KIRKNEWTON
COMMUNITY COUNCIL

Briefing Paper

An Aide to forming an Opinion on the deployment of the Colzium Wind Energy Power Station (known as Fauch Hill Wind Farm), based in the community council boundary of Kirknewton

Purpose

To provide a framework for working out whether this wind energy power station should be accepted or not.

Background

Kirknewton has been identified as one of the host communities for a wind energy power station to be sited to the west of Harperrig Reservoir. West Calder and Harburn have also been so identified. East Calder and Murieston, though not directly hosting, are close. The developer seeks to gain community acceptance for the scheme, has conducted its own consultation and is offering a number of community benefit packages to encourage acceptance. Community Councils had been relying upon the developer's consultations to ensure sufficient engagement with local people so as to allow reasoned evaluation and debate to take place. Kirknewton Community Council is concerned a sufficient sample of the Kirknewton community has not been engaged with this consultation to provide confidence in community opinion about the wind farm, and is therefore prompted to produce this document to hopefully help people in our community say what they think about this proposal and to help you to complete the questionnaire at https://www.surveymonkey.com/s/FauchHillWindFarm

Introduction

The primary objection to Wind Energy Power Stations is visual, a secondary objection is noise and a third is impact on the natural world, birds, insects, flora and fauna. Other objections include cost, subsidisation, and poor utilisation and need for back-up energy supply.

The potential visual impact can affect many, many more people than merely those within visual range; noise impacts are felt, if at all, by the immediate locality; natural world impacts can be extensive (or not) but often excite the interest of a limited number of experts and devotees, whether local or general. It can be reasonably claimed that if the wind energy could be trapped by devices, hidden in the heather, resistance to wind power stations would be trivial.

So the question that has to be investigated is whether wind energy harvesting is necessary, is essential or is marginal.

In order to determine this, two critical questions about energy supply over the next 20/25 years or so have to be answered;

The first question is concerned with whether there is a serious risk of the lights going out and the second is whether or not making use of the wind as a source of supply of energy is going to have a profoundly detrimental impact on the ability of future generations to survive or even be as well off as we are in social, environmental and financial terms.

Nobody has the answers to these issues with such clarity that they can be accepted as givens. Each of us has to endeavour to come to a view.

Energy Supply

Some bold assertions need to be made; these are all challengeable.

1. Stored energy

Nuclear Power at about its current level can be provided for the next 20 years or so. The reserves of relatively easily obtainable uranium ore are in decline. It would be unwise to build an energy future dependant substantially on Nuclear Fission processes. But the amount of energy available in the stored waste products of nuclear fission is enormous and, if harvestable without global security risk, could power the country for centuries. But its then waste products, though relatively short-lived (centuries, not millennia), are, unless carefully processed, a further major security risk. The cost of generating electricity is about 2.5p/kWh.

Coal reserves remain, and are in significant quantity under the North Sea. Substantial issues surround their extraction and processing. Exhaust products are amongst those for which atmospheric pollution and supposed climactic change can be charged and needs to be assessed in this context.
Coal with oil and natural gas is a source of energy, created mega millions of years ago, trapped and stored and once used is depleted for the almost infinitely indefinite future. Its use can only be legitimate in ethical terms, when (or if) without it very survival is threatened. Along with oil and gas, its main great advantage is that its energy is already stored. Unlike oil and gas whose energy with appropriate processing is almost instantaneously available, coal fired electrical energy can be turned off and on but not instantaneously. The same is broadly true for nuclear fission. UK coal is hard to extract in quantity. New techniques of in-situ processing are relatively unproven and with relatively unknown/unknowable side issues to do with contamination and pollution of ground and water sources. But significant trials have been completed successfully, and exploitation could commence within the next 20/25 years. World coal reserves are extensive, but expensive to process in forms which enable long distance transportation, unless resorting to low cost human labour exploitation. The cost of generating electricity is between 2.5p/kWh and 5p/kWh. The basic capital cost per kW of production capacity is 2p, operating costs of 1p/Kwh and fuel cost of 1.3p.

Oil is a declining reserve. As a natural resource it is very valuable as a feed-stock for chemical and pharmaceutical needs. Although a primary energy source for heat, for electricity, for transport fuels, it is accepted that dependence on it must be reduced. It is this change, this reduction in the use of oil for basic human needs, which is the greatest determinant of the concern of the future secure supply of energy. Remaining sources of oil lie largely in the territory of states, whose political stability is questionable, or places, cold, remote or deep, where the processes of extraction are very difficult and the technology risks relatively high, all of which imply significant risks of interruption of supply. Oil fired power stations in the UK have largely been withdrawn from service with the last at Fawley to close by 2015. Less than 1% of UK electricity supply depends on oil.

Natural Gas is a reasonably available resource, increasingly in lower quantities from domestic production, although in due course this decline may be substantially slowed if onshore and off-shore reserves can be proven to be sufficient and safely exploited from shale reservoirs. Security of supply for a number of decades is reasonably assured given the scale of reserves in friendly Norwegian waters. Homes use almost as much gas directly as they do electricity, which in its turn is about 75% dependant on gas. It may not be wholly unreasonable to argue that for the next 20 years or so gas availability will be such that the lights will not go out. So gas supply availability needs to be examined more carefully. The following 2 sources are relevant.

24th World Gas Conference
ARGENTINA | 2009

3 The European gas market: upstream and downstream characteristics

a. European reserves and production As of 1 January 2008, total European remaining proven gas reserves were estimated at 6177 billion cubic meters (bcm), representing 3.4% of global reserves. In terms of reserve life (proven reserves/production), Europe has 20 years of reserves at the current production rate. Norway enjoys the leading position in Western Europe with 30 years of reserves, followed by the Netherlands (19 years). Romania and Poland display significant reserve lives, with ratios of up to 55 years and 22 years respectively. From the World Gas Conference Buenos Aires 2008

The Energy Agenda in 2011

WORLD ECONOMIC FORUM

Synopsis

In 2010, the global energy sector felt the vibrations of China's footsteps. China will soon be using 3 billion tons of coal per year, and of all coal fired power stations constructed over the next 25-years, 90% will be in China. China's growing energy demands could be partially satisfied by cross-border supply, such as the importation of hydroelectricity from Russia. Of the hydrocarbon energy sources, gas is forecast to have the highest growth rate. By 2035, energy generated from gas is predicted to approach energy generated from coal. But while gas is perceived as a cleaner energy source than coal, concerns persist over the carbon dioxide emissions associated with gas production, and specifically the chemical contaminants associated with the production of shale gas. Atul Arya, Senior Vice-President, Research and Analysis, IHS, USA; Global Agenda Council on Climate Change outlined opportunities for Europe in shale gas, second and third generation bio fuels as well as innovation in storage solutions. "Eastern Europe, in particular, has great opportunities to exploit unconventional shale gas resources."

Without doing a lot of hard work, it would appear that gas is going to be around in sufficient quantities to stop the lights going out, provided that adequate infrastructure is put in place. The cost of generating electricity is somewhere between 2p/kWh and 4.5p/kWh, depending on fuel cost variability. A basic capital cost per kW of production capacity is 0.7p, operating costs of 0.3p and fuel costs of 2.6p

But all of the above are thought to be causing CO^2 concentrations to rise and also to be at the heart of global-warming concerns. So, although it doesn't appear that there will be a "lights-out" situation, there may well be issues to consider, concerned with our responsibilities to the circumstances, which future generations may well have to face, to endure and to overcome.

The great virtue of these stored hydro-carbon energy sources, listed so far, is that they can be turned on and off relatively quickly to respond to demand.

2. Renewable Energy

Ground-source Geothermal is a stored energy source and also a renewable. The source of the energy is the daily dose from the sun and the storage device is the thermal mass of the planet's surface. The density of energy storage is relatively low and therefore considerable mass is required to realise a significant quantum of heat energy, especially as electrical energy is required both to collect and intensify it. Its use is not necessarily therefore wholly carbon-free. The cost of generating electricity is about 4.5p/kWh.

Wave & Tidal

Wave energy is generally a form of wind energy, either from relatively recent passages of wind in a high frequency form or less recently lower frequency long ocean waves. In both cases the effect of wind has been smoothed out over longer timescales and to that extent is more predictable and regular. Clearly it is a renewable source, where the energy source is free. Although there has been research work conducted over many years from Salter's nodding ducks of the 1980's to the wave-derived wind-driven counter-rotating Wells turbine on Islay of the 90's, it is only in very recent years that there has been a gear change in development and trials and one or two cases of early exploitation. Substantial misgiving remains over the difficulties and costs of maintaining operations in the windy/stormy/salty near coast marine environment, given the power transmission needs to the beach and then to areas of demand. It would be unreasonable to postulate that the engineering issues cannot be overcome, but questions remain as to cost, and therefore to investment comfort to assure significant roll-out within the next 20 years or so. Wave energy has therefore been ignored for the purpose of this presentation.

Tidal energy has been deployed successfully for many years (La Rance near St Malo, France) since the '60's. So far it has depended on special and specific circumstances. Indeed it is more than likely that tidal power stations will be purpose designed and such has been the approach considered for the Severn barrage. Nevertheless there are tidal wave turbine projects of a more generic variety being proposed and tested, of which the Atlantis Resources Corporation's AK-1000 turbine 400MWatt array in the Pentland Firth looked promising. Recently approval has been given for a Hammerfest Strøm of Norway 10Mwatts system to be located off Islay. Although the power potential of Tidal energy around UK coasts, especially Scotland, is high, measurable in GigaWatts, the number of useful specific sites is relatively small and they are quite frightening to any mariner that knows them and has mostly spent time at sea avoiding them. It is unlikely that substantial tidal energy supply will be available within the next two decades. At the moment reliable information about capital and operational costs and expenses is not available.

Solar Photovoltaic (PV) clearly is a renewable source of power. It is only in recent years that the cost of photo-voltaic cells has been falling due to rising scales of manufacture and largely Chinese production to the extent that serious consideration can be given to large-scale deployment. The cost of generating electricity was given in 2006 as about 45p/kWh, but is thought to be rapidly falling. The bulk of the cost per kWh is in the capital cost. It is thought possible that the cost/kWh will be of the order of 3p/kWh in 5/10 years time in Northern Europe! Given that some 15/20 m^2 will be required per kW, so 1 hectare will generate of the order of 5MWatts. Some would argue that this would be a less offensive use of land and particularly low quality land than such alternatives as 4.5 MWatt wind-turbines, 150 metres high, sweeping over much the same area. Of course, those who dislike plastic on farm-land (as per raspberry and strawberry production etc might take a different view). As solar power cannot be captured at night and only in day-light hours, so it's notional daily production capacity is limited. Of course, this is reflected in the capital cost evaluation. It does imply nevertheless, as with wind-power, that an alternative energy source must be available outside its operating hours. But, of course, its day-light operating hours are substantially more predictable than those derived from wind-fronts passing through, and to that extent it is a more valuable energy source for the provision of reliable/continuous power to consumers.

Wind is an intermittent renewable source. The energy density of wind is relatively low. To get a feel of this just imagine the difference in the size, in terms of land use, of a coal-fired power station with its power output in Gigawatts and a wind-farm in Megawatts. The visual intrusion therefore of wind energy power sources on the environment is large. This matters on land; less so, offshore. Of course, the exhaust waste into the environment from wind is non-existent when compared with coal or gas fired power stations. Equally the fuel cost of wind is nominally free. Greatest power capture from wind tends to be in windy places, which though often remote are often highly visible. The capture capacity is limited by the robustness of the wind-turbine in its particular situation, offshore within the salt/water/air spray corrosion and battering, onshore to do with ground foundations. Current designs are not particularly robust and a significant proportion of wind energy, a cube of wind speed, is therefore lost. Future designs may be developed to improve capture effectiveness, but the possibility of their significant deployment within the next decade or so must be limited.

As wind energy is intermittent, its power output must be supplemented by a non-intermittent supply in order to be able to provide continuity of electrical power. Therefore for say 1 MWatt of continuous power, apparently derived from wind, about $1/3^{rd}$ will be derived from the wind-turbines and $2/3^{rds}$ will be generated by another power source, normally one that can be turned on and off quickly, given the relative unpredictability of wind. Combining solar power into the wind-power based power station will reduce somewhat the intermittent nature of the wind-source. There is more daylight in the summer, when wind tends to be less. Whereas more wind in winter months can balance off the relative lack of day-light solar.

Nevertheless it means that the cost of delivering 1MWatt of wind-power must include the Capital Expenditure recovery and non fuel operating expenses for both the wind-turbines and the back-up power source (and its own fuel, when in operation) in order to make any meaningful comparison of the cost of wind-power generated electricity.

More sophisticated analysis regard the UK as a wind-power station, over which weather fronts pass over extended periods of time, with power being obtained from the whole of the front and being transmitted to where needed; the nearer the point of demand to the source of electrical supply, the lower the transmission requirement and therefore transmission losses and costs (pylons and so on). But the windiest places tend to be the least habitable; so there is an inevitability of power transmission from remote places with its substantial visual intrusion, be they say Scotland or offshore.

The cost of generating reliable (backed-up) wind electricity is about 5.5p/kWh for onshore turbines and over 7p/kWh for offshore. Capital cost per kW for onshore turbines is around 4p with an operating cost of around 0.2p and zero fuel cost. Offshore equivalents are 5p and 0.4p respectively.

Renewable Energy Sources, that are available to be rolled out, namely solar and wind, suffer from disadvantages to do with the nature of their energy source, the unpredictability of wind-generating weather patterns or the limits of day-light hours. Without a storage mechanism, there has to be an availability of other generating plant to provide the power needed when these two renewable sources are unable to do so. But whereas the capital cost of solar and wind is relatively high with essentially free fuel, by contrast the capital cost of conventional plant is relatively low, but the fuel cost is high. So saving fuel cost for an added capital cost is an equation which can/may produce an affordable cost of electrical power.

There is a question of what is affordable. This largely depends on what costs now and in the future have to be taken into account. Amongst these is the issue of the impact of climate change and global warming. For example if polar ice were to melt catastrophically, as a direct result of preventable global-warming triggered by the accumulation of CO^2, caused by man's activities, resulting in cities like London to become inundated, then the future costs will phenomenal.

It is not a matter for this paper to give credibility to the arguments either for or against climate change, its consequences and its causes. There are many eminent people who have written on the subject, both for and against. Two things are clear.

- The planet's climate is warming.
- The concentration of CO^2 in the atmosphere has increased substantially.

But it is at least arguable whether the warming is but a part of normal cycles and it is arguable whether the increased concentrations in atmospheric CO^2 have a direct causal relationship to all or any part of the observed warming. Rather like smoking and lung cancer, where the association was clear but the link was, perhaps still, remains unclear, and yet smart people gave up smoking just in case, so intuitively at least smart thinking now would suggest endeavouring to limit or reduce, if possible, the emission of CO^2 and similar gases in a sensible manner, just in case.

This thought process would nevertheless suggest that an emission reduction programme that dramatically impoverished human society now would not be smart, would not be welcomed and would not probably be effective (rather like trying to collect taxes, which are too high), unless of course the precise causal relationship is proven, at which point it will be a matter of "all hands to the pumps".

Kirknewton Community Development Trust was charged by the Community Council to conduct discussions with the developers, EFRG, on the one hand and West Lothian Council on the other. These discussions have been considerable. The Development Trust has also set up arrangements to enable separate but very important discussions

concerning special arrangements for those house-holds which are really close to the wind-farm.

It is common practice for developers to recognise that they are using space which, although not owned by anybody, can be seen to impact on all those nearby, and to offer to compensate them for using this space. It is also a fact of life that such use will require planning consent. Objections often occur to the use of the land and space in this way. Planning consent is, of course, a formal process and one into which many can contribute. In the case of this wind-farm, as it is deemed to be a Section 36 Power Station, the Scottish Government is the planning authority (not the Local Authority). There are statutory consultees to such a planning application. One of these is the Local Authority, in whose territory the proposed power station lies. This for Colzium is uniquely West Lothian Council. Therefore a report will be prepared by the planning department of West Lothian Council, which evaluates the application, setting it against the criteria of the adopted Local Plan and other relevant statutory factors. The report is presented to the local authority's development / planning committee with an invitation to support / approve / modify / revise / deny the report and its recommendations, which might be to raise an Objection. An Objection would be expected to lead to a Public Enquiry. A Public Enquiry can be time consuming and expensive. Clearly therefore developers, wishing to avoid a Public Enquiry, will seek to make their arrangements with local communities and local authorities so that the risk of there being an objection is reduced.

Often developers prefer to deal through a local authority rather than have to make separate arrangements with communities, especially a plethora of them. So it is in this case that the developer has chosen to deal through West Lothian Council. After much discussion with all parties arrangements have been agreed in principle, whereby the two "host" communities of Kirknewton and West Calder / Harburn (as defined by Community Council areas), will each benefit from about 30% of the Community Benefit Package. These funds will be administered by properly established, fully transparent and wholly accountable Community Development Trusts. The remainder will be devoted to educational, rural and other community objectives and managed by an equivalent West Lothian Development entity.

It is probable that the scale of share of this community benefit that Kirknewton can anticipate enjoying on annual basis will be around £82,800.

An opportunity has been provided by the developers to those local entities with capital to participate in the ownership of the wind power-station and obtain a related share of the profits from it. We with other local communities could well apply to grant aiders, such as the Big Lottery Fund, and thereby participate directly. Clearly a regular, reliable revenue stream from such an investment would be beneficial for the implementation of projects and programmes, as set out in the Community Development Plan (this can also be seen online at http://www.issuu.com/kirknewton/docs/community_development_plan_nov_11).

The Community Council first met with the developer EFRG well over 12 months ago. The Community Development Trust was then charged with the conduct of the negotiations over the Community Benefit Package and has reported the outcomes as expressed hereby. The Community Council was assured that the developers would be undertaking a sufficiently extensive consultation process within the community that the support or otherwise of the project would be by it properly determinable. With that comfort, there then appeared to be no need for the Community Council to undertake its own test of opinion.

We have not received such adequate information from the developers which would allow us to have sufficient confidence in results so far provided to us, particularly on the sample size of those who have engaged in the community consultation from Kirknewton so the Kirknewton Community Council have determined to undertake its own consultation, which will be presented in due course to the appropriate authorities in West Lothian Council and Scottish Government. To ensure objectivity, we have asked an independent market

research company, IBP Strategy and Research, to assist us in this process.

It is probably the case that those most immediate to the wind-farm and therefore directly impacted by a change may have a different opinion to Kirknewton residents who will not see the wind farm on a daily basis. It must be remembered that they too are members of our community.

As this will be public information, so the results of the consultation and the methodology employed will be published on the Kirknewton web-site and will be widely available for all those that might wish to access it.]

This paper provides the background to the consultation and members of the Community are invited to read it, make their own enquiries and form their own views so as to be sufficiently informed and then better able perhaps to express a considered view in the consultation.

Various Sources

http://www.gridwatch.templar.co.uk/

Energy Production and Consumption: UK National Statistics Publication Hub

Total energy statistics - Department of Energy and Climate Change
www.decc.gov.uk/assets/decc/11/stats/publications/dukes/2307-dukes-2011-chapter-5-electricity.pdf

www.vestas.com/Files%2FFiler%2FEN%2FPolitical_initiatives%2FReports%2FComparative-cost-of-energy-Oct2006-EER.pdf

How much shale gas do we have? | Shale gas | British Geological Survey (BGS)

Underground Coal Gasification in the UK - The Coal Authority

Photovoltaic publications : Global Market Outlook, Solar Generation

www.iea.org/weo/docs/weo2011/WEO2011_GoldenAgeofGasReport.pdf

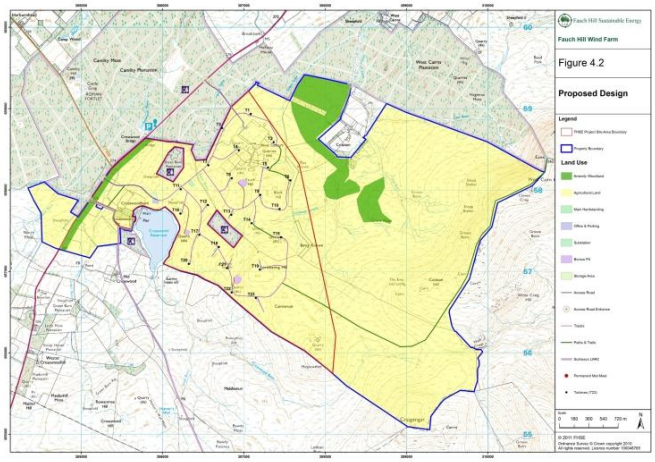
Community Renewable Energy Toolkit

http://www.vestas.com/Files%2FFiler%2FEN%2FPolitical_initiatives%2FReports%2FComparative-cost-of-energy-Oct2006-EER.pdf

http://www.fauchhillsustainableenergy.com/

http://www.bp.com/sectiongenericarticle800.do?categoryId=9037134&contentId=7068677

Map of Site



Written by Hugh Hunter Gordon in a personal capacity.