

Uranium Availability

In his State of the Union address US President Bush announced that the US would resume the construction of nuclear reactors. In 2004 Canada accounted for 93% of the North American production of uranium so that decision will have a major impact on the available supplies of uranium and hence on Ontario's decision about building more nuclear power reactors. On a worldwide basis Canada accounted for 29% of the global production and the US accounted for 2%.

If you divide the current known reserves plus the anticipated new reserves by the current rate of consumption of uranium the apparent lifetime of the resource is 36 years. Obviously any increase in consumption in the US will reduce that lifetime. Moreover, if Ontario builds 25 new power stations as has been proposed by the OPA and continues the operation of some of its existing nuclear plants then domestic consumption would substantially reduce the lifetime even more, possibly to as little as 25 years or less.

The OPA report estimates that the lifetime of the new reactors will be 60 years, with a further 30 year extension to be achieved by retubing the reactors. The cost estimates appear to have been based on that assumption (although very little information has been provided on the costing calculations). Those lifetime estimates are strikingly different from the actual experience with the existing Canadian reactors, none of which has achieved even one third of the predicted lifetime. However, it really doesn't matter whether the reactors would last for 90 years or 25 years if there is no fuel for them.

The nuclear industry has proposed that a new model of the CANDU reactor type (not yet approved for use) could increase the burnup of uranium, slightly increasing the longevity of the supply. Moreover, lower grades of ore could be utilized, increasing production at the expense of cost. It has even been suggested that uranium might be extracted from seawater. However, the OPA has not reported on what impact such changes would have on either the supply or the fuel cost. If the US consumption rises sharply then it appears to be highly unlikely that such measures would do anything more than adjust the supply lifetime by a few years.

It has been argued that Ontario must adopt a nuclear program immediately because we ultimately have no other choice. It is claimed that renewable sources of energy cannot meet the energy demand and fossil fuels present the dual problems of exhaustion and excessive pollution and greenhouse gas production. That message is being intensively broadcast on TV and in newspaper reports, but it is false. Renewable energy sources can readily meet the energy demand, primarily by employing seasonal energy storage to achieve a temporal balance between supply and demand of heat and cold (see other reports on this site). Moreover, such

renewable energy can meet our needs for the foreseeable future and it has a large potential for coping with future population growth. That is very different from the consequences of depending on the uranium supply which will run out within two or three decades.

Compared to Canada the US has much less potential for employing seasonal heat storage because their temperature swings are much smaller. Nuclear power is therefore much more attractive in the US.

Canadian reactors use (nearly) natural uranium, burn up nearly all of the fissionable material, and then dispose of the fuel rods in storage dumps. It is possible to use trans-uranium elements as the fissile material and produce yet more trans-uranium elements in the reaction process, reprocessing the expended fuel to recover that new fissile material. Such breeder reactors still start with uranium as the original fissile source but they make much more effective use of the uranium, extending the supply lifetime. Of course that is not much help if nearly all of the uranium has been burned up, as is proposed by the OPA. A breeder reactor cycle uses different reactors, and requires a very different (and much more expensive) fuel processing infrastructure. The OPA has not assessed that potential for Ontario, and it would be so radically different from what has been proposed that it would require a new review.

The proposed new reactor does have some capability for coping with higher levels of enrichment so there is a possibility of integrating the Canadian and US nuclear programs in order to alleviate the fuel supply problems to some degree. However, there are many implications that would need to be examined. The benefits might not justify the effort, and could not be evaluated until the US nuclear expansion program is actually underway. Such a program would make Canada even more dependent on the US for its fuel supply, and might require major changes in the waste disposal procedures.

The biggest concern of all is what we will do when the uranium runs out. If the US ramps up its nuclear program quickly then we will run out of uranium before the last of the OPA-proposed reactors is even built. Of course we could turn to seasonal storage at that time, but we would in the meantime have wasted 100 billion dollars on a short lived nuclear white elephant, and we will have wasted 20 years during which the storage modules that are needed for seasonal storage could have been built in an orderly way. If the OPA and the government continue to pretend that the seasonal storage option does not even exist then our choices will be either a sudden and major loss of electric power production or a return to burning dirty fuels like coal.

For further information see:

http://kanata-forum.ca/seasonal_storage.htm

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