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Construction Method of Water-Loop System using Multi Water Resources

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Abstract. In these days, water-loop system using multi water resources is lively discussed. This system distributes water effectively by using multi water resources instead of new water resources development. Multi water resources consist of surface water, rainwater, reclaimed water, seawater etc. This system would be distributing sanitary water stably, and able to economical maintain the related facilities. Also, this system has an emergency reaction ability when system is faced with accident. Especially, if multi water loop system is constructed by using the city's securable water, nation's water resources will be utilized effectively and water resources will be developed or reused on a small scale. The necessary elements of water-loop system design are suggested in this research. The elements are the followings; Model of connected water-loop pipe networks, platform model of multi water resources loop system, range of technology, difference with existing systems and direction of construction.

Keywords: Water-Loop System, Smart Water Grid, Multi Water Resources, ICT.

1 Introduction

Nowadays, water resources utilization is increased due to the construction of New city or Innocity, but natural water resources such as dam, stream water from the waterworks system mainly. In water-stressed area, development of variable water resources like rainwater, reclaimed water, seawater and utilizing techniques in order to develop the water resources.

Although variable water resources are existing near the consumer, the current system of water resources utilization is hard to operate because connecting pipe network for water resources utilization are not constructed.

Generally, inner city waterworks system has increased the stress of water resources utilization. This problem caused by distant locality of dams. These dams are increasing the cost of network construction, operation energy of pumping station and WTP [1]. Instead of water resources development at a long distance, system that can utilize the unused water resources such as reclaimed water, rainwater etc. is

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constructed, water resources of a small scale can be developed without new water development.

If supply system of small scale is constructed, costs of water resources development can be reduced because intraregional unused water resources of can be utilized. But, water resources development and supply network construction technology using intraregional unused water resources are not completely researched yet. Therefore, system that can effectively utilize the intraregional unused water resources is constructed, self-reliance ability of water resources will be enhanced.

To improve the self-reliance ability of water resources, it needs a development of multi water loop system. Multi water loop system secures variable water resources and is able to utilize them for optimal utilization/distribution of water resources. To achieve this, some researches such as development of water-loop and maintenance system, standardization technology development, economic analysis, feasibility study etc. have to carry out in parallel.

2 Construction Method of Multi Water-Loop System

Multi water-loop system would be distributing sanitary water stably, and able to economical maintain the related facilities. Also, this system has an emergency reaction ability when system is faced with accident. The differences from existing water distribution system are the followings; ① Consideration of multi water resources(classify the potable and non-potable), ② Storage function of raw water and treated water, ③ Connection of waterworks in the basin unit, ④ Mutual exchange of water-related data between each system[2].

Multi water-loop system is the intelligent system which combined with ICT(Information and Communication Technology). It means that intelligent operation and management system which contains intelligent water blending process, optimization technique, intelligent development of water resources based on realtime monitoring is integrated with the ICT [3].

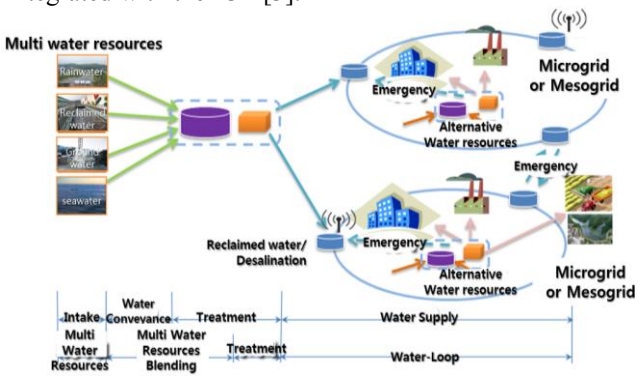

Fig. 1. Conceptual Diagram for Multi Water-Loop System

Multi water-loop models can be classified according to storage use, centralized or decentralized type. Another is the hierarchical type that distributes water on purpose such as agricultural water, industrial water, residential water, etc.

Water platform (blending reservoir) means that storage facility of multi water resources in water-loop system, it can be divided into two platform types, storage type and networks type. Storage platform type can be divided into single storage type and decentralized storage type. Also, networks type is divided into storage networks type and decentralized networks type.

Multi water-loop system is divided into New city water-loop and existing city water-loop by development type and also divided into mountainous area, plains, coastal, island by location of area.

Technological scope of multi water-loop system contains a lot of element technologies in consumed place [4]. These things are this followings; selective intake, design of water platform capacity, intelligent supply/distribution, forecast of demand (smart water mining), smart meter & sensor, energy saving (smart energy harvesting), asset management (smart water mapping), smart building, smart irrigation, etc.

Multi water-loop system utilizes the intraurban water resources, and can reduce the construction cost of pipeline network because multi water-loop does not need a long distance transmission pipe. So, this system also produces and supplies the multi water resources at a low cost and small scale. Further, it should be a effective water resources operation system which vitalizes the city's water industry as well as boosts the city's self-reliance ability [5].

3 Conclusions

To utilize the various water resources in the cities, water-loop system that uses the multi water resources has to be constructed for water supply; this water has the adequate water quality.

In this research, design methods of multi water-loop system are suggested. In detail, model of connected water-loop pipe networks, platform model of multi water-loop system, range of technology, difference with existing systems and direction of water-loop system construction are indicated. Therefore, they can be applied to design & construction of multi water-loop system to set up effectively.

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