Energy 103 - Our Major Source

by Prof. Ken Johnson, Ret.

There is no doubt the primary source of the Earth's energy has been and continues to be the Sun (officially called Sol). And if the theory is true that the Earth and its moon were once a part of Sol, then it must include the Earth's nuclear, geothermal, and tidal (Moon induced) energies as originating from Sol also. Our major source is from fossil fuels, which are the storehouse of millions of years of solar energy, received by the Earth and put into the growth of vegetable and animal life . . . producing hydrocarbons, carbohydrates, and oxygen. They then died, were covered by soil and rock in floods, tsunamis, landslides, tornados, volcanic eruptions, etc., which was followed by decay and fossilization into natural gas, crude oil, and coal. That has not stopped, and is continuing under our feet at this very moment . . . a 'renewable energy' . . . being renewed. According to the US Corps of Engineers, about 8 million tons of organic debris and silt are flushed every year from the US by our streams, into the Mississippi River and on into the Delta and northern Gulf of Mexico, as raw material for one of our millions of years old fossil fuel 'factories'.

In the US for 2008, fossil fuels accounted for about 70% of electric power generation (nuclear fuel was about 20%) and nearly 100% of energy for transportation.

A voice, perhaps from the back of the room, asks: 'What about hydro and wind powers?' Well, hydro power originates from Sol's radiation energy heating the Earth's ground and air. This thermal energy evaporates water into vapor form which is about 2% of the atmospheric gases and 95% of Greenhouse Gases (sorry AGW proponents, CO2 is only about 4% of GGs). The heated air/water vapor rises to altitude while changing its thermal energy into potential energy. It cools down, condenses to a liquid (clouds), and gets blown into mountainous regions for further cooling below saturation temperature, forming rain/snow. The rain and melted snow supplies the streams and rivers that form the lakes behind dams, where its gravitational potential energy is converted to electrical energy by water turbine/generator units.

Construction of hydro-electric power plants (river dams) pretty much ceased about 50 years ago in the US, primarily due to the high price of land the lake would occupy and for relocation of residents and their towns. The environmentalists were

also a factor, even to the point of getting some small plants shut down, lakes drained, and the dams removed. Perhaps another factor is that seismologists have linked earthquakes to abnormal geological stresses caused by large dammed bodies of water, including the quake in China in 2008, which killed about 80,000 people.

According to the Electric Power Annual [1], only about 6% of the electrical power generated in 2008 in the US, came from hydro-electric facilities, with no prediction of growth.

Then we come to 'wind power'. It also is a form of Solar Energy, partially produced by the 'solar winds' and other bursts of energy emanating from Sol (and possibly other stars in the Universe). These high energy particles, traveling in waves, act to create 'high' and 'low' pressure areas on the outer layers of the Earth's atmosphere. These pressure forces, along with frictional, thermal, gravitational, and 'Coriolis' forces, cause massive movements of air, generally moving from the 'Highs' to the 'Lows'. The movements can be somewhat predictable from analyzing the barometric pressure and temperature readings from various locations. Massive amounts of data and an objective scientific methodology are really required for this but presently only a relatively few measurements are actually available and so it is more of an 'art' than a 'science'. Wind turbine locations for power generation are also greatly affected by other things than high wind frequency . . . such as proximity to residential areas (noise), nearest wildlife sanctuaries (high bird mortality), remoteness (cost of connection to the nearest power grid), accessibility (construction and maintenance costs), and aesthetically, just being plain ugly to most people. Recently emerged, is a complaint from farmers downwind of the turbines about a decrease in their crop yields, apparently from a reduced flow of CO_2 as a result of slowing the wind down, with a possible pollinating insect elimination from the area because of the noise. My own observations driving through the downwind side of two of the oldest wind farms in California, the smog was decidedly worse because of the slowing of the air masses moving through the turbines.

A major design factor is the type of primary electrical generator used. The prevailing power grids in the US are alternating current (AC), operating at 60 Hz line frequency, although there are several operating with high voltage direct current (DC). No matter which type of generator is used in the turbine design, conversion unit (DC to AC, AC to DC to AC, etc.) are generally required, raising the KWH costs. Some designs use a turbine speed control mechanism, such as variable pitch turbine blades to hold the alternator at a fixed speed to generate the 60 Hz AC, but that eliminates it as a source when the wind speed is below the lowest to give a 60 Hz output.

It can be predicted that generally, because of Sol's effect on the winds, power is primarily only available during daylight hours, leaving it generally unavailable during one of the peak load periods (evenings). The Electric Power Annual for 2008 shows only about 1% of the US electrical power was generated by wind energy in that year, which in general, is not economically viable without continuing support by public tax funds. Think about it. Wind energy has a romantic connotation to it and

has been available and used by humans for thousands of years, yet the billions of dollars spent on its research just has not yielded the economic viability to compete with fossil fuel/nuclear power generation. It is fine for flying kites and sailing boats, but does not even come close to satisfying the electrical energy needs of the world.

The proponents of CO2 AGW never seem to acknowledge even the possibility that variations in Sol's output occur, let alone that they affect the Earth's temperature. They are absolutely wrong. Changes do occur, with increases generally accompanied by visible phenomena like: dark 'spots', bright 'faculae', 'flares', 'loops', 'prominences', and 'coronal holes', many of which could swallow several Earths whole and never even burp. The 'sunspot' phenomena are thought to have been first studied by Galileo in the 1700s and as more data were collected over the decades, it became apparent the number of spots varied in a cyclic manner, similar to a sine wave with a period of about 11 years. They were called 'Solar Cycles' and given a number. The most recent was #23 which reached its maximum number of spots in about 2004, experienced a slow decline, and ended free of spots several months ago. Is this a possible reason for the observed global cooling over the last several years?

Around 04/05/10, there occurred severe disruptions in long distance radio communications (a common result of heavy sunspot activity), which coincided with the reappearance of sunspots to begin Solar Cycle #24. Fossil tree growth rings and ice core temperature indicators show a similar cyclic pattern in past history, leading to the conclusion the energy output of Sol rises and falls with the sunspot activity. This has been verified by satellite measurements of the solar irradiance and was the subject of a 2003 report by Messrs. R. C. Willson (Columbia U.) and A. V. Mordvinov (Russian Academy of Sciences), published in the 03/04/03 Geophysical Research Letters, concerning measurements made during Solar Cycles #21, #22, & #23. These data indicated changes in irradiance energy of about 0.2% from minimum to maximum and an overall increase in solar energy received by the Earth of about 0.005% per year. Doesn't sound like much, but quantity wise, based on a 25 year average, the Earth received about 200 quadrillion more BTU today than it did yesterday and will receive 200 quadrillion more BTU tomorrow than it did today. All other factors being constant, that could result in about a 0.02 deg. C per year increase in global temperature . . . a Natural Global Warming (NGW).

A few years ago, some researchers did some more "curve cracking" analyses of the historical global temperature data and found another sinusoidal appearing component with a 1500 year period. Their work is chronicled in a book which made the New York Times Best Seller List as: Unstoppable (every 1,500 years) Global Warming *[2]*, by S. Fred Singer & Dennis T. Avery. A quote from its Prologue is: "When Eric the Red led Norse families to settle in Greenland at the end of the tenth century, he had no idea that he and his descendants were about to demonstrate dramatically the Earth's long, moderate climate cycle."

Seems that our primary energy source is not quite as constant as thought, but based on the great immeasurable storehouse of fossil fuels we have, we shouldn't have too much to worry about because the anti-nuke environmentalists can't be in political control forever.

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