Nuclear CO2 warming costs

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MELBOURNE, May 21 (UPI) -- The fact is, it takes energy to make energy -- even nuclear energy. And the true "energetic costs" of making nuclear energy -- the amounts of traditionally generated fuel it takes to create "new" nuclear energy -- have not been tallied up until very recently.

What exactly is nuclear power? It is a very expensive, sophisticated and dangerous way to boil water. Uranium fuel rods are placed in water in a reactor core, they reach critical mass and they produce vast quantities of heat, which boils the water. Steam is directed through pipes to turn a turbine, which generates electricity.

The scientists who were involved in the Manhattan Project creating nuclear weapons developed a way to harness nuclear energy to generate electricity. Because their guilt was so great, they were determined to use their ghastly new invention to help the human race. Nuclear fission harnessed "atoms for peace," and the nuclear PR industry proclaimed that nuclear power would provide an endless supply of electricity -- referred to as "sunshine units" -- that would be good for the environment and "too cheap to meter."

They were wrong. Although a nuclear power plant itself releases no carbon dioxide, the production of nuclear electricity depends upon a vast, complex, and hidden industrial infrastructure that is never featured by the nuclear industry in its propaganda, but that actually releases a large amount of carbon dioxide as well as other global warming gases. One is led to believe that the nuclear reactor stands alone, an autonomous creator of energy. In fact, the vast infrastructure necessary to create nuclear energy, called the nuclear fuel cycle, is a prodigious user of fossil fuel and coal.

The production of carbon dioxide, or CO2 is one measurement that indicates the amount of energy used in the production of the nuclear fuel cycle. Most of the energy used to create nuclear energy -- to mine uranium ore for fuel, to crush and mill the ore, to enrich the uranium, to create the concrete and steel for the reactor and to store the thermally and radioactively hot nuclear waste -- comes from the consumption of fossil fuels, that is, coal or oil. When these materials are burned to produce energy, they form CO2, reflecting coal and oil's origins in ancient trees and other organic carboniferous material laid down under the earth's crust millions of years ago. For each ton of carbon burned, 3.7 tons of CO2 gas are added to the atmosphere, and this is the source of today's global warming.

The total energy input of the nuclear fuel cycle -- the energetic costs of nuclear power -- must be openly and honestly assessed if nuclear power is to be compared fairly with other energy sources. Very few studies are yet available that analyze the total life cycle of nuclear power and its final energy input versus output.

One of the best is a study by Jan Willem Storm van Leeuwen and Philip Smith titled "Nuclear Power -- the Energy Balance." To quote the final conclusion of their lengthy analysis, "The use of nuclear power causes, at the end of the road and under the most favorable conditions, approximately one-third as much carbon dioxide (CO2) emission as gas (from) electricity production. The rich uranium ores required to achieve this reduction are, however, so limited that if the entire present world electricity demand were to be provided by nuclear power, these ores would be exhausted within nine years. Use of the remaining poorer ores in nuclear reactors would produce more CO2 emission than burning fossil fuels directly." In this instance, nuclear reactors are best understood as complicated, expensive and inefficient gas burners.

Setting aside the energetic costs of the whole fuel cycle, and looking just at the nuclear industry's claim that what transpires in the nuclear plants is "clean and green," the following conditions would have to be met for nuclear power actually to make the substantial contribution to reducing greenhouse gas emissions that the industry claims is possible. This analysis assumes 2 percent or more growth in global electricity demand: -- All present-day nuclear power plants -- 441 in all -- would have to be replaced by new ones. -- Half the electricity growth would have to be provided by nuclear power. -- Half of all the world's coal-fired plants would have to be replaced by nuclear power plants.

This would mean the construction over the next 50 years of some 2,000 to 3,000 nuclear reactors of 1,000 megawatt size -- one per week for 50 years! Considering the eight to 10 years it takes to construct a new reactor and the finite supply of uranium fuel, such an enterprise is simply not viable.

(This piece originally appeared in Dr. Helen Caldicott's "Nuclear Power Is Not the Answer," The New Press, 2006. This piece is published here with the permission of The New Press. Helen Caldicott is president of the Washington-based Nuclear Policy Research Institute. She was a founder of the International Physicians for the Prevention of Nuclear War, the organization that won the 1985 Nobel Peace Prize.)