Nuclear power worldwide: status and outlook

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The IAEA makes two annual projections concerning the growth of nuclear power, a low and a high. The low projection assumes that all nuclear capacity that is currently under construction or firmly in the development pipeline gets completed and attached to the grid, but no other capacity is added. In this low projection, there would be growth in capacity from 370 GW(e) at the end of 2006 to 447 GW(e) in 2030. (A gigawatt = 1000 megawatts = 1 billion watts)

In the IAEA's high projection -- which adds in additional reasonable and promising projects and plans -- global nuclear capacity is estimated to rise to 679 GW(e) in 2030. That would be an average growth rate of about 2.5%/yr.

"Our job is not so much to predict the future but to prepare for it, " explains the IAEA's Alan McDonald, Nuclear Energy Analyst. "To that end we update each year a high and low projection to establish the range of uncertainty we ought to be prepared for."

Nuclear power's share of worldwide electricity production rose from less than 1 percent in 1960 to 16 percent in 1986, and that percentage has held essentially constant in the 21 years since 1986. Nuclear electricity generation has grown steadily at the same pace as overall global electricity generation. At the close of 2006, nuclear provided about 15 percent of total electricity worldwide.

The IAEA's other key findings as of the end of 2006 are elaborated below.

There were 435 operating nuclear reactors around the world, and 29 more were under construction. The US had the most with 103 operating units. France was next with 59. Japan followed with 55, plus one more under construction, and Russia had 31 operating, and seven more under construction.

Of the 30 countries with nuclear power, the percentage of electricity supplied by nuclear ranged widely: from a high of 78 percent in France; to 54 percent in Belgium; 39 percent in Republic of Korea; 37 percent in Switzerland; 30 percent in Japan; 19 percent in the USA; 16 percent in Russia; 4 percent in South Africa; and 2 percent in China.

Present nuclear power plant expansion is centred in Asia: 15 of the 29 units under construction at the end of 2006 were in Asia. And 26 of the last 36 reactors to have been connected to the grid were in Asia. India currently gets less than 3% of its electricity from nuclear, but at the end of 2006 it had one-quarter of the nuclear construction - 7 of the world's 29 reactors that were under construction. India's plans are even more impressive: an 8-fold increase by 2022 to 10 percent of the electricity supply and a 75-fold increase by 2052 to reach 26 percent of the electricity supply. A 75-fold increase works out to an average of 9.4 percent/yr, about the same as average global nuclear growth from 1970 through 2004. So it's hardly unprecedented.

China is experiencing huge energy growth and is trying to expand every source it can, including nuclear power. It has four reactors under construction and plans a nearly five-fold expansion by just 2020. Because China is growing so fast this would still amount to only 4 percent of total electricity.

Russia had 31 operating reactors, five under construction and significant expansion plans. There's a lot of discussion in Russia of becoming a full fuel-service provider, including services like leasing fuel, reprocessing

spent fuel for countries that are interested, and even leasing reactors.

Japan had 55 reactors in operation, one under construction, and plans to increase nuclear power's share of electricity from 30 percent in 2006 to more than 40 percent within the next decade.

South Korea connected its 20th reactor just last year, has another under construction and has broken ground to start building two more. Nuclear power already supplies 39 percent of its electricity.

Europe is a good example of "one size does not fit all." Altogether it had 166 reactors in operation and six under construction. But there are several nuclear prohibition countries like Austria, Italy, Denmark and Ireland. And there are nuclear phase-out countries like Germany and Belgium.

There are also nuclear expansion programmes in Finland, France, Bulgaria and Ukraine. Finland started construction in 2005 on Olkiluoto-3, which is the first new Western European construction since 1991. France plans to start its next plant in 2007.

Several countries with nuclear power are still pondering future plans. The UK, with 19 operating plants, many of which are relatively old, had been the most uncertain until recently. Although a final policy decision on nuclear power will await the results of a public consultation now underway, a White Paper on energy published in May 2007[1] concluded that "…having reviewed the evidence and information available we believe that the advantages [of new nuclear power] outweigh the disadvantages and that the disadvantages can be effectively managed. On this basis, the Government's preliminary view is that it is in the public's interest to give the private sector the option of investing in new nuclear power stations."

Source: International Atomic Energy Agency