

Why nuclear energy?

Nuclear energy already meets a significant share of the world's energy needs

- There are 441 nuclear reactors in operation in 31 countries
- These plants generate electricity for nearly a billion people, and account for 17% of the world's electricity production
- The U.S. has 103 operating reactors producing 20% of the nation's electricity
- Illinois leads all states with the highest share of nuclear (51%)
- Technology significantly developed at Argonne forms the basis of all nuclear energy systems used worldwide

Nuclear power is reliable and economical

- In 2001, U.S. nuclear plants produced electricity for 1.68 cents per kilowatt-hour on average, second only to hydroelectric power among baseload generation options
- U.S. nuclear power plant performance has steadily improved and is the best in the world
- Average generating capacity is now 90%, up from 65% in 1990 and 56% in 1980
- This improved efficiency has yielded the equivalent of 20 new nuclear plants in the U.S. in the last decade

Nuclear energy is needed to meet growing demand without contributing to global warming

- Worldwide demand for energy is expected to double by 2030
- There is an inadequate supply of fossil fuels to sustain future demand, and fossil plants generate greenhouse gases
- Currently, worldwide use of nuclear power avoids the emission of nearly 2 billion tons of carbon dioxide annually
- Nuclear power today accounts for 75% of all non-emitting power generation in the U.S.

The U.S. Department of Energy is fostering the expansion of nuclear power in the U.S. in the coming decade

- Standardized designs will lead to greater efficiencies in all aspects of nuclear plant operations
- Technological advances offer simpler, more compact designs, which leads to reduced construction time and costs
- Improvements in the regulatory processes reduce licensing and construction uncertainties, which lowers capital costs

Ultimately, advanced "fast" reactors are needed

- Current "thermal" reactor technology extract energy from a small fraction of the natural uranium found in the earth's crust
- Fast reactors are able to extract 100 times more energy from the same amount of uranium
- Used fuel from conventional thermal reactors and depleted uranium from the enrichment process used to make thermal reactor fuel can also be used in fast reactors

Fast reactors in conjunction with fuel recycling technologies can reduce the cost and duration of storing and managing waste significantly

- Virtually all long-lived heavy elements are eliminated, leaving a small amount of waste that requires isolation from the environment for under 500 years
- Fast reactors also reduce the risk of nuclear proliferation, since they facilitate segregation and consumption of plutonium (used in nuclear bombs) as it is created
- The combination of fast reactors and fuel recycling enhances safety, resource utilization, and nonproliferation

Argonne has pioneered thermal and fast reactors, as well as fuel recycling technologies, for 60 years

- Argonne continues to be substantially involved in a leadership role to develop the technologies needed for the sustainability, safety, reliability, and security of the world's long-term energy supply



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