

## THE BIRTH OF NUCLEAR-GENERATED ELECTRICITY



The first time that electricity was generated from nuclear energy occurred in an experimental breeder reactor in Idaho in 1951.

The idea for a breeder reactor (a reactor that could produce more fuel than it uses) first occurred to scientists working on the nation's wartime atomic energy program in the early 1940's. Experimental evidence indicated that the breeding of nuclear fuel was possible in a properly designed reactor, but time and resources were not then available to pursue the idea

After the war, the newly established Atomic Energy Commission (now the Department of Energy) assigned some of the nation's nuclear skills and resources to developing peaceful uses of the atom. The large bodies of uranium ore found in the 1950's were unknown then, and, since uranium was in very short supply, it was decided that the first power reactor would attempt to prove the theory of fuel breeding



EBR-I construction began in the late 1949 at the National Reactor Testing Station in Idaho, now called the Idaho National Engineering and Environmental Laboratory. Early in 1951, a few months before the EBR-I building was completed, nine staff members from the Atomic Energy Commission's Argonne National Laboratory arrived on the scene to install the reactor, which they had designed at their lab near Chicago.

The first attempt to operate the new reactor, in May of that year, was not successful. It was determined that there was not enough fuel in the core. Acquiring additional uranium and refabricating slightly larger fuel rods took nearly three months. Then, on Aug. 24th, Walter Zinn and his Argonne staff brought EBR-I to criticality ( a controlled, self-sustained chain reaction) with a core about the size of a football. Four months of low-power operation followed while the operators studied their new creation.



On Dec. 20, 1951, the first historic experiment at EBR-I began. The reactor was started up and the power gradually increased over several hours. At 1:50 p.m., the first usable amount of electricity ever generated from nuclear power began flowing from the turbine generator. Four light bulbs glowed brightly to inaugurate the birth of nuclear-generated power. The next day, the experiment was repeated, and sufficient electricity to power the EBR-I building was generated.

EBR-I's real mission was not to show that electricity could be generated by a nuclear reactor ---scientists already knew that a reactor was a kind of furnace. Splitting atoms inside the core produces heat. Heat can be used to turn water into steam, to drive a turbine and generate electricity, just as coal-or oil-fired electrical does. Therefore,EBR-I's chief task was to determine whether scientists' theoretical calculations on fuel breeding could actually be achieved---that more nuclear fuel could be created in a reactor than was consumed during operation. Less than a year after EBR-I generated its first electricity, Argonne scientists calculated that their reactor could indeed breed fuel. Then, early in 1953, a painstaking laboratory analysis showed that EBR-1 was creating one new atom of nuclear fuel for each atom it burned. The hoped-for result was a reality.

With that kind of encouragement, Argonne scientists began to design cores that would increase the breeding ratio so the reactor could not only sustain its own operation but also produce a little bit more to fuel more reactors. Three such improved cores were developed over the next 10 years. The last of them ---- called Mark IV ---- produced 1.27 new atoms of fuel for each atom consumed. EBR-I was used for research purposes until 1964, when the reactor was decommissioned. Argonne built a new reactor ---- EBR-II ---- at the INEEL and operated it from 1964 to 1994.

Today, the United States obtains 20.9 percent of all electricity from 104 operable nuclear power plants. The benefits, however, do not stop at the U.S. border. The nuclear technology that meets the needs both in the U.S. and many other countries follows the example first demonstrated in Idaho.

On August 26, 1966, President Lyndon B. Johnson participated in ceremonies at the facility, officially designating EBR-I as a National Historic Landmark. EBR-I is maintained for visitors by the Management and Operating contractor of the INEEL for the U.S. Department of Energy. The facility is open to the public seven days a week from the Memorial Day weekend through Labor Day from 8 a.m. to 4 p.m. Visitors can see four nuclear reactors and historic displays, and learn about current INEEL projects. Through the off-season, EBR-I is open on an advance request basis only. Arrangements for such visits may be made by contacting the INEEL Tour Group at (208) 526-0050.

