Water desalination using humidification/dehumidification (HDH) technique powered by solar energy: a detailed review

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ABSTRACT

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Water and energy are two of the most important topics on the international environment and development agenda. The social and economic health of the modern world depends on sustainable supply of both energy and water. Many areas worldwide that suffer from fresh water shortage are increasingly dependent on desalination as a highly reliable and nonconventional source of fresh water. So, desalination market has greatly expanded in recent decades and expected to continue in the coming years. In the developing world, water scarcity led to the pressing need to develop inexpensive, decentralized small-scale desalination technologies that use renewable resources of energy. This study reviews one of the most promising of these technologies, humidification–dehumidification (HDH) desalination powered by solar energy. The different types of HDH cycle design and its constituents (humidifier, solar heaters, and dehumidifiers) have been investigated. The review also includes water sources, demand, availability of potable water and purification methods. It is concluded that HDH technology is a promise process for decentralized small-scale water production applications, but it needs additional research and development to enhance the system efficiency and economy.

Keywords: Water desalination; Humidification–dehumidification; Solar-driven

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