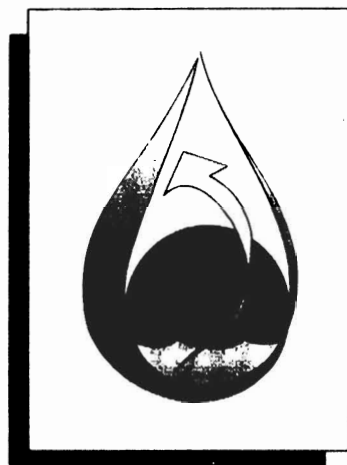


# **BOOK OF ABSTRACTS**



## **Mediterranean Conference on Renewable Energy Sources for Water Production**

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## **THE STATE OF USING RENEWABLES IN WATER RELATED AREA IN SOME N.I.S. COUNTRIES AND COOPERATION IN BIOFOULING INVESTIGATION**

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The brief outlook of situation on renewable energy sources in some countries of the former USSR done. The main reasons of research limitation in the field of application renewable energy sources to desalination in Russia as well as in other N.I.S.'s countries are the following: absence of the system for economic profits of producers and consumers of equipment and energy on the basis of renewable energy sources (RES); small State investment in research; shortage of modern equipment for research in the area of renewable energy water production processes.

The introduction water purification systems combined membrane processes with RES are very actual for rural regions of Belarus (RB). The Republic imported the main part of energy sources. The most suitable RES for Belarus is wind energy utilisation. In the rural area less than 15 % of the rural population live in houses with a water drain/sewerage, and the other part uses water from pit wells or, at the best, from water-columns. More than 70% of the water used for water-supply does not meet the State Regulation quality requirements and contains iron (1-5, and sometimes 10 mg/l), nitrates (3-5, on occasion more than 10 mg / l), organic pollutants, etc. The water with such parameters should be subject to compulsory treatment. (Source: National Program "WATER", 1993 - 2000 Years). At present some programs are preparation for 1996-2000 years and include research in the area RO and UF. The membrane market in RB is open for introduction of desalination technology for brackish water on renewable energy sources base. The way for solving the problem may be adsorption the European Union experience in the desalination.

Since at present we can not to expect a big increasing of RES supply systems capacity, the benefit from improvement membrane desalination plants combined with RES can be reach by the plant operational cost reducing. As far as the energy supply systems and membrane units construction are improved the problem of biofouling become more important.

In membrane systems and water pre-treatment filters biofouling appears as a biofilm forming inside porous media (filter media) as well as outside porous media (RO membranes). The sterilisation and hydrodynamic action (flow turbulence, etc.) does not give the long term success. To circumvent biofouling there is a need for more deep understanding of the phenomena involved in biofilm functioning. One important aspect is the dependence of diffusion phenomena in biofilm on its structure.

Under support of Program PRAXIS XXI, University of Minho (Portugal) with participation of Polotsk State University (Belarus) conducts the research "Study of the relations between physicochemical properties of the biological materials and their filtration through specific porous media" in order to unveil this aspect of the problem.

The existing porous media models abound in a large number of parameters and their correlation under outer factors variations often presents a hard-to-solve problem. This research gives the possibility of developing separation processes and identifying the criteria to optimise the selection of the best couple biological material to separate/filter (membrane) to be used. The role of porosity and tortuosity in biofouling phenomena are discussed on the basis of preliminary investigation in the joint research. The complexity of the relations between porous media structure, porosity and tortuosity vs. effective diffusion shown.