

신재생에너지를 이용한 해수담수시스템 실증 연구

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Demonstration study of desalination system with renewable energy

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This study was carried out to evaluate the operating performances of the evaporation desalination system with solar energy. This system was designed to use evacuated solar collector as the heat source, supplying the required heat energy and photovoltaic power as the electric source, supplying required power to pumps in the desalination system. The 5kW photovoltaic power generation system to make the electricity, the single-stage fresh water generator with plate heat exchanger, and remote control and monitoring system. Solar desalination system was designed and installed in Jeju-island, Korea in 2006, after about 4 years of operation, usability and stability of solar desalination system was guaranteed. The system comprises of the desalination unit which was designed to have daily fresh water capacity of 2m³, a 120m² evacuated tubular solar collector to supply the heat, a 6m³ heat storage tank, and a 5.2kW photovoltaic power generation to supply the electricity to hydraulic pumps for the heat medium fluids. On a clear day, average daily solar irradiance in Jeju-island was measured to be 500W/m² and the daily fresh water yield showed to be more than 500 liters under this condition. After around three years of a long term operation of the system from January 2007 to August 2009, average daily freshwater yield was analyzed to be around 330%. The relationship equation between solar irradiance and freshwater yield was found to be $y=1.1806x - 107.89$.

Key words : Desalination(해수담수화), Solar Energy(태양에너지), photovoltaic power(태양광) plate type Heat Exchanger(판형 열교환기), Fresh water(담수)

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Study on the Operation of the Solar Heating System with Ground Source Heat Pump as a Back-up Device

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The study on the operation characteristics of solar space and water heating system with ground source heat pump (GSHP) as a back-up device was carried out. This system, called solar thermal and geothermal hybrid system (ST/G), was installed at Zero Energy Solar House II (KIER ZeSH-II) in Korea Institute of Energy Research. This ST/G hybrid system was developed to supply all thermal load in a house by renewable energy. The purpose of this study is to find out that this system is optimized and operated normally for the heating load of ZeSH-II. Experiment was continued for seven months, from October to April. The analysis was conducted as followings ;

- the contribution of solar thermal system.
- the appropriateness of GSHP as a back-up device.
- the performance of solar thermal and ground source heat pump system respectively.
- the adaptation of thermal peak load
- the operation characteristics of hybrid system under different weather conditions.

Finally the complementary measures for the system simplification was referred for the commercialization of this hybrid system.

Key words : Solar Heating System(태양열 난방시스템), Ground Source Heat Pump(지열히트펌프), Solar Thermal & Ground Source Heat Pump Hybrid System(태양열/지열하이브리드 시스템), Zero Energy Solar House(제로에너지 솔라하우스)

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