TWh (7.5GW)

Coal at 16.2% generating 13.56TWh (6.3GW)

Imports (via interconnectors) at 7.1% generating 5.92TWh (2.8GW).

[http://www.enapps.com/news\\_and\\_rep/Q1\\_2016\\_Market\\_Summary.pdf?ct=t%28April+2016%29](http://www.enapps.com/news_and_rep/Q1_2016_Market_Summary.pdf?ct=t%28April+2016%29)

**STORAGE** has been heralded as one of the main drivers that could convert intermittent renewables to a reliable baseload supply. Much reference to this has been made specifically in battery storage however there are many other forms of storage including hydro, thermal, compressed air and flywheels. The reality is that it will be many years before commercially viable large capacity storage solutions are able to provide the level of large scale storage needed to meet demand.

the USA and China. Once again Scotland has leading manufacturers of heat pumps which are devices that provide heat energy from a source of heat which includes extracting warmth from rivers and sea water to provide low carbon, affordable heating for homes and businesses.

**BIO-ENERGY** is produced from biological material derived from living, or recently living organisms. It most often refers to



Cereal Docks Spa, Italy.



**Hector Grant**  
Chief Executive  
Scottish Energy Association

The Scottish Energy Association (SEA) works for the economic success of its industry members in the power and energy sector working in Scotland, across the UK and internationally.

