

NATIONAL POLICY FOR SEAWATER DESALINATION:
NEW CHALLENGES

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Basic Water Desalination Policy at the Beginning of the 70's

1. The present policy for the advancement of research in the field of water desalination was formulated as early as 1970 and was formally expressed in the NCRD report Policy for the Advancement of Water Desalination Research in Israel published in that same year. The basic elements of this policy are:

- a. The development of original processes is to be stressed as the processes available at the time in world markets were economically unfeasible for water production in Israel;
- b. emphasis is to be placed on the following distillation processes: multi-effect distillation, vapor compression distillation, and direct contact distillation;
- c. in the area of brackish and waste water special consideration is to be given primarily to the development of membranes and installations for the treatment of industrial and domestic sewage. Low priority is given to the treatment of brackish water because of their limited quantity in Israel and the fact that the majority of brackish water is usable directly, without further treatment, for specific purposes.
- d. promotion of research in areas which are crucial to the efficient operation of desalination plants, such as research on the prevention of scale formation and corrosion, the use of new materials in desalination plants, heat transfer and research to optimize the operation of desalination plants;
- e. the encouragement of new ideas for research and development in the field of water desalination as well as the encouragement of young researchers and developers to enter the field.

2. In order to pursue this policy, the Prime Minister decided to place the responsibility for shaping it and coordinating its implementation on a single central government organization which was to serve also as the sole arm of the government for the allocation of research and development funds in the area of water desalination. The NCRD was the organization chosen to perform these functions.

3. The performance of this policy by the NCRD was accompanied by intensive professional and public activities to create a high degree of awareness to the problem of water desalination in Israel among researchers, government officials and industrial managers. One example of this activity is the annual national conference on water desalination held under the auspices of the NCRD, whose participants

include members of all of the three sectors mentioned above. At these conferences the implementation of the research plans for water desalination are examined and the outlines of future policy discussed.

The Results of the Policy and Research Achievements

4. The consistent implementation of the above outlined policy has brought a number of important successes. The Israel Desalination Engineering (IDE) multi-effect and vapor-compression distillation processes are today commercially viable, and are supplying water in Eilat and the Sinai. At present, a large multi-effect distillation plant is being planned to be linked to the city of Ashdod power station. Plants of the types mentioned above are exported and have thus brought in sorely needed foreign currency. In addition, the profits from these sales have already covered the investments made in developing these desalination processes.

An analysis made recently by the Israel Atomic Energy Commission shows that the linking of a multi-effect distillation plant to a nuclear energy power station would have great advantages and reduce even further the price of water obtained from this dual purpose plant.

The direct contact distillation process (Kogan-Rose process) is in the advanced stages of its development and we hope that will soon enter the large scale testing stage. This process has many advantages, especially in the significant savings it brings about in the use of valuable materials. In addition it may also be of use to the chemical industry for the concentration of various solutions.

Desalination processes for purification of industrial and domestic sewage are also approaching the stage of application, especially the reverse osmosis process using non-cellulosic membranes which was developed by IDE.

The use of new membrane processes is likely to enlarge the amount of wastewater that will be recycled and ensure the high quality of this water. It is very likely that plants based on this technology will be exported abroad.

New Challenges in Seawater Desalination

5. In retrospect it can be said that the research and development activities of the last few years have achieved the original goals set by the NCRD desalination policy, namely, the creation of new water sources cheaper than those prevailing, and the penetration of Israeli desalination plant products into the world market. However, the technological developments taking place in the world and the new economic reality emanating from the energy crisis have raised new problems for Israel in the field of desalination. The high price of energy together with the difficulties Israel faces in its supply, dictates the need for finding ways to decrease Israel's dependence on foreign sources of energy for the desalination of water in large quantities. The challenge facing Israel in this regard is two-fold: the use of nuclear energy for desalination and the maximum use of

solar and wind energy as additional energy sources. Concurrently, Israel must strive toward the adaptation of new processes and improvements of existing processes, whose use entails lower specific demands for energy.

In the last couple of years research was performed in many countries with the aim of simplifying the processes for desalinating sea water and reducing their cost. One of the most promising directions for achieving these goals is the use of membranes. Research in the area of development of special new membranes for seawater desalination is extremely expensive and as a result Israel has not as yet invested funds in this direction. However, in light of the great advances made in this area in the last few years, especially by the Americans, Israel must learn this technology and adopt it to its specific needs. This technology is likely to have a number of advantages in use, especially when conditions necessitate and justify the setting up of single-purpose plants for seawater desalination, as opposed to the multi-effect distillation process, whose distinct advantage lies in its use of cheap steam obtained from a power station to which it can be linked.

6. The setting up of desalination plants linked to nuclear energy power plants, the harnessing of solar energy for desalination and the adoption and improvement of membrane technologies for desalination are the great challenges for Israel in the coming decade in the field of sea water desalination.