



## The Global Nuclear Energy Partnership (GNEP)

### GNEP Element: Demonstrate Small-Scale Reactors

**G**NEP will provide small-scale reactors suitable for emerging economies that currently depend on oil and other fossil fuels for growing energy demands. Addressing this market is essential to safely expanding nuclear energy in developing nations and small-grid markets without increasing proliferation concerns.

#### **Small, More Proliferation-Resistant Power Reactors**

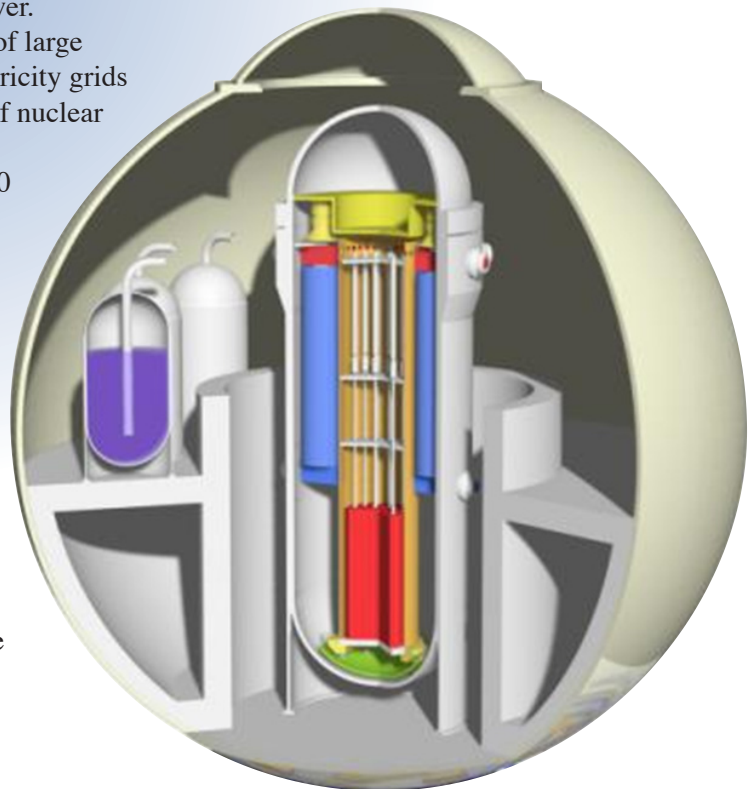
Light water reactors (LWRs) dominate the commercial use of nuclear power. Historically, the requirements of large national markets with big electricity grids have driven the development of nuclear power reactors, resulting in commercial units of about 1000 MWe. Markets with much smaller grids and less well-developed technical infrastructures have not had much impact on power reactor designs and technologies. A different reactor design approach, tailored for this market segment, could help meet the rising power demands associated with economic growth and urbanization, while

avoiding the use of fossil fuels that would otherwise be burned in power plants.

In order to expand the use of nuclear energy in these small electricity markets, a small

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*An example of a "small reactor" is IRIS, International Reactor Innovative and Secure ([www.irisreactor.org](http://www.irisreactor.org))*



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reactor is preferred for small electricity grids. These reactors will be safe, simple to operate, more proliferation-resistant, and highly secure.

### **How the reactors would work**

Small, more proliferation-resistant reactors could incorporate numerous features that would help address the intended market. Candidate features include fuel designs that offer very long-life fuel loads (possibly ones that last the entire life of the reactor so that refueling is not needed); effective, yet inexpensive IAEA safeguards to promote non-proliferation that might include remote monitoring; physical protection against sabotage and other terrorist acts; standardized designs in the 50 to 350 MWe range; potential for district heating and potable water production; fully passive safety systems; simple operation that requires

minimal in-country nuclear infrastructure; use of as much existing licensed or certified technology as possible; and use of advanced manufacturing techniques.

### **Showing that customers can count on small reactors**

Today, there are no fully developed or installed reactors that have all these features. Further evaluation and exploration of these concepts with GNEP member nations would support future decisions on continued development and, eventually, deployment.

Research, development, and preliminary design of several candidate small reactors are underway in a number of advanced industrialized countries. The GNEP seeks to form international partnerships to accelerate certification of marketable designs, and deploy operational demonstration plants in parallel with advanced fuel cycle demonstrations.

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