

# Conclusions

Nuclear energy is a technically complex source of energy that remains unique among energy sources as a result of a number of factors. In relation to nuclear energy in its current form, it has been shown that:

- Nuclear energy is a major source of energy in the world, producing about 17% of the world's electricity.
- The large majority of reactors use ordinary water as coolant and moderator, uranium as fuel and a once-through fuel cycle.
- The disposal of low-level waste and intermediate-level waste is a mature practice, but the disposal of high-level waste is not yet carried out; public opposition is the main constraint although progress towards implementing solutions is beginning to be made.
- Very high levels of safety are essential to nuclear energy deployment, though some degree of risk remains.
- An effective system of radiological protection has been developed based on three principles: justification, optimisation and limitation.
- Existing power plants are generally economically competitive, even in deregulated markets, but decisions to build new power plants may depend on public policy factors.
- A framework of national laws and international agreements governs virtually all aspects of the use of nuclear energy, indicating larger governmental involvement than for other energy sources.
- Nuclear energy has certain advantages over other energy sources: carbon-free and air-pollution-free generation of electricity as well as security of supply.
- Evolutionary and revolutionary advances in technology are being pursued to develop new applications of nuclear energy and to improve the performance of nuclear energy systems.

In light of these characteristics, nuclear energy is at something of a crossroad at the beginning of the second nuclear century as it undergoes a thorough review by governments, the public and industry. Decision makers are faced with the difficulty of how to meet the continued growth in world energy demand while minimising the environmental impacts of energy production. They must do so while accounting for public attitudes, the cost and competitiveness of the various energy sources and public policy objectives such as security of supply and non-proliferation. How they resolve the tension between these sometimes-conflicting factors will ultimately define the extent of nuclear energy's use worldwide. How soon promising advances in the state of the art can influence these decisions will also play a significant role.

If a case cannot be satisfactorily made that nuclear energy is economically competitive, safe and that there are acceptable solutions for its waste, then nuclear energy is likely to decline, at first slowly, in importance. Yet, if it can be demonstrated to the satisfaction of the public that nuclear energy does address these concerns, it is likely that there will be strong new growth in nuclear power.