Will there be a "nuclear renaissance"?

Will there be the "nuclear renaissance" discussed by the many speakers at "The Role of Nuclear Power" workshop? To meet various targets in offsetting greenhouse gas emissions, the need for a wide range of numbers of new nuclear power plants was cited: 10,000 by John Ritch, 4900 by Williams (to provide all seven Socolow and Pacala "wedges"), 2500 by Smith and Makhijani, to avoid increased carbon dioxide emissions, 50 by Mary Quillian to keep the same percentage in the mix of electric power generation. Yet Quillian could point to only 34 new reactors in even the remotest of planning stages.

Further insight into this issue can be gained from "Nuclear Power: Outlook for New U.S. Reactors," written by Larry Parker and Mark Holt of the Congressional Research Service and available from the collection of on-line resources Frank Settle has arranged in conjunction with his concept map for the workshop, <http://npw.wlu.edu/materials/index.html>. Parker and Holt list the 34 "announced nuclear plant license applications," all "generation III" designs or designs derived from them (see chart in "The Role of Nuclear Power" article for explanation of nuclear reactor "generations"), yet they noted that under the new Department of Energy (DOE) Nuclear Power 2010 Program, "offering to pay up to half the licensing costs incurred by industry applicants," only "three utilities applied to the Nuclear Regulatory Commission (NRC) in 2003 for early site permits to build new reactors at existing plants in Illinois, Mississippi, and Virginia."

This DOE program was set up to attract applicants to the reformed licensing process which the NRC set up in 1989, in which "the Early Site Permit Program allows utilities to get their proposed reactor sites approved by the NRC before a decision is made on whether or not to build the plant," "Standard Design Certification for advanced reactor designs allows vendors to get their designs approved by NRC" (such approval has been given to all generation III designs), and "the Combined Construction and Operating License (COL) provides a 'one-step' approval process, in which all licensing hearings for a proposed plant are expected to be conducted before construction begins." The work to obtain the early site permit is expected to take 2-4 years, the COL another 3.5 years, followed by plant construction of 5-7 years. The total of 10-15 years may sound long, but it is much shorter than the 26 years between the application to build Watts Bar 1 in 1970 and the onset of the plant's operation in 1996 (the most recent U.S. reactor to come on-line). Parker and Holt also note that "initial efforts by utilities to obtain early site permits have been slowed by substantial public comments" and that "the new procedures to not prevent state intervention in to the process. . . ." Moreover, in addition to public concern about reactor accidents, "in the post-9/11 environment, concerns about terrorist attacks are likely to be raised as well."

In addition to NRC Licensing Reform and the Nuclear Power 2010 Program (originally named "to pave the way for deployment of at least one new nuclear power plant by 2010"), The Energy Policy Act of 2005 offers further incentives to build new nuclear power plants, at least for the first ones in line. Offered "is a 1.8 cents/kwh tax credit for up to 6,000 megawatts of new

nuclear capacity for the first eight years of operation, up to $125 million annually per 1,000 megawatts." This would help only the first five reactors, but the Internal Revenue Service has published a protocol that would distribute the tax credit among all the reactors which apply for a license prior to 31 December 2008. Likewise, the regulatory risk insurance, to "cover the principal and interest on debt and extra costs incurred in purchasing replacement power because of licensing delays," would apply at 100% to only the first two new reactors and at 50% for the next four after that. The 2005 Energy Policy Act also provides for loan guarantees, but Parker and Holt write that the DOE published that "appropriations for the program are not anticipated."

With all these incentives, why are there so few applicants? Parker and Holt spend the last half of their report providing the answer: economics. As presented at "The Role of Nuclear Power" workshop by both Fetter and Quillian, electricity can be generated more cheaply by coal and natural gas. Parker and Holt show that the tax credit for new nuclear power would make it competitive, but that would apply to only five nuclear power plants, clearly not the basis of a "nuclear renaissance." The only ways to make nuclear power economically competitive with fossil fuel-generated electricity is for the cost of the fossil fuel to rise or for a tax to be imposed on the car generated by its combustion. Although the cost of coal is declining, the cost of natural gas has been subject to several recent fluctuations. Parker and Holt cite $6.65/thousand cubic feet (in 2004$) as the "breakeven point" that would make nuclear electricity competitive with that generated by natural gas. To make nuclear power competitive with a carbon tax, "the breakeven point for nuclear power versus natural gas-fired facilities is about $30 a metric ton (2004$); the breakeven point for nuclear power versus coal-fired facilities is about $15 a metric ton (2004$)." (This tax is significantly less than the $100/ton tax discussed by Fetter at "The Role of Nuclear Power" workshop.)

In spite of the reticence with which the nuclear power industry is approaching a comeback, Parker and Holt note the improved health of the nuclear power industry that already exists. Reactor downtime of 25% in the mid 1990s was reduced to 10% in 2006, and more than 60 reactors have had their ratings increased, for a combined total of 2500 megawatts. And the Tennessee Valley Authority is working to put their Browns Ferry 1 reactor, which has not operated since 1985, back into operation.