

Support Material for Nuclear Energy 360: EBR-1 Tour at INL

Objective: The learner will understand the basic steps of nuclear power generation.

Background Reading:

Many different energy sources can generate power to do the work of heating, lighting, moving, or producing things in people's lives. Nuclear energy is one way to produce electricity. Nuclear energy comes from the powerful forces contained in the nucleus of uranium atoms. During the process of nuclear fission, the bonds that hold the nucleus together are broken, releasing a great deal of energy. In a nuclear power facility, this energy in the form of heat turns water into steam, which then spins turbines and generates electricity.

The first successful application of using nuclear power to generate electricity took place in Idaho in 1951. Today, the experimental reactor known as EBR-1 is a National Historic Landmark. In the facility, a visitor can see a model of the reactor core where the nuclear fission took place. Metal fuel rods, containing uranium fuel, were bundled together in the reactor. The heat produced during nuclear fission was used to boil water into steam that turned the turbines' blades. The visitor may see the turbine generator room, where, using nuclear-powered electricity, four light bulbs were lit up. It was the first time a nuclear reactor had made that much usable electric power. A signature wall features the names of the scientists who worked on the project. Visitors can also see the room where used fuel, which can be dangerous to living things, was investigated in a "hot cell" with 39-inch concrete walls and 34 layers of leaded glass.

The EBR1 reactor is the birthplace of nuclear power. The scientists working there achieved what they set out to do: they proved that they could use a reactor to make electricity over an extended period. They went on to use what they learned to improve the process, and today 20% of the electricity in the United States comes from nuclear energy. Nuclear energy has many advantages, such as not producing air pollution through burning, and also many challenges, such as disposing of radioactive waste safely.

Learn more at <https://sciencetrek.org/topics/nuclear-energy>.

Discussion Questions:

- Why is EBR1, the Experimental Breeder Reactor in Idaho, so significant?
- What are the basic steps in producing nuclear power?
- What was the job of the scientists in the control room?
- What steps were taken to protect the workers in the hot cell?
- How did the scientists at EBR1 use the Scientific Method in their work?