

Nuclear desalination

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New solutions to the ancient problem of maintaining a fresh water supply is discussed in a special issue of the Inderscience publication *International Journal of Nuclear Desalination*. With predictions that more than 3.5 billion people will live in areas facing severe water shortages by the year 2025, the challenge is to find an environmentally benign way to remove salt from seawater.

Global climate change, desertification, and over-population are already taking their toll on fresh water supplies. In coming years, fresh water could become a rare and expensive commodity. In the latest issue of the journal IJND, research results presented at the Trombay Symposium on Desalination and Water Reuse offer a new perspective on desalination and describe alternatives to the current expensive and inefficient methods.

Pradip Tewari of the Desalination Division at Bhabha Atomic Research Centre, in Mumbai, India, discusses the increasing demand for water in India driven not only by growing population and expectancies rapid agricultural and industrial expansion. He suggests that a holistic approach is needed to cope with freshwater needs, which include primarily seawater desalination in coastal areas and brackish water desalination as well as rainwater harvesting, particularly during the monsoon season. "The contribution of seawater and brackish water desalination would play an important role in augmenting the freshwater needs of the country."

Meenakshi Jain of CDM & Environmental Services and Positive Climate

Care Pvt Ltd in Jaipur highlights the energy problem facing regions with little fresh water. "Desalination is an energy-intensive process. Over the long term, desalination with fossil energy sources would not be compatible with sustainable development; fossil fuel reserves are finite and must be conserved for other essential uses, whereas demands for desalted water would continue to increase."

Jain emphasizes that a sustainable, non-polluting solution to water shortages is essential. Renewable energy sources, such as wind, solar, and wave power, may be used in conjunction to generate electricity and to carry out desalination, which could have a significant impact on reducing potential increased greenhouse gas emissions. "Nuclear energy seawater desalination has a tremendous potential for the production of freshwater," Jain adds.

The development of a floating nuclear plant is one of the more surprising solutions to the desalination problem. S.S. Verma of the Department of Physics at SLIET in Punjab, points out that small floating nuclear power plants represent a way to produce electrical energy with minimal environmental pollution and greenhouse gas emissions. Such plants could be sited offshore anywhere there is dense coastal population and not only provide cheap electricity but be used to power a desalination plant with their excess heat. "Companies are already in the process of developing a special desalination platform for attachment to FNPPs helping the reactor to desalinate seawater," Verma points out.

A. Raha and colleagues at the Desalination Division of the Bhabha Atomic Research Centre, in Trombay, point out that Low-Temperature Evaporation (LTE) desalination technology utilizing low-quality waste heat in the form of hot water (as low as 50 Celsius) or low-pressure steam from a nuclear power plant has been developed to produce high-purity water directly from seawater. Safety, reliability, viable economics, have already been demonstrated. BARC itself has recently

commissioned a 50 tons per day low-temperature desalination plant.

Co-editor of the journal, B.M. Misra, formerly head of BARC, suggests that solar, wind, and wave power, while seemingly cost effective approaches to desalination, are not viable for the kind of large-scale fresh water production that an increasingly industrial and growing population needs.

India already has plans for the rapid expansion of its nuclear power industry. Misra suggests that large-scale desalination plants could readily be incorporated into those plans. "The development of advanced reactors providing heat for hydrogen production and large amount of waste heat will catalyze the large-scale seawater desalination for economic production of fresh water," he says.

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