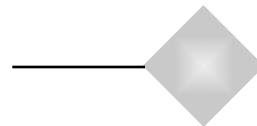


BREAKING THROUGH EDITORIAL



Departments of Energy and Interior Announce \$26.6 Million in Funding to Develop Advanced Hydropower Technologies



Peter Graneau

Under the same title as this editorial, the U.S. Department of Energy (DOE) on April 5 published (<http://energy.gov/articles/departments-energy-and-interior-announce-266-million-funding-develop-advanced-hydropower>) a request for research to substantially increase the development of existing and future hydroelectric resources. As the efficiency of modern turbines is already 90% or even greater, the DOE has not emphasized or even expected significant improvements in this area. However, it has been recently discovered that there exists a new energy source which can drive the turbine rotor in addition to the gravitational energy, stored in the water reservoir behind the dam, which is the primary source of hydroelectricity. This opens up the possibility of significantly higher turbine efficiencies which will be of great importance to the DOE and DOI hydroelectric programs. Vince Marshall, a reader of *Infinite Energy*, pointed out that the upgrading of turbines¹ fits this research purpose precisely.

The upgrading of water turbines was explained previously in *IE*.¹ The additional energy supplied to the turbine rotor is stored in chemical bonds between neighboring water molecules, called hydrogen bonds. This energy is liberated from the water when hydrogen bonds are broken. They are not the O-H bonds inside the water molecule, but chemical bonds between oxygen atoms in one water molecule and hydrogen atoms in neighboring molecules. Hydrogen bonds are responsible for the liquid cohesion of ordinary water and were first proposed in 1923 by the American chemist Gilbert Lewis. It is extensively discussed in the chemistry literature.² The amount of chemical energy stored in the hydrogen bond is, unfortunately, not widely discussed for it is difficult to measure, but its value has been estimated³ to be 688 J/gm.

Not until it was realized that hydrogen bond energy in the ocean water is responsible for the self-intensification of hurricanes did it occur to this author and his colleagues that it could become an important new source of clean energy. During the condensation of water, the hydrogen bond energy is restored to liquid water. Hydrogen bond energy is in fact derived from solar energy, which makes it a renewable energy source. For this to be of practical value, hydrogen bond energy has to be extracted from a large quantity of water. This fact drew our attention to hydroelectric turbines which are, today, generating 10% of all the electricity consumed in the U.S. The surprisingly high efficiency of these

systems (90% or more) may already be the result of hydrogen bond energy contributions. At the turbine site, near the bottom of the dam, it is not easy to distinguish gravity-related energy from liberated hydrogen bond energy. When a hydrogen bond is ruptured, it leaves the previously bonded pair of nuclei with unshielded positive charge. The nuclei will then repel each other instantly and strongly in the tensile rupture direction.

Energetic droplets, produced by bond rupture and impacting on the turbine blades, will help to drive the electricity generator. This is the particle mechanism which, we hope, the proposed research will confirm. To collect an appreciable amount of energy from many hydrogen bond ruptures, the water flow has to be large. This is the case in high power hydroelectric turbines. Readers of *IE* will be interested to know whether the principle of hydrogen bond energy liberation can be proved with small turbines in laboratory environments. We know that fog jets from water arc explosions have driven various aluminum turbines of about 10 centimeters diameter. Geometric scaling of water-driven turbines is therefore a distinct possibility. Domestic water supplies, providing a liquid head of 5 - 10 m, would be adequate to start the experimental research in the laboratory.

For full-scale tests, a turbine from an existing plant would have to be replaced with an upgraded turbine. The involvement of hydrogen bond energy would then be definitely confirmed by a measured "efficiency" of over 100%.

The mechanical water heater⁴ is a machine which is very relevant to the liberation of hydrogen bond energy from room temperature water. It consists of an electric motor, in the kW-range, coupled to a turbine-like rotor. A local supply of water is pumped by the rotor of the second machine and the liquid is thereby heated. In this process the water temperature is raised from room temperature to a level representing up to 50% energy gain. The only explanation of the temperature rise and energy gain is the liberation of hydrogen bond energy in the turbulent water of the second machine. This is an example in which mechanical energy is converted to heat. In the upgraded water turbine, the energy transfer is from mechanical (gravitational) energy to kinetic rotor energy. But heat is kinetic energy. This is the connection between the upgraded water turbine and the mechanical water heater. The new clean energy source is renewable because the bond energy of a liberated water mol-

ecule is restored on condensation in the atmosphere, leaving no polluting byproducts.

Electric energy production without carbon dioxide contamination of the atmosphere is not the only advantage of upgraded water turbines. These new machines generate the cheapest form of electricity because the process involves no fuel charges. Besides, since no new dam or increased water flow is required, the cost of the additional energy is also virtually free of capital charges.

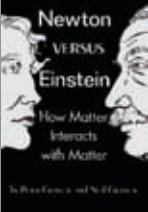
In view of the silence of textbooks about hydrogen bond energy manipulation in water, how certain is it that the output of hydro turbines can be made greater than the gravitational energy input? The answer is: the liberation of hydrogen bond energy has been proved, first with water arc explosions⁵ and secondly with electrospray experiments.³ These two peer-reviewed results have not yet been widely discussed in public by water scientists and water turbine experts. A public debate of these issues would probably launch a major experimental program.

Of equal importance is our claim that hurricanes self-intensify their force with the aid of hydrogen bond energy.⁶ My own efforts to arouse interest in this suggestion by the many hurricane researchers have produced no response. The enormous magnitude of the intermolecular internal water energy stored in the oceans is so surprisingly large, one thinks, that it could not possibly have been overlooked for

88 years. It is the time to explore this further, now that government funds have become available to advance hydropower technologies.

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Peter Graneau and Neal Graneau

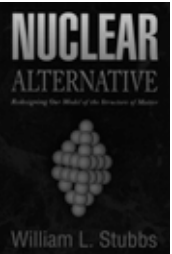
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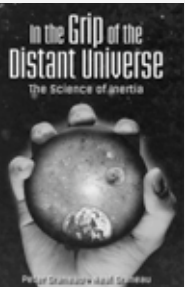
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