

Solar desalination plant for sea water, waste water or brine

A new system of seawater desalination has been developed, consisting of a solar heat collector made of a transparent film surface in a pyramid-shaped tent and another dark one (to retain the maximum amount of heat) material inner truncated pyramid parallel to the former, generating a layer of heated air. Heat accumulates at the vertex, where high temperatures are achieved. This allows the evaporation of seawater injected by micro-nebulizers, resulting into moisture-laden air being pulled by a central axial tube leading to a 'cold spot' located underground. Here a network of galleries, filled with the stored water, provides cold temperature to dissipate heat and to condense the steam into pure water. Partners to further develop the technology and/or to establish commercial agreements along with technical cooperation are sought.

The Challenge

Desalination of seawater is a tool that can now enable the production of fresh water with no other restriction than the energy required to separate the salt contained in it. This currently takes place by reverse osmosis or other procedures that involve large economic costs for the amount of energy required and the cost of the existing plants. Given that the places and times fresh water is most needed are also the places and times that the most sunlight is available, this system, based upon capturing the sun's heat, allows us to use sunlight to vaporize and distill sea water. An underground reservoir of cold water galleries provides the 'cold spot' where water condenses and is stored.

The Technology

Vaporization of water yielded relies on the interchange temperature between water and air where it takes place. By means of the pyramid-shaped tent an efficient concentration is achieved at its vertex. Here, micro-nebulizers provide the maximum contact surface between water and air at a high temperature. Having an extra space to reach the axial vertical condensation tube that absorbs the moist air, salt drops (which are far more dens than moist air) dry as they fall. The moisture rich air is absorbed by the distillation column where, by means of the cold sea water that feeds the system and by the cold water stored underground, a full drying out of the air is achieved. The dried air returns to the inner area of the pyramid through its own pressure.

Innovative advantages

- Dramatic reduction of energy costs.
- Highly sustainable, almost zero CO₂ emissions.
- No brine production.
- Low initial investment.
- Inner space of the pyramid can be used for other purposes: housing, animal farming, greenhouses, schools, a sports arena, train-bus-taxi stations,...

Current stage of development

The calculations and the design of the elements of the system have been worked out. Contact with companies willing to provide the necessary elements has already taken place. Implementation would not surpass three months of time.

Applications and Target Market

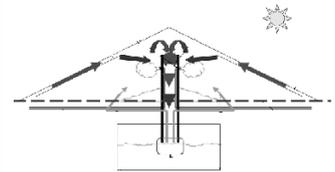
This technology represents an important advancement in energy savings since the main thermodynamic work relies upon the sun's heat energy (except for a small amount of electrical energy for the overall system that can be provided by photovoltaic panels). The investment for the whole system is much less than for other existing technology. Other elements for yield maximization are considered by means of continuous computerized self-monitoring of the device via custom software.

The system is targeted to any country where water shortage is a limitation for rural, human or touristic development, is close to sea, and has high sun radiation. This applies to more than 40 countries worldwide. The system can also be installed offshore.

Reference number

MKT2011/0037_E

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Low initial investment
Low energy expenditure
Highly sustainable
Almost zero CO₂ emissions
Short processing time
High robustness
No brine production

Business Opportunity

Technology available for licensing with technical cooperation

Patent Status

Patent priority application

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