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## Innovative zero liquid discharge based effluent treatment system for API industry clusters in India

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The pharmaceutical industry in India is estimated to be US \$ 26 billion, with exports of US \$ 13 billion annually, to about 100 countries. Active Pharma Ingredient (API) is the active compound with medicinal properties and is a constituent of formulations. Hyderabad, the capital city of Telangana state in India is the hub of API manufacturing in South India, with over 400 manufacturing units concentrated in 6 industrial estates surrounding the city. The effluent streams from these units are difficult to treat with conventional treatment systems, due to high COD, and dissolved solid concentration in the effluents. The treatment systems evolved over the past 25 years, to arrive at a zero liquid discharge based treatment system wherein treated wastewater is reused in the plant utilities like boiler and cooling towers. The zero liquid discharge based treatment system consists of primary treatment followed by stripper, multiple effect evaporators (MEE) and agitated thin film dryer (ATFD). The stripper condensate which contains concentrated organics is sent to cement plants for co-processing, while MEE and ATFD condensate are sent to biological treatment system to be treated along with lean streams of effluents like utility blow downs, and domestic wastewater. The treated wastewater from biological treatment system are passed through reverse osmosis (RO) system to obtain permeate which is reusable in utilities, and reject which is sent to MEE for evaporation. The operational expenditure of the treatment system is due to maintenance, steam usage, electricity, chemicals and salaries. An innovative approach of utilizing the steam for power generation followed by usage of return steam for operation of stripper, MEE and ATFD will increase the viability of treatment systems and statutory compliance. This model facilitates viable common effluent treatment plants (CETP) for various API industry clusters in India.

### Biography

Gopu Venugopala Reddy is a professional environmental Consultant for the past 25 years, with academic background of Industrial Chemistry. He is associated with most of the major API manufacturing units by providing consultancy services to them.

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