



## Nuclear Energy, Long Term Requirements

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There are serious warnings about depletion of oil and gas and even more serious warnings about dangers of climate change caused by emission of carbon dioxide. Should developed countries be called to replace CO<sub>2</sub> emitting energy sources as soon as possible, and the time available may not be longer than few decades, can nuclear energy answer the call and what are the requirements? Assuming optimistic contribution of renewable energy sources, can nuclear energy expand to several times present level in order to replace large part of fossil fuels use? Paper considers intermediate and long-term requirements.

Future of nuclear power depends on satisfactory answers on several questions. First group of questions are those important for near and intermediate future. They deal with economics and safety of nuclear power stations in the first place. On the same time scale a generally accepted concept for radioactive waste disposal is also required. All these issues are in the focus of present research and development. Safer and more economical reactors are targets of international efforts in Generation IV and INPRO projects, but aiming further ahead these innovative projects are also addressing issues such as waste reduction and proliferation resistance. However, even assuming successful technical development of these projects, and there is no reason to doubt it, long term and large-scale nuclear power use is thereby not yet secured. If nuclear power is to play an essential role in the long-term future energy production and in reduction of CO<sub>2</sub> emission, than several additional questions must be replied. These questions will deal with long-term nuclear fuel sufficiency, with necessary contribution of nuclear power in sectors of transport and industrial processes and with nuclear proliferation safety. This last issue is more political than technical, thus sometimes neglected by nuclear engineers, yet it will have essential role for the long-term prospects of nuclear power. The status of the intermediate and long-term issues will be discussed, with special attention to the nuclear proliferation issue in view of unfavourable recent development, such as failure of 2005 NPT renewal conference and the Iran and North Korea cases. It will be argued that nuclear proliferation threat is the only really serious obstacle to the large-scale use of nuclear energy. In positive political environment solution of this problem could be possible on the lines of the very early US proposal (so called Baruch plan, UN 1946). Present political developments appear to demand renewed attempt to internationalize proliferation sensitive fuel cycle installations. Reasons will be discussed for a conviction that prospects for this may be better than in 1946.

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