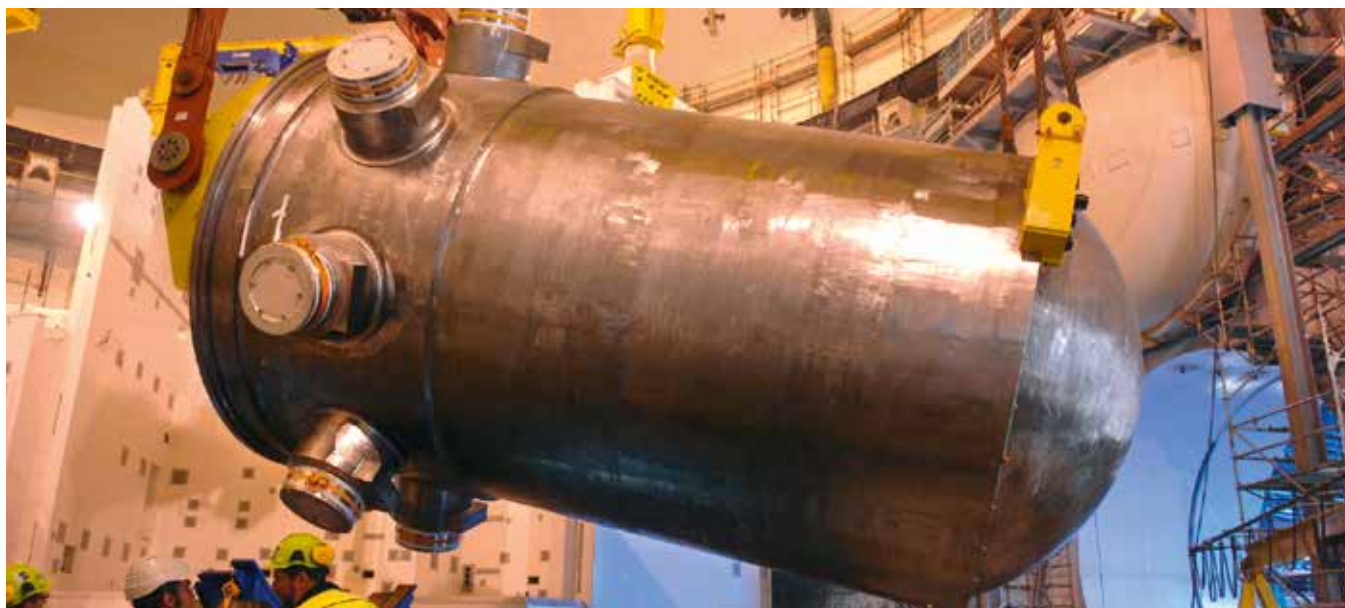


LOOKING INTO THE FUTURE:



1 For nuclear energy to play a substantial role in a sustainable global energy supply, both technical and institutional innovations are needed. Through various international cooperation activities, the IAEA promotes innovation that will lead to more efficient, more affordable and more sustainable advanced reactor technologies. Over 80% of the world's operational nuclear power plants use light water moderated and cooled reactors, commonly called light water reactors (LWR). Advanced LWR designs are being developed or are under construction in several countries to help meet future energy needs.

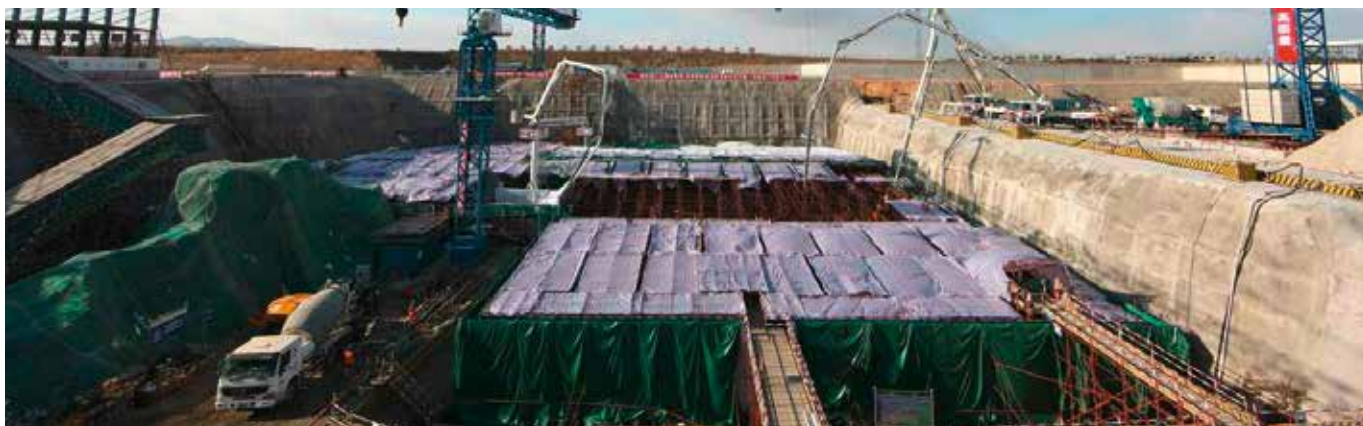
Photo: Reactor pressure vessel installation at Olkiluoto-3 in Finland, one of the latest LWRs under construction. (TVO)



2 Fast reactors could produce over 60 to 70 times more energy per kg of uranium than with current technologies. Closing the nuclear fuel cycle by using fast reactors and by recycling used fuel could enhance the use of natural resources and reduce the amount of long lived radioactive waste. Examples of fast reactors include the China Experimental Fast Reactor (CEFR), operational since July 2011, as well as the Prototype Fast Breeder Reactor (PFBR) in India and the BN-800 in Russia, both under construction.

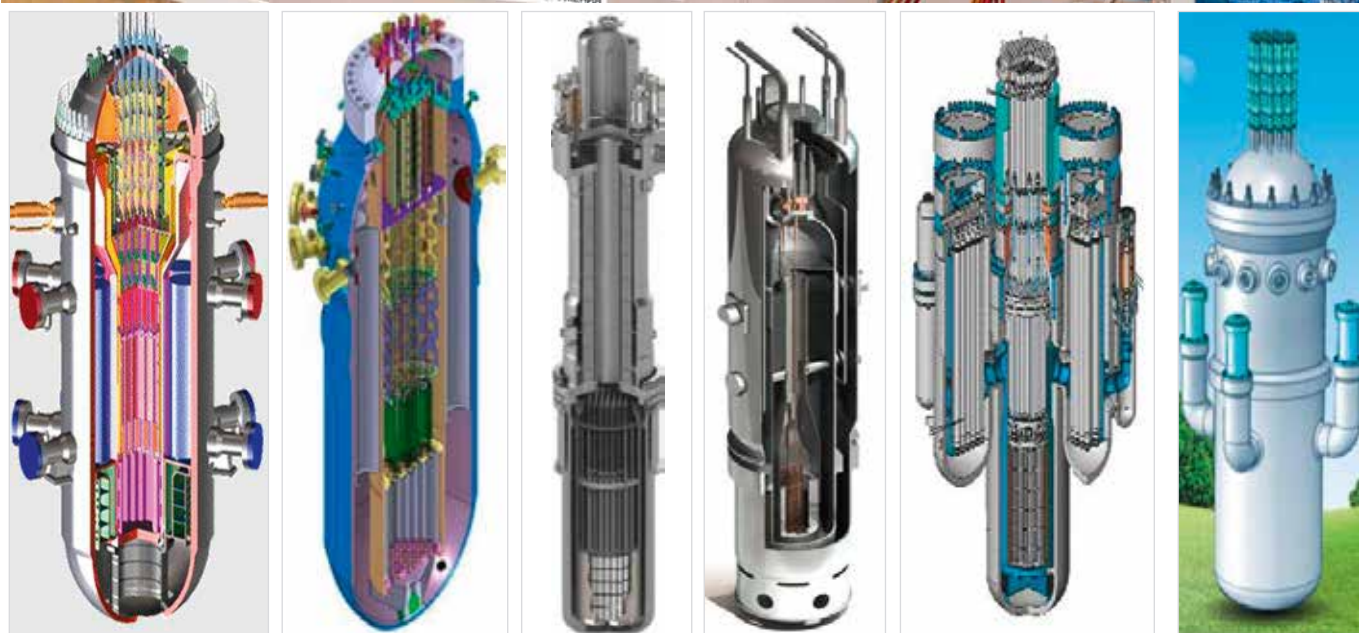
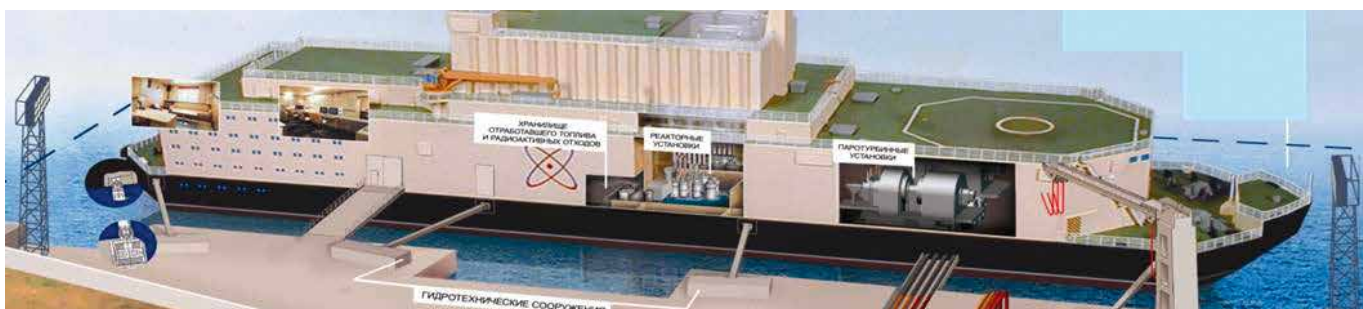
Photo: Construction works at the sodium cooled fast reactor BN-800 in Russia. (ROSATOM)

ADVANCED REACTORS



- 3 Other advanced reactor technologies, such as high temperature gas reactor (HTGR) designs, can provide high efficiency electricity generation. In the longer term, they could also provide a cost effective source of high and low-temperature process heat for nuclear hydrogen and nuclear desalination applications. Several international research and development as well as power projects are under way worldwide for advancing this technology.

Photo: Construction of the world's first prototype HTGR, Shidao Bay-1, started in China in December 2012. (INET/Tsinghua University)



- 4 There is growing interest in small and medium sized nuclear power reactors (SMRs), partly because they allow smaller, more flexible and incremental investment over time. 'Small' means fewer than 300 MW(e), 'medium sized' means between 300 MW(e) and 700 MW(e). There are approximately 45 innovative SMR concepts at various stages of research and development. This diagram illustrates some of the SMR concepts deployable within the next decade.

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