

## Problem 8 (Topic of Lecture 18)

As announced in the news release below, Egypt is to explore the use of nuclear energy.

Assume that it is desired to add 1000 MWe of nuclear capacity to be operational within 10 years in Egypt.

What unit output sizes of what reactor coolant type would you recommend and why?

Limit your written solution to 3 pages of prose and 3 pages of analysis and figures (if you wish to include such information), (hence 6 pages total maximum).

Among things you need to consider are the mission to be fulfilled by this nuclear energy addition (i.e. what is your selected energy product), the installed Egyptian capacity already dedicated to this mission, the geographic and capacity of the distribution system for the selected energy product (i.e. in the case of electricity, the Egyptian electric grid) and the Egyptian and global equipment supplier capabilities you will employ.

### **EGYPT WILL EXPLORE THE USE OF NUCLEAR ENERGY**

*(Nuclear News, October 2006, p. 18f)*

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President Hosni Mubarak has called for a national discussion on the possible introduction of nuclear power in the country. "We must take more advantage of new and renewable energy sources, including the peaceful uses of nuclear energy, and I call for a serious dialogue which takes into account the clean and cheap sources of energy available through nuclear technologies," Mubarak said. He added that Egypt will act to implement the results of the discussion "without hesitation." Mubarak, who was speaking at the annual conference of his National Democratic Party in Cairo on September 21, also noted that Egypt possesses the knowledge to proceed.

Mubarak's comments followed the presentation of an energy policy paper by his son, Gamal Mubarak, who is the party's assistant secretary general and secretary for policies. Gamal Mubarak explained that Egypt's need to explore other sources for energy, including nuclear energy, has become extremely urgent. "President Mubarak asked party cadres to put nuclear energy on their discussion agenda five months ago," Gamal Mubarak said. He added that while this issue must be studied in detail, he thinks that Egypt will start a program in a matter of seven or eight years.

The Egyptian Atomic Energy Agency operates a multipurpose research reactor, ETRR 2, at the Inshas Nuclear Research Center near Cairo. Built by the Argentine company INVAP, the reactor went critical in 1997. ETRR 2 has many features similar to Australia's OPAL reactor, also constructed by INVAP, where first fuel was loaded on August 11. Both are pool reactors of around 20 MWt of power, designed for the irradiation of materials and the production of radioisotopes and neutron beams.