



# Use of Nuclear Energy for Desalination

## Position Statement

### March 2005

The American Nuclear Society (ANS) endorses the use of nuclear power reactors for desalination of seawater. Desalination is the process that removes dissolved minerals from seawater or brackish water. All of the technologies currently in use for desalination require significant amounts of energy, either as low-temperature process heat or electricity. As stated in Position Statement 14, "Use of Nuclear Energy for the Production of Process Heat," the ANS believes that nuclear reactors are a safe and environmentally benign source of process heat and electricity for desalination plants.

Currently, it is estimated that one-fifth of the world population, or more than 1 billion persons worldwide, do not have access to potable water.<sup>1-3</sup> This results in more than 3 billion cases of illness and two million deaths per year because of water-related diseases.<sup>1,2</sup> This situation is likely to deteriorate in the future because of increasing population, commercialization, and industrialization, particularly in arid and semiarid regions, and because of the cost of tapping new water reservoirs. It is anticipated that by 2025, 33% of the world population, or more than 1.8 billion people, will live in countries or regions without adequate supplies of water unless new desalination plants become operational.<sup>4</sup> In many areas, the rate of water usage already exceeds the rate of replenishment, and in the United States, severe water shortages have already occurred in some regions, e.g., California, Florida, and Texas.

Nuclear reactors have already been used for desalination on relatively small-scale projects. In total, more than 150 reactor-years of operating experience with nuclear desalination has been accumulated worldwide. Eight nuclear reactors coupled to desalination projects are currently in operation in Japan. India has nearly completed a demonstration plant, and Pakistan has launched a similar project.

However, the great majority of the more than 7,500 desalination plants in operation worldwide today use fossil fuels with the attendant emission of carbon dioxide and other greenhouse gases. Increasing the use of fossil fuels for energy-intensive processes such as large-scale desalination plants is not a sustainable long-term option in view of the associated environmental impacts. Thus, the main energy sources for future desalination are nuclear power reactors and renewable energy sources such as solar, hydro, or wind, but only nuclear reactors are capable of delivering the copious quantities of energy required for large-scale desalination projects.

#### References

1. R. S. Faibish and T. Konishi, "Nuclear Desalination: A Viable Option for Producing Fresh Water," *Desalination*, Vol. 157, p. 241 (2003).
2. "Isotope Techniques in Water Resources Development and Management," *Proceedings of an International Symposium*, International Atomic Energy Agency (1999).
3. "Nuclear Desalination," Information and Issue Brief by the World Nuclear Association, <http://www.world-nuclear.org/info/inf71.htm> (Aug. 2004).
4. Projected Water Scarcity in 2025," International Water Management Institute, <http://www.iwmi.cgiar.org/home/wsmmap.htm>.

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The American Nuclear Society, founded in 1954, is a not-for-profit scientific and educational society of more 11,000 scientists, engineers, and educators from universities, government and private laboratories, and industry.

Position Statements are the considered opinions and judgments of the Society in matters related to nuclear science and technology. They are intended to provide an objective basis for weighing the facts in reaching decisions on important national issues.