XVIII
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Benefit Analysis of Water Saving and Carbon Emission Reduction in a University in Shanghai

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Objectives

Water is an indispensable resource to promote human economic and social development. The rapid development of the region is accompanied by the rising demand for water, resulting in increased pressure on sewage treatment, and increasing energy consumption and carbon emissions of the water system. Therefore, water saving means pollution reduction and carbon reduction. However, water-saving measures will also consume energy and lead to carbon emissions. Therefore, under the constraint of the "double carbon" goal, it is urgent to clarify the relationship between water-saving measures and carbon emissions, find the optimal water-saving plan, promote the transformation of development mode to green cycle and low-carbon, improve the level of efficient and clean use of water resources, and realize the synergy of water saving and carbon reduction.

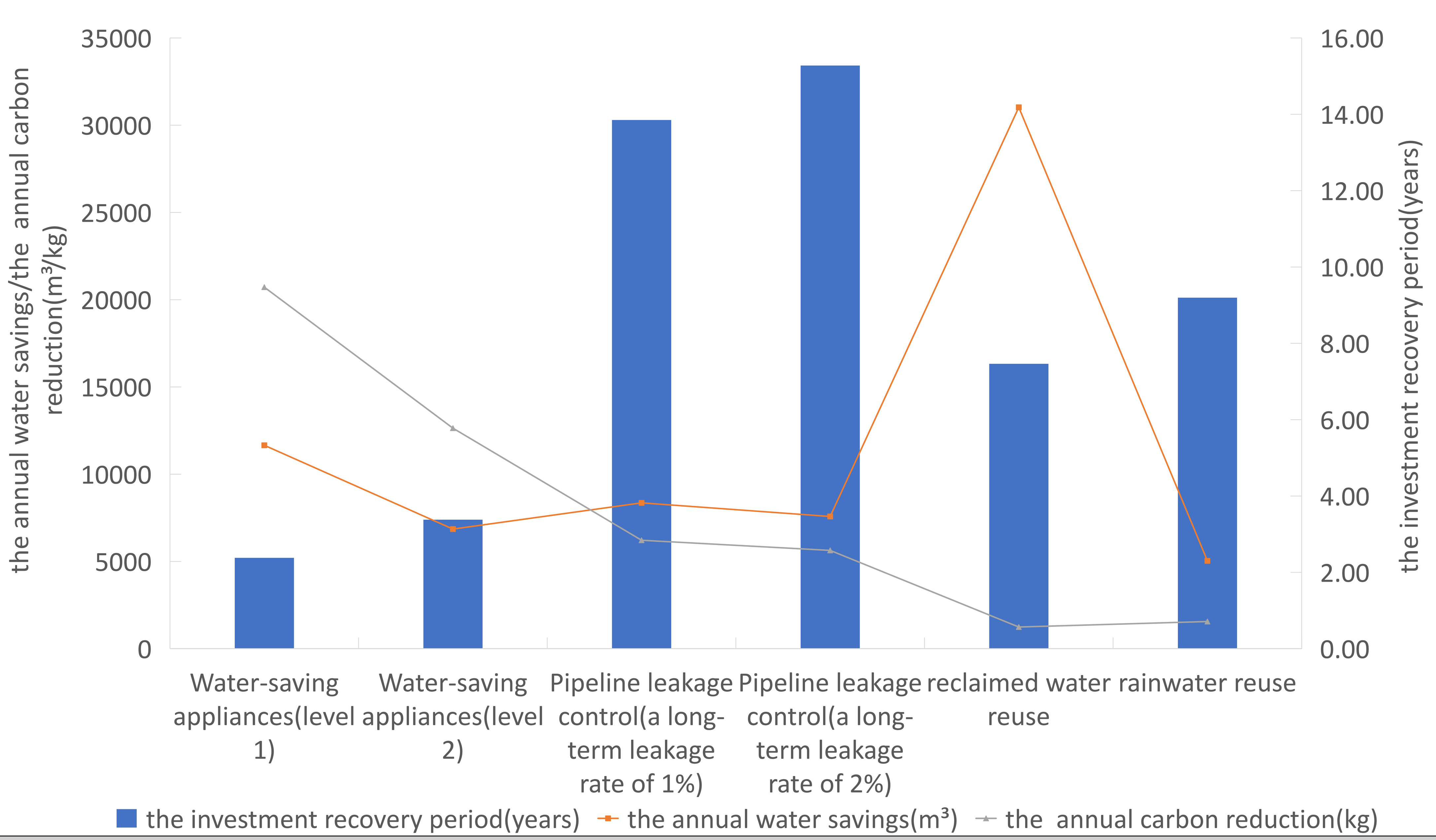

Figure 1 Comparison of Water Saving, Carbon Reduction and Recovery Period of Different measures

Methods

Taking a university in Shanghai as an example, this paper discussed the water-saving benefits, economic benefits and carbon emission reduction benefits of four major water-saving measures (water-saving appliance renovation, pipe network leakage control, reclaimed water reuse and rainwater reuse). And conducted a comprehensive analysis of the measures.

Results

（1）For water-saving instrument renovation project, the annual water savings are at an intermediate level, but the annual carbon reduction is the largest, and the investment recovery period is the shortest. Its comprehensive benefits are the best.

（2）The leakage control of the pipeline network (using a smart water management system) is at an intermediate level in terms of annual water savings and carbon reduction, with the longest payback period for investment. However, for universities with high water consumption and frequent pipeline leakage, its water-saving potential is very great, and the recovery period will also be correspondingly shortened.

（3）The reclaimed water reuse project has the largest annual water savings, but the smallest carbon reduction. The initial investment is very large, which is suitable for universities with abundant funds and can achieve good water-saving benefits.

（4）The rainwater reuse project is at an intermediate level in terms of water conservation and economic benefits, while the carbon reduction benefits are relatively poor.

Conclusions

（1） Priority will be given to the transformation of water-saving appliances and the selection of Class 1 water efficiency appliances.

（2） Strengthen refined management and strictly implement pipeline leakage control. The water-saving potential of pipeline leakage control is very great, and universities should choose suitable measures for leakage control based on their own actual situation. For universities with high water volume and frequent leakage, a smart water information platform can be built to quickly respond to abnormal water usage and repair it in a timely manner; For universities with low water volume, new pipelines, and scarce funds, manual meter reading can be used for management.

（3） Timely carry out reclaimed water reuse. For universities with large green areas, high landscape water usage, and a wide range of miscellaneous drainage reuse, the water saving capacity of the reclaimed water reuse system is very considerable, and in high reuse cases, investment costs can be quickly recovered. In response to the issue of large initial investment amounts, the government can obtain green financial support from financial institutions for water-saving projects through the recently launched "water-saving benefits" business. To address the issue of low carbon emission reduction benefits, further optimization of the process can be carried out to reduce energy consumption and reduce carbon emissions.

（4） Timely carry out rainwater reuse. The amount of rainwater reuse is influenced by various factors such as rainfall, catchment area, and reservoir volume. A reasonable rainwater reuse system should be designed based on the actual situation. Multiple ways can be explored to utilize rainwater, combining the transmission and storage of rainwater with campus landscape and ecological environment construction, further reducing carbon emissions, building green campuses, and achieving sustainable development.

XVIII
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