

# NATURE TO THE RESCUE OF MAN

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The *Boston Globe* of June 23, 2006 reported that a study requested by the U.S. Congress and supervised by the U.S. National Academy of Sciences found that "... a sharp rise in temperature made the late twentieth century the warmest period in 1000 years." Few scientists doubt that global warming is taking place. There is less agreement on what causes the worldwide trend of increased ambient temperatures. A plausible explanation is the accumulation of greenhouse gases, and particularly carbon dioxide, in the atmosphere. If true, we have the means to stabilize the average temperature on earth by reducing the combustion of fossil and all hydrocarbon fuels.

A dire consequence of higher ambient temperatures is the melting of polar ice and the consequent rise of the sea level. This displaces human habitations in coastal areas. Since we have only the combustion of hydrocarbon fuels to blame, we may as well take the precaution and burn less coal, oil, and natural gas. A significant step in this direction would be to generate electricity without chemical combustion. This has been done to some extent since the beginning of the electrical age, 100 years ago. One of the first major power plants was a hydroelectric station at Niagara Falls which is still in use.

Hydroelectric power is totally clean and economically competitive with thermal power plants. So why is not all our electricity hydroelectric power? The reason is that there exist only a limited number of geographical locations on earth where a large quantity of water can be stored behind a tall dam, less than a thousand miles away from major electrical load centers (cities). No more than 10% of all electricity is of hydroelectric origin.

Hydroelectric power is renewable solar energy. Other renewable solar energy sources are photovoltaic collectors of radiation and windmills harnessing kinetic energy from the atmosphere. Compared to hydroelectric power, they require costly man-made energy collectors which occupy areas of land and the sea. It is generally believed that they will, therefore, play a minor role in the prevention of global warming. Nor will the replacement of oil with ethanol be of much help, for ethanol is just another hydrocarbon fuel dumping carbon dioxide into the atmosphere. The belief that hydrogen in fuel cells will solve the pollution problem is equally misleading. The production of large quantities of hydrogen is based on the dissociation of hydrocarbons and the disposal of carbon dioxide to the air.

At the beginning of the twenty-first century, two alternative energy technologies are being researched with the objective of generating all electricity totally without greenhouse gas evolution. The first is controlled thermonuclear fusion which converts heavy water from the oceans to helium and electrical energy. This project, which has already been in progress for fifty years at a cost of billions of dollars, is beset with technical difficulties, and is decades and billions of dol-

lars away from becoming a commercial enterprise. The funding of the next ten or twenty year long phase of the fusion project is being provided by China, the European Union, Japan, Russia, South Korea, the U.S., and India. These countries are responsible for half the world's population. It illustrates how important it is deemed to be for human society to deal with the threat of global warming.

The second technology is virtually unknown. Keeping it out of the limelight was the wish of an unidentified European sponsor. Nevertheless, nine peer-reviewed papers have been published in the scientific press. They lay the foundation of a new energy technology which is based on the liberation of chemical hydrogen bond energy from water by electric arc explosions. As the stored potential bond energy derives from the kinetic energy of colliding water molecules, propelled initially by solar heat collected in the atmosphere, we can claim that the liberated bond energy is actually solar energy. Moreover, it is renewable solar energy, for the broken bonds can be renewed on releasing the unbonded water molecules back into the atmosphere.

The remarkable water arc explosions first attracted attention in Germany, fifty years ago, because of their anomalously large forces. Almost immediately they became industrially useful for metal shaping operations on production lines. Not until 1994 was it discovered in the U.S. that the arc explosions were the result of the powerful repulsion between small water droplets in the arc column. The collection of droplets has been described as fog. Jets of high-speed fog driven out of the water were invisible to the naked eye because they persisted for too short a period of time. This is how arc investigators overlooked them for half a century. The first dramatic video camera record of a supersonic fog jet in the air above a water arc explosion was produced by Richard Hull of Richmond, Virginia. The jet was only a few degrees warmer than ambient air, proving that it was not propelled by heat. The kinetic energy acquired by the fog jet in the arc was sufficient to punch holes through metal plates.

The creation of the small water droplets proved that intermolecular hydrogen bonds had been broken. The potential energy, which was previously stored in the hydrogen bonds, became kinetic energy of fog droplets. We propose that the kinetic fog energy should be used to drive turbo-generators of electricity. This process does not deposit carbon dioxide or any other greenhouse gas in the atmosphere.

The storage of solar energy in hydrogen bonds of water is a gift of nature. It occurs during the process of condensation of water molecules to the fog droplets of clouds. No help is required from man, his arsenal of scientific equipment, and his financial resources.

A major attraction of water-born energy is its ready availability almost anywhere on earth. This availability also depends on solar energy. Most water is continuously mov-

ing, driven by atmospheric heat or gravitational effects. The gravitational energy of water behind the dam of a hydroelectric plant has been created by atmospheric heat lifting water molecules from sea level to cloud level and then moving the clouds inland. Hydrogen bond energy plants would equally depend on the horizontal transport of water from the oceans over areas of land.

The storage of potential energy in the hydrogen bond takes place in the upper atmosphere where H<sub>2</sub>O molecules collide with droplets of water all over the world. It is a most fortunate accomplishment of nature. The transport of the water droplets to wherever electrical energy has to be generated is a further huge contribution of nature to a clean energy solution for our civilization. Man, however, has to contribute a little by inventing an efficient turbine which will convert the kinetic fog energy produced by water arc explosions into electricity. This is a large undertaking but it does not rival the enormous difficulties still faced by controlled thermonuclear fusion.

The peer-reviewed papers on hydrogen bond energy liberation have been collected in a 92-page booklet under the title *Unlimited Renewable Solar Energy from Water*. The booklet is available from the New Energy Foundation (ad appears on this page).

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