Man Proposes – Nature Disposes!

The fundamental problem with most forms of so-called 'renewable energy' is their inability to produce *continuous* AC power over a reasonable life span as occurs with a conventional power plant - whether fuelled by coal, gas, hydro, or nuclear. The greatest problem facing solar, wind, and wave power *is the weather*. Severe weather at sea and over land can unleash very strong forces capable of significant damage to or total loss of these forms of structures, as well as degradation from exposure to extreme temperatures, corrosion, etc.

When looking at the problems associated with wind turbines, the real problem is their inability to cope with strong wind gusts, and also of the effects of hail and lightning. To obtain insurance in Germany it is mandatory to replace gear boxes every five years at the outside because of the high incidence of claims. The *National Renewable Energy Laboratory* in Colorado in the USA, where much testing is done, maintains that no wind turbines are reaching a 20-year life span (which is too short anyway) because of gearbox failures, blade, and other assorted failures. Many gear boxes have to be replaced within three years at costs of around $300,000 per unit, and the *Laboratory* admits it doesn't know why this applies to all types, and from all manufacturers.

I can give the reasons why!

The engineers designing them don't understand the type of forces that occur when a line of severe thunderstorms passes through. In any well-developed thunderstorm with a decent cell structure and tops above 40,000' you can expect lightning, hail, and severe turbulence with updraughts and downdraughts sometimes in excess of 200 miles per hour (320 kms .per hour). Lightning can generate voltage of around 50 billion volts and temperatures of about 30,000°C which can be highly damaging to blades and electrical equipment; hail damage to blades causes out-of-balance problems and this is why the gear boxes and bearings fail.

The Impracticality Of Wind Turbine Propellors & Solar Panels.

Most damaging of all are the extreme wind gusts associated with the passage of a thunderstorm cell over a point on the ground. It is not commonly known that as a storm passes the wind veers suddenly through 180° and this, together with extreme downbursts, means that the blades can not be effectively feathered where they are horizontal to the airflow, because the airflow is changing rapidly all the time.

This short paper from General Electric explains the risk factors very well. And here are some pictures from someone who says that *"I am a proponent of wind turbines, in fact any renewable energy in general. Of course we only see the good side of it, not the problems that the world has had with them. This post in particular focuses on wind turbines, and some of the spectacular accidents that have occurred."* One wonders at his continuing enthusiasm! This article from *Der Spiegel* covers the dangers of wind turbines very well. It is very interesting that wind turbine manufacturers and operators won't release details of all the failures and damage that have occurred, and continue to occur. If the real statistics were openly available much of the subsidies and funding would cease!

Wind turbines are also limited in operation by either very hot or cold temperatures which affect both electrical equipment and gear-box oil. In 2006 *all 186 South Australian wind turbines stopped* when the temperature exceeded 42°C, and one caught fire. When any large object continues to revolve at speed around an axis, centrifugal forces over time cause particles in its mass to move outwards and this causes an out-of-balance situation; because of this, helicopter blades have to be rebalanced every six months, and in pairs. Aircraft propellors need a major overhaul every 2,000 hours, and flight in heavy rain has been known to pit helicopter blades over a period of time, as does dust and other airborne debris.

About two years ago two helicopters returning from an oil rig in the North Sea off Aberdeen passed though an area of rain at 2,500', and with what looked like mild weather radar returns. The first one flew through uneventfully, whilst the second some ten miles behind and slightly higher encountered '*St Elmo's Fire',* followed by an intense white light and then an extreme explosion-like bang. The blades were so badly damaged that they had to be replaced and this was caused by entering a static discharge field associated with the *small* storm cell. *All these phenomena can have the same affect on wind turbines.*

This paper features a number of photographs, including one of a wind turbine blade shown on page 16 that had been struck by lightning. One look at this picture shows clearly what happens with such a strike. Wind turbines tend to be built in elevated locations (to catch the wind) where they are particularly vulnerable to lightning strikes – a factor that seems to be overlooked in the planning of such installations.

Solar cells are generally not guaranteed to withstand more than a 2.5cm hail stone travelling at terminal velocity which *is much lower* than that delivered from under a storm cell, and would suffer the same damage as mentioned above from lightning and extreme wind gusts.

A further problem for Wind and Solar in providing meaningful power into a grid system is that because of their *intermittent* nature neither can provide *reactive power* into an AC distribution system. *Reactive power* is little understood, except by power engineers and those operating complex power systems, and is vital in regulating voltage when a system gets increased loads or when faults occur. The large scale blackout in the Eastern USA in 2003 *was caused by not enough reactive power* being available to regulate voltage when a series of failures caused a drop in voltage, and then the system cascaded into a huge shutdown.

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Wave power has not been demonstrated to perform or survive extreme weather for an extended period, and the problem of anchoring, corrosion, electrolytic action, and marine growth is a major impediment to machinery immersed in salt water for years, problems long known to the boating and marine fraternity!

In conclusion, I will add that the problems involved with severe thunderstorms have been known to aviation and aircraft manufacturers for a long time now, and it has taken the loss of many airline aircraft trying to take off or land under storm fronts for this lesson to be learned. Airline pilots are taught to have a very healthy respect for the well-developed thunderstorm, *and yet wind turbines are erected on hilltops and high ground with large blades anchored to high towers and exposed to the very forces – high winds & lightning - that far stronger aircraft make sure they deliberately avoid.*

Richard Kleeman

Richard Kleeman is a retired Domestic Airline Captain who has been flying for 45 years. He also holds a Grade 5 Masters Ticket for boats, and has had a lot of offshore boating experience up the Queensland Coast. His comments are based on these years of practical expertise.

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