

It is impossible to say at this time what the demand for uranium will be after March 31, 1962, the present expiry date of the guaranteed market. The military demand may continue at the present rate or may cease altogether. On the other hand, we may have a situation in which there is still government buying but on a reduced scale. Whatever happens, it can be safely predicted that there will be some requirement for uranium for use in atomic power programmes in the early sixties. It is evident, however, that the demand for uranium in the early stages of a Canadian atomic power programme will take up only a small part of our potential production. Consequently, if the military requirement ceases or is cut back substantially, Canadian producers may have to look to export markets and should expect to meet the same conditions which prevail in the case of other base metals which are not in short supply.

The second stage of the research and development programme began in 1951 with the decision to design and construct a second reactor at Chalk River. This decision reflected the confirmation of the earlier belief that atomic energy could be used for peaceful purposes. It also took into account the continuing demands of the military programme. Hence, the new reactor has been designed for a dual purpose - to produce plutonium and to provide larger and improved experimental facilities. These experimental facilities, because of the reactor's size and high neutron flux, should be the finest in the world. This reactor is expected to go into operation in June of 1956.

This second stage of the combined programme, which might be described as the transitional stage, came to an end late in 1953 with the realization that our earlier hopes for the industrial application of atomic energy had a very good chance of being realized. My main purpose this evening will be to tell you why we think this is so.

When the nucleus of the uranium atom is split in a reactor, enormous quantities of heat and energy are released. In reactors designed exclusively for plutonium production - that is, for military purposes - the heat is exhausted in the reactor coolant. In other words, it is a waste product. The main purpose of our work at Chalk River is to find a way of using this heat. The obvious use is the making of steam to drive a turbo-generator in a power plant. This is what we mean when we speak of atomic power.

Before I discuss the engineering difficulties which must be overcome in designing a power reactor, perhaps I should state the problem in its economic context. The importance of atomic fuel as a source of power will depend on its cost, translated into cost per kilowatt hour of electric energy generated. This raises a second economic consideration - the future demand for power in Canada, the sources from which this demand can be met, and their probable cost. On the basis of this twofold economic consideration, we believe that atomic power, if it is to be used for large central power stations, must be produced for a cost not greater than the cost of producing power in a conventional thermal station using coal at \$8.00 per ton, or for a cost somewhere between 5 and 7 mills per kilowatt hour.