

# 능동적 신재생에너지 생산을 통한 하수처리장 에너지자립화 향상 Improving Energy Self-sufficiency in Municipal Wastewater Treatment Plant using Renewable Energy Production

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**Abstract**

Increasing energy prices and growing concerns about global warming address the need to improve energy self-sufficiency in many industrial and municipal sectors. Wastewater treatment plants (WWTPs) are representative of energy-consuming facilities in Korea, accounting for 5% of national energy consumption. We present renewable energy technologies and energy self-sufficiency scenarios in a municipal WWTP (30,000 m<sup>3</sup>d<sup>-1</sup>) located in Yongin, South Korea. By employing photovoltaics (PV, 135 kW), small hydropower turbine (10 kW), and thermal energy from treated effluent (25 RT: refrigeration ton) within the WWTP, a total of 142 tonne of oil equivalent (toe) of energy was estimated to be generated, accounting for 365 ton CO<sub>2</sub> yr<sup>-1</sup> of greenhouse gas emission reduction. Core renewable technologies under consideration include 1) hybrid solar PV system consisting of fixed PV, dual-axis PV, and building integrated PV, 2) low-head small hydropower plant specifically designed for treated effluent, 3) effluent heat recovery system for heating and air conditioning. In addition to these core technologies, smart operation and management scheme will be presented for enhancing overall energy savings and distribution within the WWTP.

**Key words : Renewable Energy, Photovoltaic, Small Hydropower, Heat Recovery, Wastewater Treatment Plant**

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