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Nuclear waste a nearly limitless source of electricity

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BY TOM RANDALL

The Chicago area economy runs on an aging nuclear-power infrastructure that must be updated if it is to provide economic growth and jobs.

Illinois produces more electricity with nuclear energy than any other state, just over 50 percent of its needs. In the 1970s and '80s, 14 nuclear plants were built, eight of them primarily to service Chicago and northern Illinois. But today three of those plants -- two in Zion and one in Grundy County -- have been retired. The two remaining Dresden plants are up for relicensing in 2009 and 2011 -- a likely renewal, but not a sure thing.

Complicating matters is the 13 million pounds of "waste" nuclear fuel that these plants are sitting on.

Replacing aging nuclear facilities with gas-fired plants is an unsatisfactory option considering that high demand and limited supply of natural gas are already pushing the price of natural gas through the roof. Although coal is plentiful, constructing coal-fire plants would involve too much environmental resistance because of its noxious emissions. So-called renewables and alternatives such as wind and solar are little more than pipe dreams. Using either of them would require covering most of the Illinois landscape with production facilities just to supply Chicago.

It would be wrong to blame the folks at Exelon for this quandary. They inherited an aging power infrastructure that was born out of a morass of environmental and regulatory rules that make building any kind of electricity-generation plant nearly impossible.

But there is a solution. It involves that so-called "waste" or spent nuclear fuel, and a new generation of nuclear plants known as Integral Fast Reactors (IFR).

Using existing technology, reactors can extract less than 1 percent of the energy from nuclear fuel. But the new IFRs can extract 99 percent of the energy from that same fuel by integrating a new fuel recycling process with "fast" reactors that are capable of using it. This relatively straightforward process is described in detail by physicists William Hannum, Gerald Marsh and George Stanford in the December issue of *Scientific American*.

Therefore, simply building IFRs next to existing nuclear plants in Illinois would enable us to use waste fuel over and over again, providing virtually limitless electricity for Chicago and northern Illinois. At the same time, we would dramatically reduce the problems of storing and transporting waste fuel, a concern for some in this age of terrorism.

But three hurdles stand in the way of developing this solution.

*First, President Jimmy Carter banned all recycling of nuclear fuel in 1977 based on the fear that it would produce bomb-quality plutonium.

*That led Hazel O'Leary, energy secretary under Bill Clinton, to kill research on IFRs in 1994, just as the work was nearing completion at Argonne National Laboratory near Chicago, because it involved reprocessing.

*The third hurdle that stands in the way of building any kind of nuclear generating facility is the long and uncertain permitting process that drives away potential investors.

These hurdles could be overcome.

A simple executive order to lift the ban on the specific type of recycling used by the IFRs, pyroprocessing, would take care of the first hurdle. This would not represent a threat of nuclear proliferation since this type of recycling does not produce plutonium that can be used for making weapons.

The second hurdle, restarting the IFR project would require an appropriation of \$300 million and an order by Congress for Argonne to finish its work.

While that work is in progress, Congress and the administration must tackle the much higher hurdle of streamlining the arduous and uncertain permitting process at the federal level. With the obvious energy shortages and price spikes caused by limited production in this country, such reform should be a top priority.

It is time for Illinois' congressional delegation, Republicans and Democrats alike, to lead a push in Washington to secure the state's economic future with the only practical source of electricity produced by a new generation of safe, pollution-free nuclear power plants.

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