A Case Study of Water Re-usage in Tokyo

Bureau of Waterworks, Tokyo Metropolitan Government

The Current Condition of Water Re-usage in Tokyo

Tokyo is the capital and largest city in Japan. The population of Tokyo is 12 million. The average water demand was 5 million m³/day in 2003.

One of the major problems in the Tokyo Metropolitan Government is that once a drought breaks out, the water demand exceeds the water supply. In order to prepare for droughts, improving the efficiency of water consumption, such as through method the water re-usage, is a very important policy. The Bureau of Waterworks in the Tokyo Government has encouraged property owners to have water reuse facilities in their buildings since 1974.

A Comparison between the Cost of Reusable Water and the Price of Water Bill from Tokyo Waterworks

Tokyo Waterworks estimated the construction and maintenance average costs of the water reuse facilities, and compared these costs with the price of the water bill from Tokyo Waterworks.

Tokyo Waterworks researched the facilities’ capacities, their operating condition, the construction and the maintenance costs. Analyzing the relationship between these items, Tokyo Waterworks made formulas for follow cases, school buildings, office buildings, hotel and hospital.

Figure 3 shows comparison between the cost of reusable water and the price of the water bill.

1) school : consuming at a rate of 5m³ to 25m³/day, reusable water is more expensive.
2) office : consumption is over 160m³/day, reusable water is less expensive.
3) hotel and hospital : consumption is over 170m³/day, reusable water is less expensive.

An Estimation of the Future Reusable Water Consumption

Tokyo Waterworks estimated the future rate of the reusable water consumption through formulas.

Tokyo Waterworks analyzed the relationship between the economical growth ratio, the new buildings’ total floor space and the capacity of water reuse facilities. From this analysis, Tokyo Waterworks made formulas to estimate the future reusable water consumption.

The research conducted by “the property owners’ review on water reuse facilities” showed that

1) If a property owner using reusable water paid 20% more than the price of the water bill from Tokyo Waterworks, the coverage ratio of water reuse facilities in buildings would increases to 1.54 times more than the current tendency.
2) If an owner using reusable water paid the same as the price of the water bill, the coverage ratio of facilities would increase to 3.92 times more than the current tendency.

Tokyo Waterworks estimated the future reusable water consumption in 3 cases. In this estimation, the price of water bill is $7/m³ and the cost of reusable water is $9/m³:

- case1 : The current tendency remains in the future. The property owner’s pay is $9/m³. The estimated consumption in 2015 is 85,000m³/day.
- case2 : Property owner’s pay is 20% more than the price of the water bill. The owner’s pay is $8.6m³. The consumption in 2015 is 98,800m³/day.
- case3 : Property owner’s pay is the same as the price of the water bill. The owner’s pay is $7/m³. The consumption in 2015 is 152,000m³/day.

Conclusions

The cost of water re-usage is a very important factor for property owners to have water reuse facilities in their buildings.

1) The capacity of the water reuse facility is more than 160m³/day ~ 170m³/day.
2) The cost of reusable water is the same as the price of the water bill.

Tokyo Government promotes the water re-usage and encourages owners to have facilities for increasing the capacity to 200,000m³/day in the future.