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Abstract

For overcoming the limitation of existing water resources management system, Smart Water Grid(SWG) appeared, which is an intelligent water management system, combined with most up-to-date technology of information and communications (ICT: Information Communication Technology). Through high-efficient and next generational water controlling infrastructures system, water, reused water, seawater etc. all kinds of water sources were applied and efficiently distributed, controlled and transported. SWG is by definition the technology that water resource of regional and temporal imbalance can be effectively solved.

SWG Research Group is to be a technology development organization that aimed at combining with Water Business (Water), Information Business (Smart) and Infrastructures Business (Grid), assuring water resources and solving the gap of water resources. It does not only assure the water quality and water safety of supplying, low energy and achieving high-efficiency, but also deal with the Climate Change. For this, the technology of assuring and distributing regional and temporal safe water resources, considering Climate Change, through the water balance assessment and automation of water supply in the area (Grid), applying the technology of water supply assessment and management, infrastructures related to ICT, assuring two ways(importing and exporting data) - real time optimal operation technology, and realizing and developing the essential technology combining with ICT integrated water resources technology.

Furthermore, the applied technology can compare well with the actual place according to its own specificity, and this kind of package is expected to develop. Look into the near future, the package will be applied in the developing countries by Micro unit (Complex, Building etc.) This is our SWG Group goal

Keywords – Smart Water Grid, Water Resources, Waterloop, Optimal Uses, Climate Change

Introduction

1. Definition of SWG

For overcoming the limitation of existing water resources management system, Smart Water Grid(SWG) appeared, which is an intelligent water management system, combined with most up-to-date technology of information and communications (ICT: Information Communication Technology). Through high-efficient and next generational water controlling infrastructures system, water, reused water, seawater etc. all kinds of water sources were applied and efficiently distributed, controlled and transported. SWG is by definition the technology that water resource of regional and temporal imbalance can be effectively solved.

2. Project Background

- Global requirement for stable water supply
- Requirement for incubating global water enterprises which have capacity with ICT based Smart Water Grid technology to meet the increasing water demand
- Need for Total Solution approach of 3S (Security, Safety, Solution) in water resources management

3. Project Objectives (3S)

- Security: Secure of water resources and reduction of regional gap to access water resources
- Safety: Guarantee the stability of water quality and water supply grid

- Solution: Smart maintenance and management with low energy and high efficiency

4. Final Goals of Research Group

- o Vision: The best country on Water Welfare until 2020
- o To Establish ICT based water management infra-system with high efficiency
 - Improving 30% of Self-supporting water resources, alternative water resources within 0.5kg CO_2/m^3
 - Lowering 50% of frequency of problems occurred in water distribution system
 - Lowering 10% of energy to operate water system and 20% of cost to maintenance and management

5. Contents of Research Projects

5.1 The First Sub-project

- o Title : Development of Smart Water Resources Securement Technology to be Connected to New Town
- o Details
 - (1-1) : Micro-grid based Water Treatment and Water-loop Application Technology for Sustainable Multiple Water Resources Utilization in New Town
 - (1-2) : Development of Multi Water-loop System for Optimal Water Resources Utilization and Allocation
 - (1-3) : Development of Stabilization Technology and Pilot Platform for Micro Water Grid
 - (1-4) : Designing Technology for Smart Water Grid for Test Bed

Figure 1 is to reveal research contents of SWG

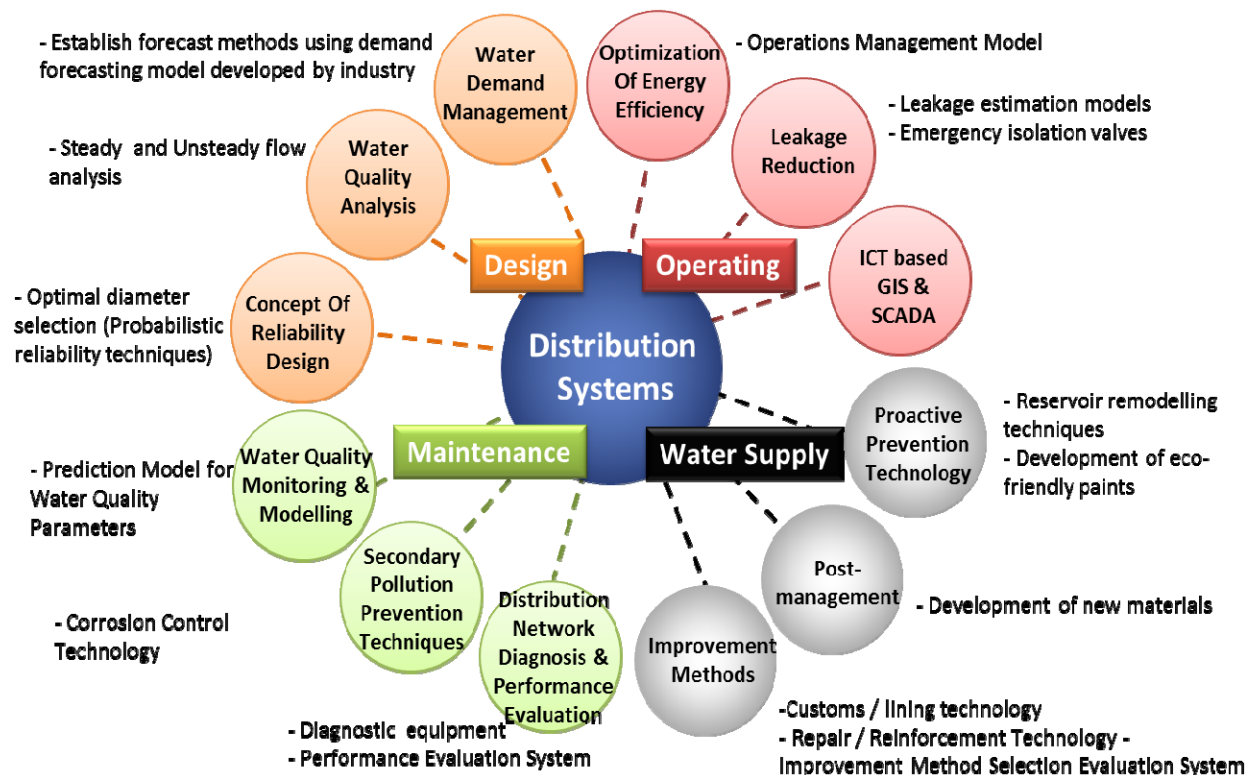


Figure 1 Research Contents of SWG

5.2 The Second Sub-project

○Title: Development of a Platform for Smart Watershed Management for Optimal Water Resources Utilization

○Details

- (2-1): Development of Water Shortage Risk Evaluation System
- (2-2): Development of Technology for Automated Real Time Water Supply Design and Operation
- (2-3): Smart and Integrated Management Technology for Water Supply Information

5.3 The Third Sub-project

○Title: Development of ICT based SWG Water information Management Technology

○Details

- (3-1): Establishment of ICT based AMI Network and Water Information Service
- (3-2): Development of High-Tech Sensors and Smart Multi-functional Measuring Instrument for Water Resources Monitoring and Management
- (3-3): Development of Modeling/Simulation based Optimized DSS

Figure2 shows ICT Based Water Resources Management in the target watershed.

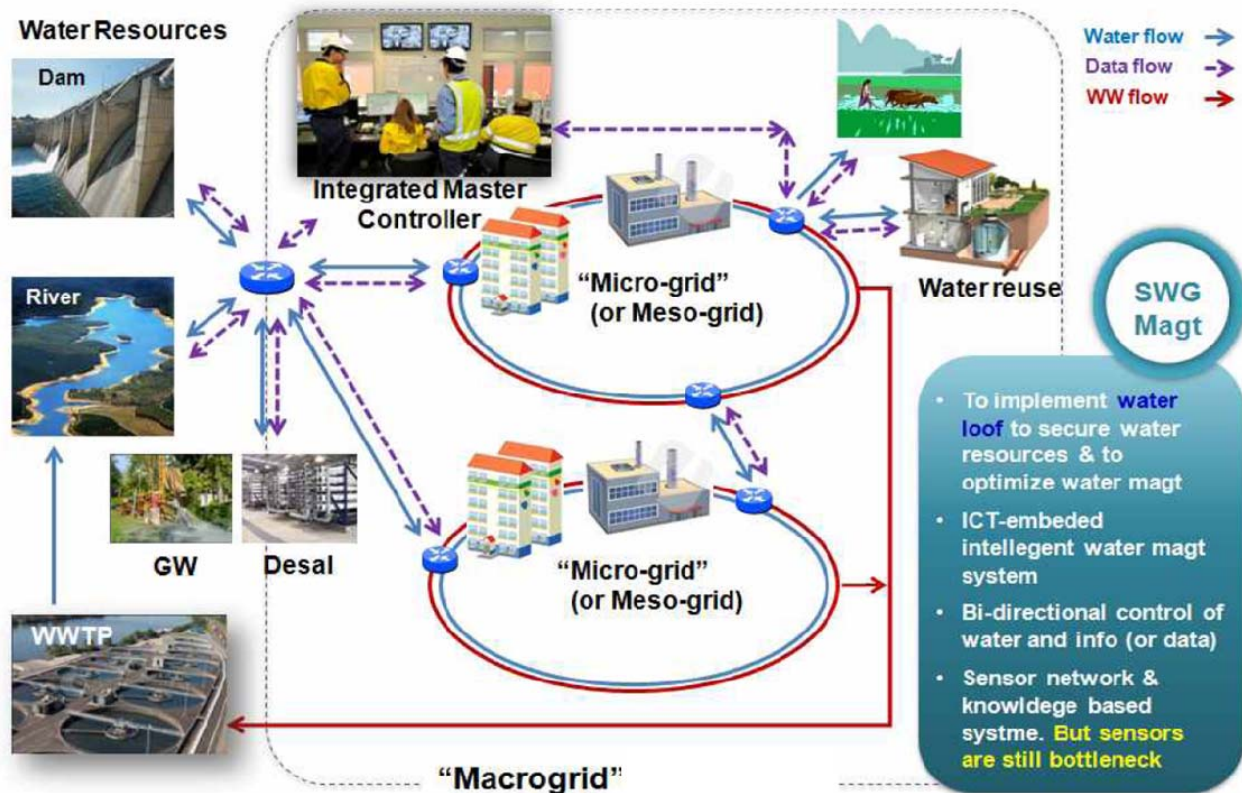


Figure 2 ICT Based Water Resources Management

Key Issues and Challenges

1. D/B & Programs

There are total comprehensive D/B package and 7 Programs for individual purpose depending upon sub-issues.

- SWG Information Management D/B
- SWG Decision-making (DSS) for a unified integrated operating program

- SWG T/B for applying design program
- State and the city's water shortage assessment program
- Remote monitoring and control program
- Water information services program
- Water Loop operating program
- Fully designed water treatment program

2. Technical Design & Guidelines/Manuals

- Usage of technology components during the construction phase
- Decentralized / centralized water loop operating technology
- Water supply due to climate change impact assessment
- Verify the efficiency of facility(water supply and demand)'s automation and commercialization
- Water supply control automation HW
- For water resources monitoring and management, and on-site sensor adaptive self-supporting high-performance
- Low-powered, compact, lightweight, multifunction smart multifunctional gauge

Recommendations/Findings/Options/Questions

1. Target package configuration for each scale

Figure 3 describes package products of SWG Group, these package products mainly on Macro-scale, Meso-scale and Micro-scale, which apply the technology that can compare well with the actual place according to its own specificity, and all package products can be linked each other. They show once organism combination.

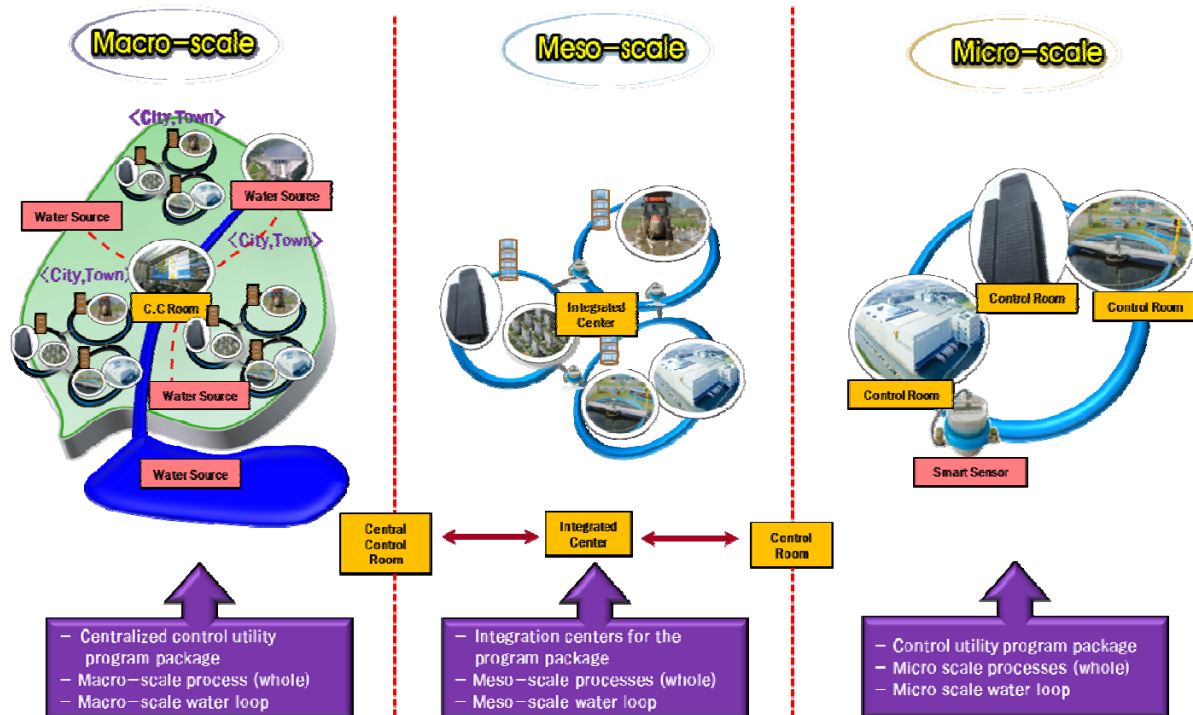


Figure 3 Package Products of SWG

2. The package targeted for Developing Countries

Figure 4 shows the Microscaled SWG, and it will be applied in the developing countries at first. There are five parts in the Micro-scale package, including Micro Program Package, Remote monitoring and control technology, Water production/distribution process, Water Information Service and SWG sensors and instruments. For the Micro Program Package part, four functions appear, they are Micro SWG D/B, Decision-making, Supply and Demand reduction assessment, and Water treatment functions. The Micro-scale package achieves the most up-to-date technology.

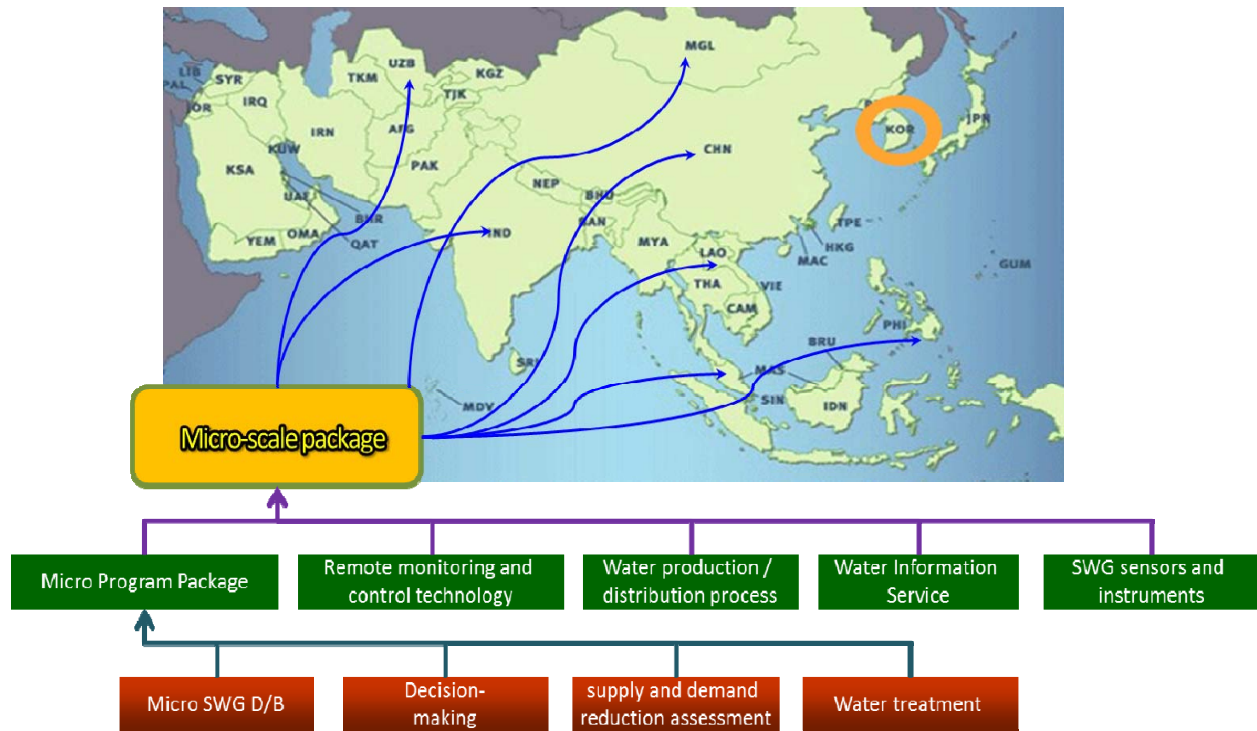


Figure 4 Microscaled SWG

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