

Alternative Energy: Arthur Christmas

Predicting is a dangerous game. Making Predictions in writing is an even more dangerous game, but this is BRAVE Partners – so here are the firm's bold statements about the alternative energy industry in 2012.

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Business is getting into full swing for 2012. In keeping with the firm's name, BRAVE Partners LLP likes to make some bold predictions for the coming year.

To be sure of getting the context right, to BRAVE Partners "alternative energy" is any business involved in the production and distribution of energy that is not mainstream oil & gas. This extends to coal gas and oil shale extraction as well as forms of renewable energy and the grid infrastructure required to distribute many forms of renewables.

Predicting is a dangerous game with many a prediction haunting the predictor in years to come. One relevant such example being:

"The energy produced by the breaking down of the atom is a very poor kind of thing. Anyone who expects a source of power from the transformation of these atoms is talking moonshine."

- Ernest Rutherford, 1933.

However, in the spirit of adventure for the New Year, BRAVE Partners makes a single prediction for 2012.

 UK to experience brown-outs or rolling black-outs during 2012.

2012: Prediction

Ageing plant and EU regulation will reduce UK electricity generation capacity by at least 11GW by 2016. It is difficult to see how sufficient capacity to cover just this shortfall will be constructed, let alone cover the inevitable rise in demand.

BRAVE Partners predicts that in 2012 the UK will experience brown-outs or rolling black-outs.

The miners' strikes in the early 1970s last saw significant black-outs in the UK. More crucially, industrial production was limited, by law, to three days a week under the "Three-Day Work Order".

For those confused by the title it is inspired by Arthur Scargill, the leader of the National Union of Mineworkers through the bitter industrial dispute in the mid 1980's where Margaret Thatcher and the miners battled it out.

The explosive growth in the use of technology since the 1970s means that a shortage of power would have a significantly greater impact on the UK economy.

Demand

Globally the demand for electricity is rising due to population growth; increasing use of technology; and increasing affordability of technology. The UK is no different. In June 2011, the BBC reported that the UK population is growing at its fastest rate since 1962 which was during the period described as the "baby boom".

Furthermore, the adaptation of technology and the power consumption of items is increasing. Whilst demand for power does reduce in a recession – a quick visit to an Apple store will make one wonder if there is a recession; and anyone who has tried to pump electricity into an iPad with an iPhone charger will appreciate that there is a significant growth in the power consumption of these devices.

Supply

Generation capacity in the UK currently stands at about 90GW. However, over the next four years a significant amount of generation capacity will come off-line. It is difficult to envisage how this capacity is to be replaced with the constraints on the various options to replace it. Many pundits, including BRAVE Partners, are therefore predicting that the UK will experience rolling black-outs or brown-outs in the near future. A brown-out is where the network voltage is reduced, so electricity continues to be supplied, but it does not do as much – as anyone who has tried to run a UK 240V hairdryer in a 110V country will know!

The EU and coal

The European Union (EU) has issued the Large Combustion Plant Directive. This Directive seeks to limit the emission of certain pollutants into the air from large combustion plants. Large combustion plants are those that have a thermal input of more than 50MW and convert this into heat. As a result at least five

coal fired power stations in the UK will be closed by 2015, representing a loss of 8GW, or nearly 10%, of generation capacity.

Carbon capture and storage (CCS)

New coal capacity will require carbon capture and storage technology. Whilst this technology is technically advanced, the economics are far more opaque. There are some potential synergies (ie cost-savings) in combining the need for carbon stores with the costs of decommissioning the wells and infrastructure around depleted oil and gas fields in the North Sea. The cancellation of the Longannet CCS project placed the economics of CCS clearly under the spotlight. Logannet, at 2.4GW, is the third largest coal-fired power station in the UK. The cancellation of this project prompted the Trades Union Congress (TUC) and the energy industry to publish the “coal Roadmap”, making the argument for clean coal as an integral part of the UK electricity generation infrastructure.

There is, however, currently no real timetable or agenda for clean coal. Therefore it is hard to see how any of the current coal-fired capacity will be replaced by new coal fired capacity for the foreseeable future.

Nuclear

Nuclear has been an important part of electricity generation in the UK. In 1997, the contribution of nuclear peaked at a 26% share of all UK generation capacity. Since then the contribution has declined to 16% by 2009. The decline has been, at least partly, driven by the Chernobyl disaster in 1986. Whilst there might appear to be a long (11 year) gap between Chernobyl and the peak in UK nuclear power contribution, this reflects an important characteristic of nuclear energy – very long lead times.

Today, four of the remaining ten plants are due to close by 2016 which will lead to an estimated loss of generation capacity of around 3GW.

In November 2009, the Government published the Nuclear National Policy Statement in which the approval of 10 new nuclear power plants was announced. However, Scotland, now devolved, has not approved any additional nuclear capacity. Electricité de France (EdF), which now operates most of the nuclear power plants in the UK following their acquisition of British Energy in 2009, also proposed the construction of two additional nuclear reactors at the time of the take-over. However, none of this capacity is expected to be operational before 2018, due to the long lead times for nuclear previously mentioned. This would leave a power gap from 2016 to 2018. The situation has been worsened by the meltdown of the Fukushima power plant following the Sendai earthquake in Japan. At a minimum this created a seven month delay while Mike Weightman, Her Majesty's Chief Inspector of Nuclear Installation, produced a report on the implications of the Fukushima disaster for the UK nuclear industry.

Whilst Rutherford's prediction seems funny because it is now known that vast amounts of energy can be derived from splitting atoms, it is in fact possibly presentient.

Rutherford knew that splitting atoms had the potential to produce vast amounts of power. His concern was whether this could be done in a practical way.

To a large extent, the jury is still

Mike Weightman's report concluded that there is no fundamental safety weakness in the UK nuclear industry. However, it did conclude that the industry could improve its safety further. If anything, waiting for these improvements will delay development further. That said, EDF was granted planning permission for the Hinckley C site in July 2011. Whilst this is progress, the nuclear site licences will be the critical issue and these have not yet been granted.

In short, nuclear generation is to lose around 3GW of generation capacity by 2016 and any replacement nuclear will not come on-stream before 2018 at the very earliest. There are moves to prolong the life of some of the other existing plants, but this will only serve to decrease the rate at which further shortfall will occur. It will not reduce the current shortfall, but will only serve to reduce the decline going forward.

Jumping Jack Flash (It's [a] gas, gas, gas)

The lyrics to The Rolling Stones hit Jumping Jack Flash are purported to have developed from an early morning conversation between Keith Richards and Mick Jagger after spotting Richards' gardener, Jack Dyer, one morning at his country house. Jagger had asked what the noise was, to which Richards replied: "Oh that's Jack – jumpin' Jack"

That aside, the UK appears to have become addicted to natural gas for energy. This possibly first developed as the North Sea oil failed to meet UK demand and coal production also reduced significantly. Natural gas became the only fuel in which the UK was self sufficient.

Prices were therefore pretty much set in terms of the marginal cost of extraction and not in terms of global supply and demand.

This has now changed and the UK is no longer self sufficient in natural gas. The country is dependent for natural gas on the whims and pricing of Qatar and Russia. As an aside this leads to a secondary BRAVE Partners prediction. With Cuadrilla and others make impressive headway on finding large reserves of shale gas in the UK, it will not be long before these are commercially exploited and the UK, at least temporarily, once again becomes self sufficient in natural gas.

However, the current situation is that the UK is not self sufficient in natural gas and much of the coal-fired electricity generation capacity is being replaced by gas-fired facilities. The Cockerhill plant in East Lothian, Scotland is one of the more recent examples. This is driving energy prices higher as the UK becomes reliant upon natural gas for both electricity production and home heating. Much of the UK switched from oil to natural gas for heat as the North Sea oil supply diminished pushing up oil prices which were also proven to be highly volatile from the 1973 oil shock to the self-produced natural gas. The country is now in much the same situation as it was previously – except with natural gas, rather than oil.

Unless halted, the UK "dash for gas" will make the country dependent on expensive imports from countries that are not necessarily that friendly. The USA has already shown the downside of this with its addiction to oil.

The Government is now seeking to arrest this “dash for gas”. The Energy Secretary, Chris Huhne, told a fringe meeting at his Party Conference in September: “We will not consent so much gas plant as to endanger our carbon dioxide goals.”

There are therefore both price and policy pressures on increasing natural gas generation. CCS is one option here to mitigate against the policy pressures. Moreover, natural gas capacity is often presented as the back-up capacity for the intermittent production of renewable – in particular wind.

Renewables

Within the UK, biomass is in fact the largest renewable energy source. Reading the newspapers would probably lead to the conclusion that wind is the largest contributor to renewable energy and this might become the case as wind generation capacity is rising rapidly. We concentrate on wind, biomass and large-scale hydro as these account for over 97% of all renewable electricity generation in the UK with biomass dominating at 83% of all renewable in input terms.

Wind

A second provider, Scottish and Southern Energy (SSE), just passed through the 1GW of installed capacity and the overall installed capacity as of 1 October 2011 is over 5.7GW. This large headline only translates to a little over 1.5GW of real terms capacity, about the same as a mid-sized coal-fired power plant, due to the intermittent nature of wind power. Moreover, recent dramatic pictures in the newspapers of the gearboxes from wind turbines catching fire in high winds has highlighted the fact that wind power is only available in the right conditions. Just as the British trains can have the “wrong kind of

leaves” on the track, it appears that the UK, and other countries, can have “the wrong type of wind” for wind turbines.

Overall, wind power is expensive to install and maintain, especially offshore. It is intermittent in nature - which both increases the expense and requires back-up capacity. Wind does form a component of a diverse energy strategy, but in the opinion of BRAVE Partners this technology has been over-promoted in the UK and has now reached the limit of its application. The current pipeline of 3.5GW of wind capacity under construction, 5.4GW with planning consent and 9.3GW awaiting planning is simply staggering. If all of this were built, it would represent 42% of UK demand, but yet there would clearly be days when UK demand would not be met – eg when an area of high pressure sits over the UK in spring making it cold, but very still. Most tellingly – no one thinks that this enormous nominal capacity will fill the current emerging energy gap.

Biomass

There are several different types of biomass. It is effectively plant matter that is burnt. Most frequently that plant matter is wood, so most often biomass is just a fancy word for wood. That said, landfill gas is the largest single contributor to biomass electricity generation at 21.8%. There is additional opportunity to increase biomass generation. The firm has been working on some mid-scale, tens of MW production,

BRAVE Partners believes that the current level of wind capacity in the UK is too much and finds the pipeline of projects simply staggering. It is hard to see how the transmission network can cope if all of the pipeline capacity is built.

wood burning projects recently. These can be built reasonably quickly and the thermal efficiencies are reasonable if built as a combined heat and power (CHP) plant. There is a supply of fuel both domestically, where Stobart is looking to become a predominant player, and from import. The East Coast of the USA has a lot of forestry business. The scrap from that can be a useful biomass fuel source. Biomass therefore certainly has potential for replacing the coal and nuclear capacity that is coming off-line, but these plants remain reasonably small scale. The largest biomass power plant in the UK has a generation capacity of 44MW.

Large scale hydro

Whilst the UK has something of a reputation for rain, it is also not particularly mountainous – making its geography unsuited to large scale hydro power generation. The UK has a reasonable number of hydro power plants. Of these Dinorwig, the Welsh pumped storage station, is by far the largest at 1.7GW. Capacity then comes down quickly and remains as pumped storage, rather than pure hydro. Foyes is between pumped storage and pure hydro at 300MW. Thereafter the generation capacity of these sites falls rapidly. Moreover, 2011 saw a reduction in renewable energy production partly due to low rainfall reducing hydro output. It would appear that the UK is at about the limit of what it can achieve from large scale hydro and small scale hydro will not fill the impending energy gap in time.

Despite the popularity of the feed-in tariffs, domestic solar remains a very small part of UK generation capacity. Until efficient panels are installed on an industrial scale, BRAVE Partners believes that PV solar will not be significant in the UK energy mix – if ever.

Other technologies

Some time back there was a joke that Dr. Who's Tardis, a now unseen Police phone booth, should be replaced by a Barrett home on the basis that a Barrett home fulfilled all of the criteria: it has an asymmetry in the perception of space between the inside and outside and you can expect to see one popping up almost anywhere.

Whilst it is not clear that there is an asymmetry of the size of a domestic solar panel between the inside and out, there possibly is if it is thought about in terms of the size of panel required for a particular power output. You need a lot of panel for not very much power due to low conversion efficiencies. The one thing that is absolutely true is that you can expect to see them popping up all over the place. Perhaps the new Tardis should just be a Barrett Home with solar panels.

That aside, all solar PV generation capacity combined in the UK only amounts to a few hundred Megawatts. Even the rush to install domestic solar that arose from the introduction of feed-in-tariffs only added 68MW since its introduction in April 2010.

The other, emerging renewable technologies remain small scale and inadequate to fill the 11 GW emerging energy gap in the UK.

BRAVE Partners services

BRAVE Partners LLP is a boutique investment bank serving the alternative energy and (re)insurance markets. The firm's definition of alternative energy is given at the beginning of this commentary.

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enquiries@bravepartners.com

www.bravepartners.com

OFFICE: +44 844 997 0271