

Financing new nuclear power plants

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In the past decade, no new nuclear power plants were ordered by western countries and most EU states ruled out new nuclear with legislation but yet the nuclear industry continued to beat its drums proclaiming a revival. Has the time come for industry and governments alike to accept that nuclear cannot be perceived as an attractive investment on liberalized electricity market?

(600.5563) Greenpeace Finland/WISE Amsterdam - Construction costs for new nuclear power plants continue to escalate dramatically in real terms while reliability continues to disappoint, resulting in fixed costs being spread over much fewer units of output (i.e. kilowatt-hours) than expected.

Nuclear power plants are expected to be expensive to build but cheap to run: high fixed costs, but low variable costs. If construction costs are low and reliability high so that fixed costs remain low and can be spread over a large number of kilowatt hours of output, the plant is considered economically viable

Amongst variable costs, fuel costs are low, but non-fuel costs for operation and maintenance are always higher than anticipated. The operating costs of many nuclear power plants are often so high that it would be cheaper to close the plant and build a new fossil-fired station. (1)

The impact of competition on power generation

The introduction of competition has had two important impacts on nuclear economics. The first being that consumers are no longer captive to a franchise supplier therefore it can no longer be assumed that build and operational costs incurred can be passed on to consumers. These additional costs now tend to fall on shareholders as lost profits instead of consumers as in a monopoly markets; making new build of any type a huge investment risk in a liberalized electricity market. To reflect this risk, the required rate of return on capital is much higher and the period over which construction costs are recovered is much shorter in a competitive market. The shorter accounting life is based on how long it can reasonably be assumed that operating the plant will be profitable, not on the engineering life of its components.

The second factor is that existing nuclear power plants often cannot make the rate of return expected when built because the wholesale price of electricity is forced down by competition. Assets that cannot achieve the expected rate of return are characterized as 'stranded'. Owners of 'stranded' plants argue that the plants were built in good faith and were approved by regulators therefore they should be entitled to the income expected when the plant was built. If the market will not provide it, it should be raised with a surcharge on consumers. The taxpayers forced to pay for these poor investments are then surcharged as customers so that plant owners can retain expected profits. (2)

Prospects for new nuclear plants in western countries

The nuclear industry continuously claims that the prospects for new nuclear orders have improved and that new reactor designs will solve problems of inadequate safety and poor economics. That there is now one western country, Finland, about to order a new reactor, has fuelled the bluster.

In reality the only orders, apart from Finland, have been placed by Pacific Rim countries, mainly China, Korea and Taiwan, where utilities remain protected from the consequences of poor investment decisions by monopoly privileges. Even in these markets, ordering rates are much slower than projected.

The United States

In 2000, the U.S. Department of Energy (DOE) published a study commissioned by Westinghouse, which illustrates the lack of competitiveness of reactors in the U.S. The report states unambiguously that the so-called third generation nuclear power plants are not able to compete in the deregulated market. "Therefore if nuclear power is to be commercially attractive in the U.S. in the next 5-7 years, a dramatic decrease in the capital cost of a Generation III plant is necessary." (3)

There have been no new completed orders for nuclear power plants since 1973 yet comprehensive energy legislation currently debated in the U.S. Senate attempts to promote building of new nuclear reactors with heavy subsidies. (See also WISE/NIRS Nuclear Monitor 599.5557: "Energy Bill stalls in U.S. Senate") In practice this equates to a 10-year infusion of billions of dollars in research and development and tax breaks.

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Despite the will at government level, Wall Street analysts and investment bankers are reportedly unconvinced. Edward Tirello, managing director and senior power analyst at Berenson & Co., told participants at the American Nuclear Society's winter meeting that Wall Street no longer considered nuclear a good investment. He said that Wall Street was wary of investing because of real and/or perceived risks associated with nuclear. Tirello then went on to say that the task of re-educating financial communities would be "the biggest job of your life" and that if unsuccessful, the industry "is finished" (not all bad news then...). Financing is made more difficult by hedge funds that have been investing in utilities since the 1970s. Hedge funds make money by betting that stock prices drop - bad news for the industry is great news for the funds.

Entergy Corp. president, Donald Hunt commented that some nuclear companies were already involved in 're-educating' the financial community but admitted that the key to new build is whether the Energy Bill passes. He said that financial incentives would be required and suggested that this could range from emission or tax credits to those already proposed in the Energy Bill. (4)

United Kingdom

British government reviews on the economics and policies related to nuclear power in 1990 (privatization of electricity industry), 1995 (privatization of nuclear industry) and 2002 have yielded similar conclusions; the strategic case for new nuclear is weak and the economics of the business poor.

British Energy's severe economic crisis led to the company applying for government assistance. The European Commission is currently considering whether to accept the U.K. governments rescue packet (Euro 4.7 billion, US\$ 7.9 billion). This and the experience of Sizewell B are believed to have helped the government to reach the decision to rule out new nuclear power plants from the White Paper. (See also WISE/NIRS Nuclear Monitor 584: In Brief) At Sizewell B, completed in 1995, the actual price for the electricity produced was eventually three times the price originally planned. (5)

Advanced reactors

The nuclear industry is hoping that new reactor designs will solve the problem of poor economics. However, with the exception of General Electric's (GE) ABWR model, these so-called advanced

reactors exist only on paper, their supposed advantages yet to be proven.

Experience gained from two ABWRs built in Japan offers the industry no encouragement. In March 1995, GE estimated that a 1,300 MW ABWR could be constructed for US\$ 1,528 (in 1997) per kilowatt of electrical capacity. The actual construction costs of the reactors built in Japan, completed in 1996 and 1997, was reportedly double GE's estimation in 1995. (6) (7)

Finnish belief in cheap nuclear

Nuclear is an extremely political issue and the Finnish nuclear lobby's wish to have the 'first new reactor' is so strong that cost has not been a crucial factor. There is strong belief that nuclear is a cheap and reliable energy source, partly due to the operating history of existing plants and lack of serious accidents or scandals (see below).

Teollisuuden Voima (TVO) has signed a contract with AREVA (shares ownership of Framatome ANP with Siemens) and Siemens to build the EPR, an advanced model that exists only on paper, at Olkiluoto. Framatome ANP will supply the nuclear island while Siemens supplies the conventional island (turbine). (8)

Official cost estimates for the EPR have already risen by roughly 30 % above the highest original projections of Euro 1.75-2.5 billion (US\$ 2-2.9 billion).

TVO shareholders vary from electricity-intensive industry to small municipalities. Investors will get electricity generated by the EPR at cost price, either to use or sell on. TVO is a co-operative that produces power for its shareholders thereby enjoying the luxury of its own ready-made market. (9)

Many TVO shareholders appear unable, or unwilling, to make critical analysis of the economics and risks connected to the project. One example was the decision-making procedure of one of the biggest shareholders, the city of Helsinki. City council members were not provided with the economical calculations on which the estimated profitability was based and although it was possible for to seek this information from the city controller's office, only one council member took the opportunity.

Helsinki City Council is thought to be investing Euro 310.4 million (US\$ 360 million), which equates to a 9.7% share. Fortum, a TVO shareholder, is to take a 25.1% share, subject to Board approval, and is said to have issued new bonds to help refinance its debts. Fortum has put its oil business up for sale and is listing on the Finnish stock exchange to raise funds to develop its aspirations in the power trade. Stora Enso, which owns 14% of Pohjolan Voima Oy, TVOs largest shareholder is also expected to invest in the project. (10)

Special price for the Finns?

Framatome ANP is eager to get a prototype of EPR up and running in order to gain experience of the reactor and credibility for marketing to potential customers. To that end, it is supposed that TVO is getting the reactor for a 'special price', which suggests that EPR is not as competitive in the market place as perceived.

Public subsidies

Prior to the political decision on the reactor in Finland, one of the main pro nuclear arguments was that no public subsidies would be required. In reality, Siemens had applied for Hermes export credits for their turbine from the German government, improving TVO's chances of achieving a cheaper loan. Export credit guarantees are usually awarded to projects implemented in developing

countries to decrease the investment risk of the supplier. The final decision about the Hermes credits was to be made after TVO signed the construction contract however, Siemens has subsequently withdrawn the application (see below).

It had been rumored that France was also likely to subsidize the project given its governments eagerness for the development EPR. French Industry Minister, Nicole Fontaine, has recommended EPR as replacement for existing reactors to be retired by 2020. (11)

Future costs

Finnish legislation states that nuclear companies are responsible for the decommissioning of the power plants and the management of the nuclear waste. Finnish operators have reserved approximately Euro 1 billion (US\$ 1.2 billion) into a special fund for these purposes. Compared with estimates in other countries based on previous experience of decommissioning, it appears that the Finns have grossly underestimated. (12)

The nuclear industry is surviving on a small number of new orders. In most countries with liberalized electricity markets experience indicates that nuclear power plants cannot compete without public subsidies. The fact that a Finnish company is now placing an order has raised hopes among nuclear manufacturers. The Finnish 'experiment' will definitely be monitored closely by both the nuclear opponents and proponents.

Sources:

(1) The economics of new nuclear power plants and electricity liberalization: Lessons for Finland from British experience, Thomas S., 2002

(2) See (1)

(3) Study of Cost Effective Large Advanced Pressurized Water Reactor that Employs Passive Safety Features, U.S. Department of Energy, J.W. Winters, 2000

(4) Nucleonics Week, 20 November 2003

(5) See (1)

(6) GE Nuclear Energy, Presentation to the International Conference on Nuclear Power Industry Development and Cooperation, 16-17 March 1995. Price recalculated from 1992 dollars using GDP deflator.

(7) Nucleonics Week, 25 January 1996

(8) AREVA press release 18 December 2003

(9) Nucleonics Week Special, 16 October 2003

(10) See (4)

(11) See (9)

(12) VTT, Rasilainen K, Vuori S. Käytetyn ydinpolttoaineen huolto, suomalaisen suunnitelman pääpiirteet. VTT Energia, 1999

(13) Friends of the Earth Europe press release, 16 December 2003

(14) Williams, W.A., and Lee, P.S. Advanced LWR Technology for Commercial Application.

(15) WISE News Communique 485.4813: "Problems of decommissioning nuclear reactors"

(16) The Canadian Nuclear Lesson, Sierra Club of Canada and Greenpeace International Joint Briefing Paper, 2001

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