

XI - RESEARCHES IN THE UNIVERSITY OF BARI (ITALY)

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The Istituto di Merceologia, Università di Bari, has a special section, Laboratorio per lo studio delle fonti di energia, for experimental work on the utilization of solar energy and of non-conventional sources of energy and on the demineralization of saline waters.

This is one of the laboratories carrying researches as a part of the Working Group created two years ago by the Consiglio Nazionale delle Ricerche for the application of chemistry and technology in the field of the sources of energy.

Such researches have been supported by the Consiglio Nazionale delle Ricerche and the suggestions and coordination by Professor Caglioti is deeply acknowledged.

In the last year the work has been carried mainly in the following fields :

(a) Solar distillation. The work has been carried with a very simple and easy-to-handle solar still (Figure 1); the stills shown have a tray surface of 1.5 sq. meters each. Such still is Model No. 8 of the series of solar stills developed and tested in 10 years of activity of the Bari Laboratory (1). The design of the new still has been chosen for its simplicity and is similar to the one described by Mc Cracken (2).

A series of stills of various dimensions has been manufactured using different materials and has been tested for one year in Bari. Fig. 2 shows a general view of the field station of the University of Bari, on the seashore.

An efficiency of about 50 % has been recorded for the new model of solar still and this has been found satisfactory.

Six of these solar stills have been brought in an arid island of the Mediterranean, Pantelleria, and have been tested in field conditions; the stills have been given to fishermen houses and various difficulties in maintenance and scaling have been encountered and studied.

This has given the possibility of changing the construction materials and of realizing the true limitations in the field use of solar stills.

One inclined tray solar still has been designed and built with two glass cover plates between which the saline water to be distilled is circulated before entering the trays. This design has been made for studying the heat transfer from the inside air ^{to} the cover and to study the possibility of a partial recovery of the latent heat of condensation. In this still saline water is in continuous slow circulation in order to avoid scaling.

(b) Survey of geothermal sources in Italian islands. Many Italian islands lack of water and are of volcanic origin: a geographical and geochemical survey has been made in Pantelleria and in the Eolie islands in order to evaluate the geothermal sources to be used as sources of energy for the demineralization of sea water. In Pantelleria many little sources of warm saline water and few volcanic steam sources are available. In Vulcano and Stromboli some geothermal energy is also present.

(c) Extraction of water vapor from warm saline waters. Studies have been made in order to use the warm saline waters, available in many places in Italy and elsewhere associated with volcanic activities, to obtain fresh water.

The starting idea is to use an extraction process similar to the one studied in the University of Arizona and in the Georgia Institute of Technology (3).

Fig. 1



Fig. 2



In such processes an air stream is brought in contact with the warm saline water and the humid air is cooled for obtaining fresh water. A design is being developed for a humidifying apparatus to be used in arid areas and suitable to treat also little amounts of warm saline water.

Many difficulties have been encountered and no definite solution has so far been tested in the field. The test place is intended to be Pantelleria.

(d) Recovery of fresh water from volcanic steam. During the survey in the Pantelleria island attention has been drawn to the presence of volcanic "fumarole", i.e. to sources of steam in the side of ancient volcanoes. A work has been carried to condense such steam in order to obtain fresh water: the first condensation network (Fig. 3) has allowed to build a little fountain yielding one cu. meter of fresh water per day; such water is used by peasants. A greater condensation plant is under design and a water source of about 3000 to 5000 cu. meters per year is expected. This is the water need of one of the villages of the island.

(e) Extraction of water from the atmosphere. Following previous researches (5)(4) on the possibility of obtaining water from the humidity of the air, other work has been done along this line. A mechanical dehumidifier, electrically operated, is under test in Pantelleria. A different model of mechanical dehumidifier, using a gasoline motor for operating the compressor of the refrigerator, is under assembly and will be tested in the next months to correlate the fuel consumption with the water yield.

(f) New book on the solar energy. The first Italian book on the solar energy has been prepared by Professor Righini, the well known director of the Astro-Physical Laboratory, Arcetri, and by the author. The manuscript has already been consigned to the publisher Feltrinelli, Milano. The publication is expected in the next months. The author has attended at a National Meeting in Trieste on the use of sea water, in October 1962, the Madrid meeting of the Mediterranean Cooperation on Solar Energy in May 1963, and the Paris meeting of the Working Group "Fresh Water from the Sea" of the European Federation of Chemical Engineering, in November 1963.

References

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- (2) H. McCracken, "The inclined tray Solar Still", Sun at Work, 8, (3), 6-9 (1963)
- (3) Office of Saline Waters, "Saline Water Conversion Report for 1962", Washington, 1963, p. 66-67
- (5) G. Nebbia, "Methods for obtaining water from the atmosphere in arid lands", Science et technique pour les régions peu développées, Roma, 1963, p. 135-138.
- (4) G. Nebbia, "Il problema dell'acqua nelle zone aride. L'estrazione dell'acqua dall'atmosfera", Annali Fac. Econ. Comm. Univ. Bari, 17, (1960)



Fig. 3