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

Wenjiang Li, Linjun Li, Guoyu Qiu



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

3 Wenjiang Li^{a, b}, Linjun Li^{a, b, *}, Guoyu Qiu^{a, *}

4 a. Key Laboratory for Urban Habitat Environmental Science and Technology, School of
5 Environment and Energy, Peking University, Shenzhen 518055, China

6 b. Shenzhen State High-tech Industrial Innovation Centre, Shenzhen 518057, China

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8 *Corresponding authors: Linjun Li, Tel:+86-755-86910986, Email: 229224838@qq.com
9 Guoyu Qiu, Tel: +86-755-26033141, Email: qiugy@pkusz.edu.cn

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11 **Abstract**

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

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