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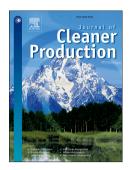
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Energy consumption and economic cost of typical wastewater treatment systems in Shenzhen, China

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Abstract

Wastewater treatment, a great potential alternative to alleviate water shortage, has been attached more and more importance in China, and has been developing very fast. The quantity of wastewater treatment plants in China has increased up to 3272 in June 2013, and has a total handling capacity of 0.14 billion t/day. However, wastewater treatment requires to consuming a lot of energy, and even energy consumption is often the main operation cost of wastewater treatment systems. Thus, it is very necessary to explore energy consumption of wastewater treatment systems and its influential factors, and seek for some possible pathways to save energy and lower cost. In this paper, we investigated the average energy consumption per unit wastewater treatment in Shenzhen, and analyzed the effect of treatment capacity and treatment technology on the energy cost per unit of wastewater treatment. The results showed that the average energy consumption of wastewater treatment plants in Shenzhen was about 0.20±0.06 kWh/t, much less than those in such developed countries as USA, Germany and Japan. This result may be related to the advanced wastewater treatment plants newly constructed and the low water quality requirements of wastewater treatment in Shenzhen. As the key to wastewater treatment, biochemical treatment sub-process consumed 50-70% of total energy cost in wastewater treatment. Secondly, the larger the treat capacity, the lower the energy cost per unit of wastewater treatment was. And the difference of treatment technologies can also significantly affect the energy consumption per unit of wastewater treatment. Finally, labor cost and electricity consumption respectively covered about 30.1% and 26.3% of total economic cost in the three typical wastewater treatment plants in original Shenzhen. Thus, upgrading treatment machines & equipment and improving management level are two effective alternatives to decrease energy consumption and lower total economic cost of

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