

WIND POWER - RENEWABLE? Maybe....SUSTAINABLE? Er, Probably not....

By Kenneth S Gilmour

Renewable energy is a term generally used to describe sources of energy which are replaced spontaneously, in a relatively short timescale. To some extent, the term is misleading, because all energy sources are renewable or non-renewable depending on how long one is prepared to wait. For instance, it is possible that oil deposits will be formed again in the earth's future, and yet it is certain that the production of sunlight will cease eventually as the sun runs out of fuel. Obviously, these represent enormous timescales in human terms, and so the generally accepted definition will suffice for now. The real issue here is **sustainability**, whether the machines and technologies required to collect the energy from the renewable sources and the current lifestyle equilibria within the world are capable of being maintained indefinitely using only the energy they generate. It is inconceivable that there could be the seamless transition (that many people expect) from the current fossil fuel economy, and expectations will have to be lowered. Practicality will quickly define a new sustainable equilibrium, some technologies will succeed, some will fall by the wayside.

Human beings build machines for many purposes, and the main consideration for each machine is fitness-for-purpose. This might involve considering cost, weight, size, corrosion resistance, longevity, etc., etc. depending on the requirements. In this age of relatively plentiful fossil fuels, rarely is 'embodied energy' (the total amount of energy used to create and operate the machine) considered, although it is becoming more common to at least think about this factor and its impact on the environment. However, the over-riding consideration is the performance of the machine, and it will be as complex and large as its intended function demands, with the price of the machine set by the cost of making it.

However, there is a class of machines, which includes **Wind Turbines**, whose purpose is to gather energy from natural sources, and convert it into a higher grade form, usually electricity, that can be used elsewhere for a range of purposes. In this case, the amount of energy that the machine could gather in its lifetime would be important, as would the amount of energy embodied in the creation of the machine. Quite obviously, if the embodied energy exceeded the gathered energy, one might consider the machine a failure, as it would be simpler to just take the machine out of the equation and use the embodied energy directly. Nevertheless, in certain circumstances, this is not possible, as in a solar power supply for a space probe, for instance.

However, as soon as the tag 'sustainability' is added to terrestrial machines, then the game changes. **Sustainability** means that, despite the depressingly low energy density of wind power, each wind turbine and its ancillary equipment must, as a bare minimum, produce **enough nett energy to create and maintain itself during its lifetime**, but it would seem that despite widespread but **ill-founded optimism**, practical experience does not indicate that this is the case as we shall see.

There is a relationship between the energy density of the fuel (the amount of fuel that has to be processed to gather a given quantity of energy) and the size of the machine that is required to exploit it. The size and weight of the machine increases dramatically as the energy density of the fuel decreases, starkly illustrating a law of rapidly diminishing returns. The energy density of fossil fuel is very high, that of wood is lower, and wind energy is very low indeed by comparison.

Nevertheless, many published sources contrarily claim that the return on the energy embodied in

large wind turbines is very large. Many, including UK Government publications, suggest that it might be as much as **20 times** during a typical lifetime. In other words, **one turbine can supply enough nett energy to produce up to 20 more turbines**. If these figures are to be believed, one might envisage a sort of turbine-begetting chain reaction, and a simple calculation will show that apart from that required for its own initial manufacture and installation, one solitary turbine, without the expenditure of even one atom of coal, oil, or gas would in 25 years have led to the **entirely self-sufficient creation of more than one million others**. This staggering productivity suggests that even a crude device would be such an attractive proposition that it is quite astonishing that engineers ever bothered with fossil fuel sources at all. After all, we were grinding corn and pumping water with wind power long ago. If it really is that productive, why did we ever stop?

And so, here we are today in a bizarre situation where there is a general, if misguided acceptance that a wind turbine will pay back its embodied energy **20 times** over, and a general, but misguided acceptance that, in addition, the consumer and taxpayer should pay subsidies and incentives that will pay back the investment in building that turbine another **20 times** over. These together represent a 4000% potential return on investment, surely enough for even the most cautious investor.

The cost of commonly traded industrial items generally reflects the amount of energy used to make them, or 'embodied'. One should be cautious about directly equating return on cash invested and the return on embodied energy, because the financial return can be an arbitrary quantity dictated largely by the selling price of the energy produced. However, in a competitive environment these parameters are fairly indicative of one another, and a **20 times return on investment is phenomenal** to say the least even without the 20 times payback of embodied energy. Compare the 15-year break-even time-scale for the investment in a new supermarket, for example.

The term '**have your cake and eat it**' springs to mind, and we challenge the Applicants to explain why the **subsidies** they would receive should not be immediately **abolished** simply on the basis that they are completely unnecessary, excessively greedy, and undoubtedly immoral.

Of course, the reality is that the 20 times return on embodied energy is either a downright lie or is based on incomplete and erroneous data and assumptions.

The alternative conjecture that **wind turbines produce less energy than is embodied in making and operating them** is very persuasive, and is no more graphically illustrated than by the situation at the **Centre for Alternative Technology**. Not far from here, near Machynlleth, there is an organization that was championing the cause of wind turbines, and indeed building and operating them, long before gullible politicians and cynical carpet-bagger commercial organizations jumped aboard this lucrative gravy-train. One might be forgiven for thinking that a 30 year head start would see them surrounded by dozens and dozens of these supposedly highly-efficient machines humming away ceaselessly, and providing all the energy they could ever want for. The only trouble is that they're not, and one thing one does notice, apart from the lack of working wind turbines, is the **extra large LPG tank and the gas boiler roaring away**.

And perhaps that very same conjecture explains why it is that, despite many, many hundreds of millions of years of evolution and the immensely more efficient 'manufacturing' mechanisms available in the natural world, it seems that **no living organism has ever succeeded in creating and maintaining itself simply from the energy in the blowing wind**. That is not to say that no living organism can create and maintain itself from any renewable source. In fact, the plants do just that, fortunately for the rest of life on earth. In this case, of course they collect the sun's radiation, which has a much higher energy density than wind power. Even so, after creating the plant, there is little surplus left over, and the plant's precious resources are carefully husbanded, especially in

higher latitudes, where the energy density of sunlight is reduced.

The truth is that wind turbines cannot be justified by the energy they will capture, and only really exist because of the generous subsidies, and other incentives such as the sinister-sounding Renewables Obligation Certificates. The Byzantine nature of the whole so-called 'Green Energy' business with all its misleading propaganda, deceit, and questionable practices like the trading of carbon credits, Renewables Obligation Certificates etc., etc., has all the hallmarks of the darkest chicanery that led to the recent world financial crisis, and will no doubt end the same way.

Cynical exploitation of the misguided compensation and subsidy culture enveloping the wind-farm phenomenon has, at the expense of the taxpayer and consumer, eliminated any chance of a reasoned economic justification by the normal de facto 'peer-review' process. This lack of control and scrutiny will almost certainly result in the **squandering of money and precious resources on these white-elephant schemes**, with potentially **disastrous consequences for Britain's energy supply future**.

It would seem that that wind power is set to cost the consumer and taxpayer dearly, and would appear to be of benefit only to those involved in producing and operating the wind turbines. Around the world this intense interest evaporates as soon as the subsidies disappear, leaving rusting hulks littering the landscape. So, to prevent this happening here, we suggest that the Applicants' true commitment and confidence in the real viability of their proposals can be tested by simply imposing special remediation terms upon all wind-farms and infrastructure proposed to be sited in environmentally and aesthetically sensitive locations. We urge that the remediation requirements should be **100% total removal of all imported materiel**, and complete reinstatement of the original land conditions. We suggest that to ensure compliance, the Applicants should be compelled to deposit cash bonds to cover the independently-assessed remediation costs before any works are authorised to commence.

We note that the United Kingdom Treasury has publicly stated that it considers the subsidies unaffordable, and moves were made to substantially reduce them, moves which failed for legal reasons. In the event that these issues were real, and not some political pantomime, cooked-up for public consumption only, we would like to suggest that the previously-employed imposition of some sort of 'windfall' (no pun intended) **taxation scheme could be used to reclaim these subsidy monies**.

Ultimately, we accept that whatever conclusion can be drawn by applying practicality, common sense, and mathematics to a problem, politics is always involved in the final decision.

And, whilst on the subject of politics may we suggest that the routing of the National Grid proposed transmission lines is **politically naïve**. In view of the definite hardening of Scottish attitudes in favour of independence, one might think that every care should be taken to avoid similar sentiments arising in Wales. Perhaps any proposed transmission lines would be better routed into the Welsh heartlands, rather than taking the shortest route possible into England, as they do now.