

**New Agenda in Water
Management**

Smart Water Management

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- II** Status of Water Management in Korea
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A close-up photograph of a person's hands cupping water over a stream. The water is clear and is falling into the stream, creating ripples. The background is a blurred natural setting with green foliage and a rocky stream bed. The lighting is bright and natural, suggesting a sunny day.

I . What does K-water do?

I -1. What does K-water do?

- **Established in 1967**

- **Government-owned company under MoE***

* Ministry of Environment

- **Employees : Approx. 6,500**

* Headquarter(5 divisions, 38 dept.)

* 7 Regional Headquarters(20 dept.)

* over 140 Regional Offices



I -1. What does K-water do?



Water Resources Mgmt.

- Operating 33 dams
- Water security & Flood control



Water Supply

- Operating 33 bulk & 22 regional water
- 25m served people



Green Energy

- Hydro, tidal Power
- Capacity : 2,000 MW (Domestics & Overseas)



Urban Development

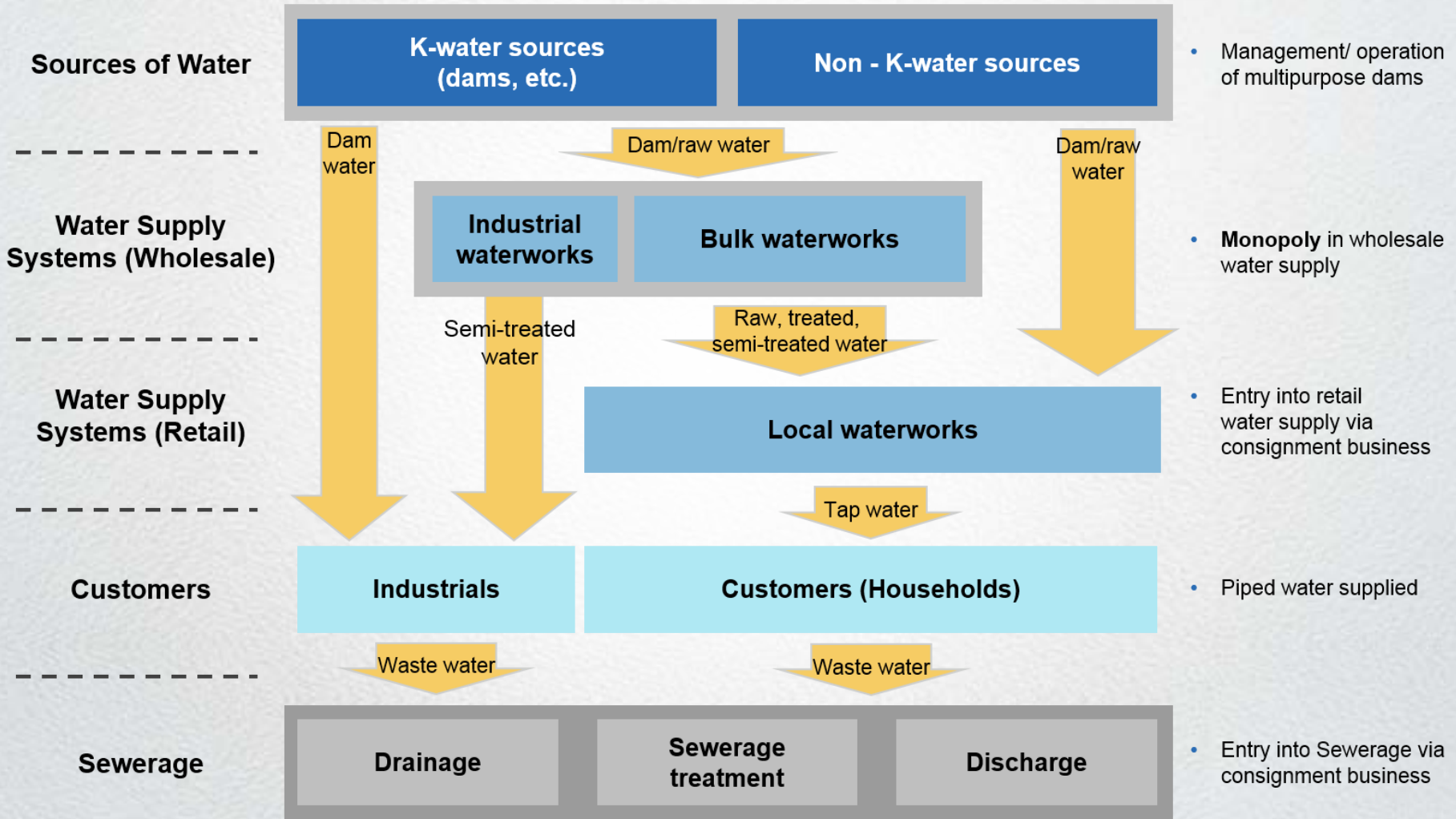
- Servicing 9 cities & industrial clusters
- Forming 4 Complexes

A close-up photograph of a person's hands being washed under a public water tap. The water is splashing, and the background is a soft-focus outdoor setting with green foliage and bright light. The text is overlaid on the left side of the image.

II. Status of Water Management in Korea

II-1. Water System in Korea

K-water plays an important and strategic public policy role in Korea's national water system



II-2. Drinking Water Supply

Now, we are supplying water all around the country

✓ 33 Bulk Water Supply Systems

- Capacity 18 Million m³/day
(47% of the total water supply facility capacity in Korea)

✓ 22 Concession Projects with Local Governments

- ✓ Operating regional water supply networks to provide water for major urban and industrial centers

✓ ICT-based Regional Integrated Operation

Intergrated Operation Center

Intake facilities

Water Treatment plants

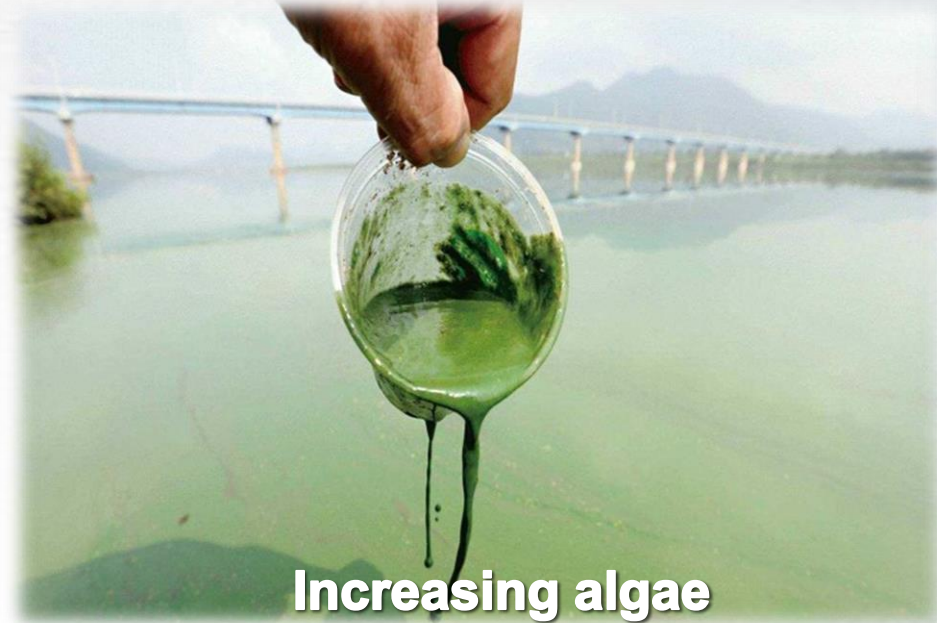
Pumping stations



An aerial photograph of a city at sunset. The sky is a mix of orange, yellow, and light blue, with some clouds. In the background, there are mountains. The city below is densely packed with buildings, including several prominent skyscrapers in the foreground. The overall scene is hazy and atmospheric.

III. Water Crisis & Issue

III-1. Water Issues in Korea



III-1. Water Issues in Korea

Deterioration of Water Quality

- Difficulties in water treatment due to increasing algae
 - ✓ Limited standard water treatment
- Frequent accidents of WQ caused by toxic substances
 - ✓ Phenol spillage, hydrofluoric acid, dioxanem etc.

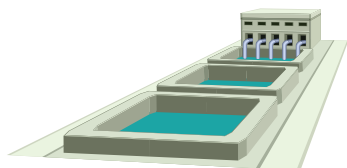


Aged Infrastructures

- Revenue rate 70% except advanced city
 - ✓ Loss of \$433 million/year due to leakage
- Vast investment costs for aged-infra
 - ✓ Plan to invest \$3.4 billion until 2030 for improvement



Unreasonable price



US\$ 0.81/m³

< Production cost >

80.6%

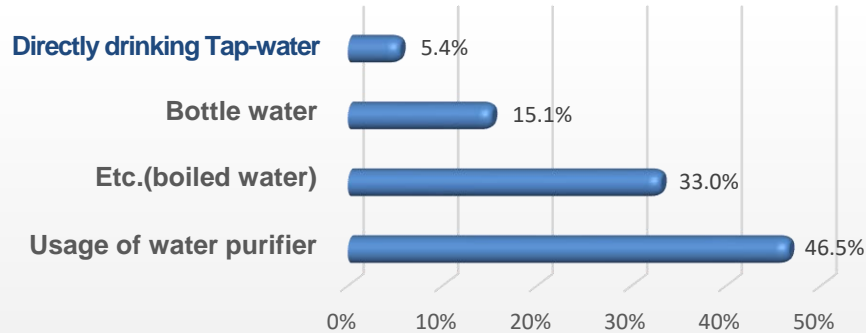


US\$ 0.65/m³

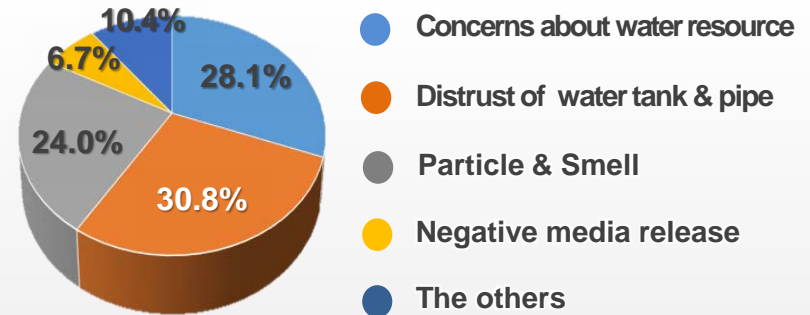
< Water rate >

III-1. Water Issues in Korea

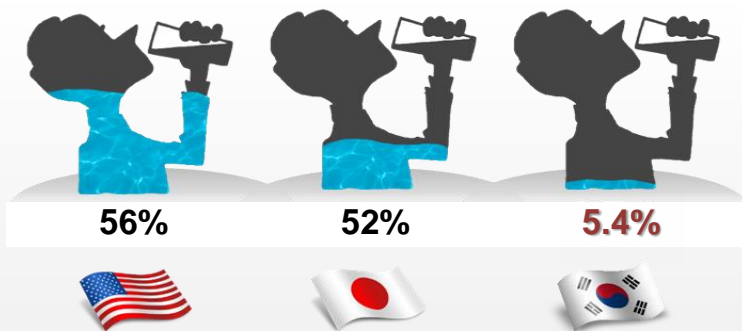
Kinds of water to drink



Reasons not to drink Tap-water



Comparison with advanced country



Increase of social costs



Necessity of Smart Water Management

III-2. Global Water Crisis

Water risk is a common challenge all human beings to manage

UN SDGs

6 goals relating to climate change and water management out of 17 SD goals

- Water and sanitation, cities, etc.



Paris Agreement On Climate Change

All nations should participate in after 2020

- Limiting global temperature increase to 1.5 degrees
- Committing all countries to submit all new NDCs(Nationally Determined Contribution) every five years from 2023

Nations Unies
Conférence sur les Changements Climatiques 2015
COP21/CMP11
Paris, France



World Economic Forum (Global Risks 2016)

One of the biggest risks all nations are facing

Top 10 risks in terms of Impact

- 1 Failure of climate-change mitigation and adaptation
- 2 Weapons of mass destruction
- 3 Water crises
- 4 Large-scale involuntary migration
- 5 Energy price shock
- 6 Biodiversity loss and ecosystem collapse
- 7 Fiscal crises

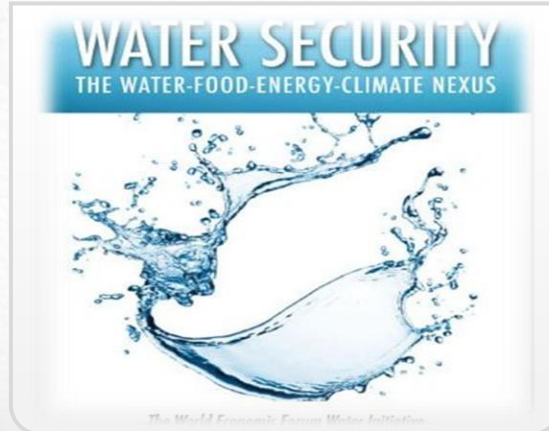
III-2. Global Water Crisis

Global challenges are integrally related to water management

Climate Change



Water-Energy-Food Nexus



Sustainable Development



Smart Water Management Innovation

An aerial photograph of a city, likely New York City, showing a dense urban area with a river (the Hudson River) and a large body of water (the Hudson River estuary). The city is surrounded by green spaces and a network of roads. The text "IV. What is SWM ?" is overlaid on the image.

IV. What is SWM ?

IV-1. Water is SMART ?

“SMART” introduced in the early 1980s as a future-oriented concept to enable real-time detection and Effective reaction by using state-of-the-art sensors as well as computers

Introduction ('80s)

“Smart military supplies”
And munitions

- applied to defense industry
- introduced to the public by taking the Gulf War opportunity



Spreading ('00s~)

Diverse industry “Smart phone”,
“Smart TV” as well as Smart SOC

- Electricity management(demand, supply)
- Intelligent transportation management system
- Ubiquitous education system



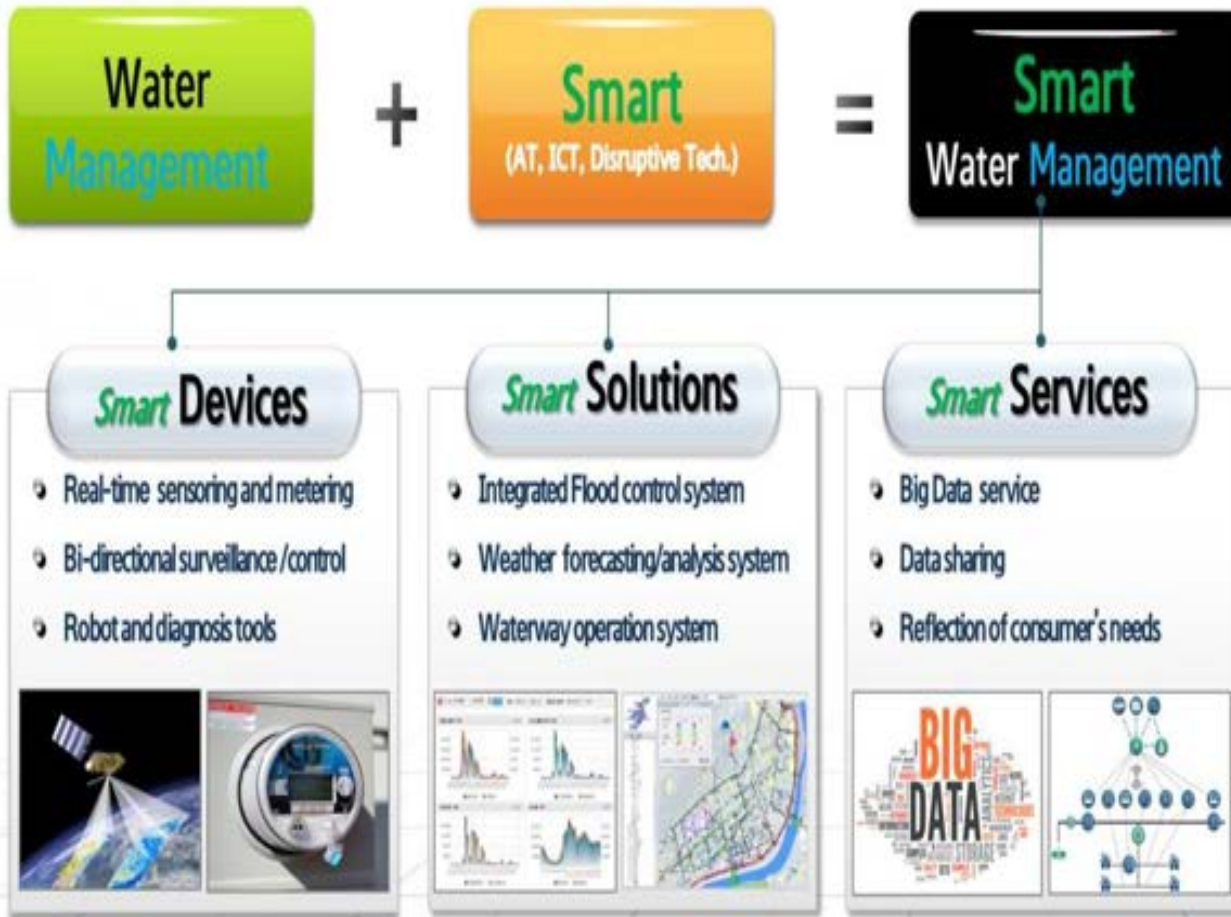
Adopted in Water (as of today)

Devices, Sensors, Network

- Bi-directional communication Technology
- Real – time surveillance and control technology
- Data analysis / evaluation technology
- Intelligent metering tech

IV-2. Smart Water Management

Intelligent water management incorporation with **ICT** tech
To enhance water service efficiency from source to tap



Intelligence

Mega city, water supply efficiency and energy consumption

The image shows a large, modern control room with multiple large monitors displaying data and maps. Several operators are seated at desks, working at the consoles. The room is dimly lit, with the primary light source being the screens.

IV-2. Smart Water Management

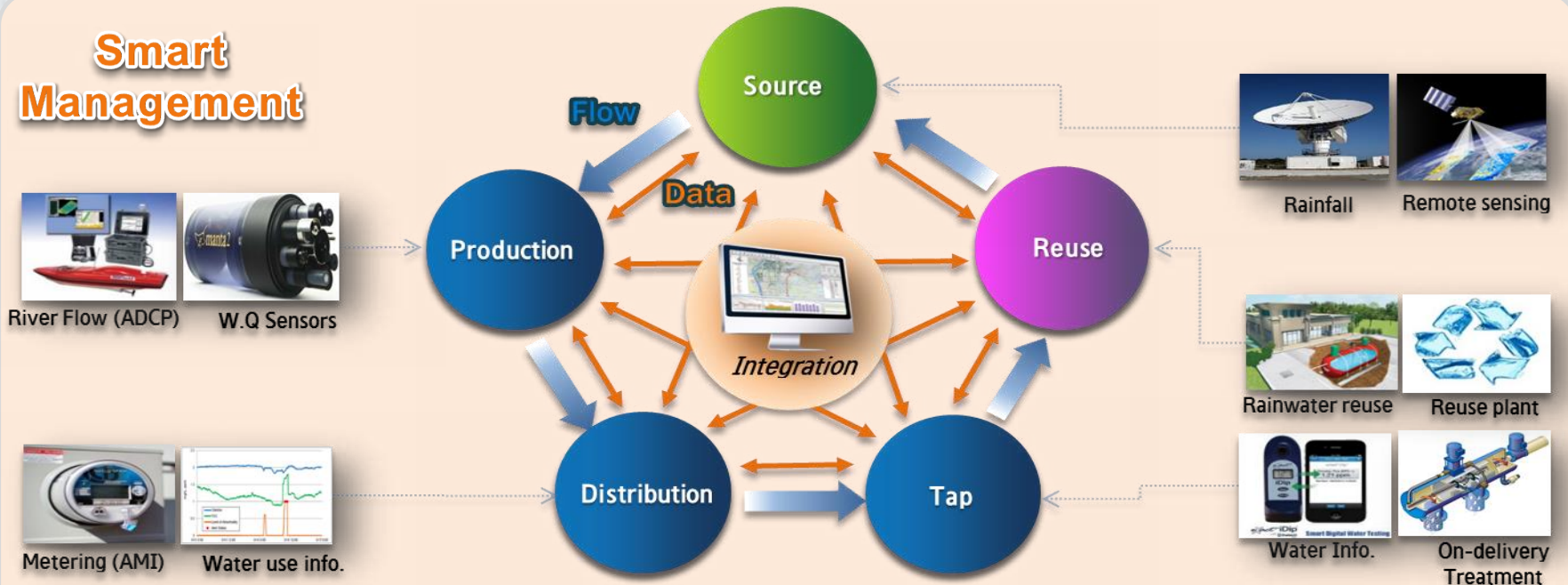
ICT based real – time decision support with using multi – directional water and information flow as diverse sources

Traditional Management



- Getting feedbacks from users are not an option when water flows are in one direction

Smart Management



- With smart devices and solution programs, each water node can communicate and feedback the water information in terms of water quantity & quality

An aerial photograph of a modern cityscape. In the foreground, a wide river flows along a green, landscaped bank. A large, circular park area with winding paths and trees is situated in the middle ground. A prominent building with a red-tiled roof and a clock tower is visible near the river. The background is filled with numerous high-rise buildings, including several skyscrapers, under a clear sky.

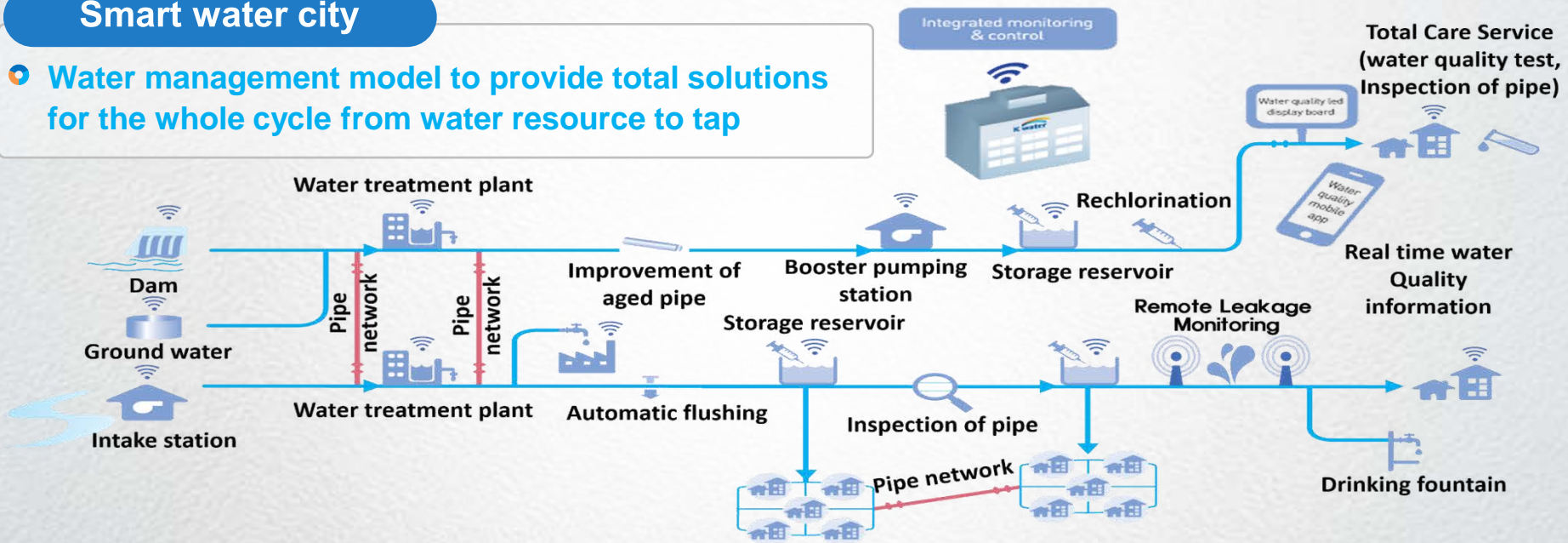
V. SWM Application

V-1. Smart Water City

- K-water's smart water mgmt. model focusing on **Water Supply**
- 2 pilot projects in **Paju & Goryeong**

Smart water city

- Water management model to provide total solutions for the whole cycle from water resource to tap



**Stable
Water Supply**

**Healthy
Water Production**

**Thorough
Management of water
Supply System**

**Consumer-
Oriented Service**

V-2. SWC in Paju – Pilot site



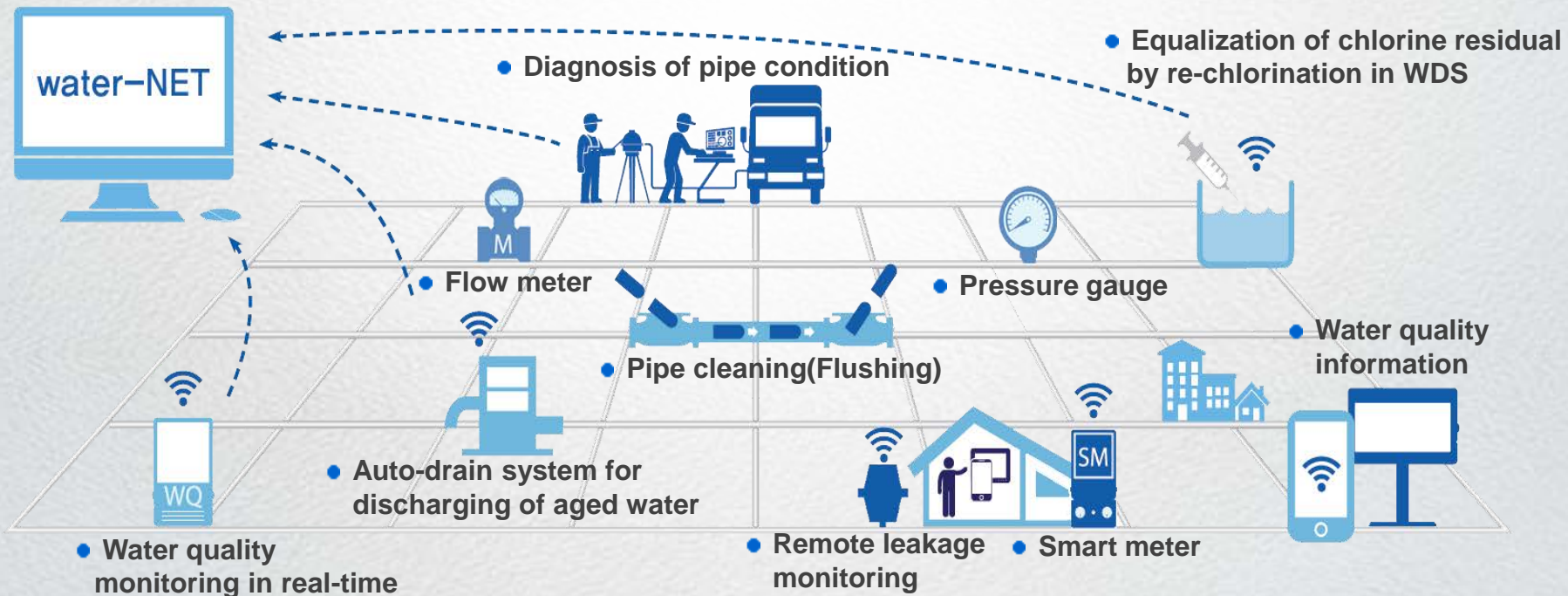
Overview of SWC pilot site

- ✓ Location : The middle west of Korea
 - Border areas nearby DMZ
- ✓ Population / Area : 420,532 / 672.47km²
- ✓ Regional characteristic
 - The mixed type of urban and rural area
- ✓ Water source : 2 (Han River, Im-jin River)
 - (Han River) Water quality is good and manageable
 - (Im-jin River) Raw water is poor WQ by high ammonia conc. during dry weather(or winter season)
- ✓ Water treatment :
Advanced water treatment (219,000m³/day)
- ✓ Water supply rate / Revenue rate : 96% / 86.3%
- ✓ Pipeline length / Reservoir : 2,072km /

33EA

V-3. SWC in Paju – Smart Technologies

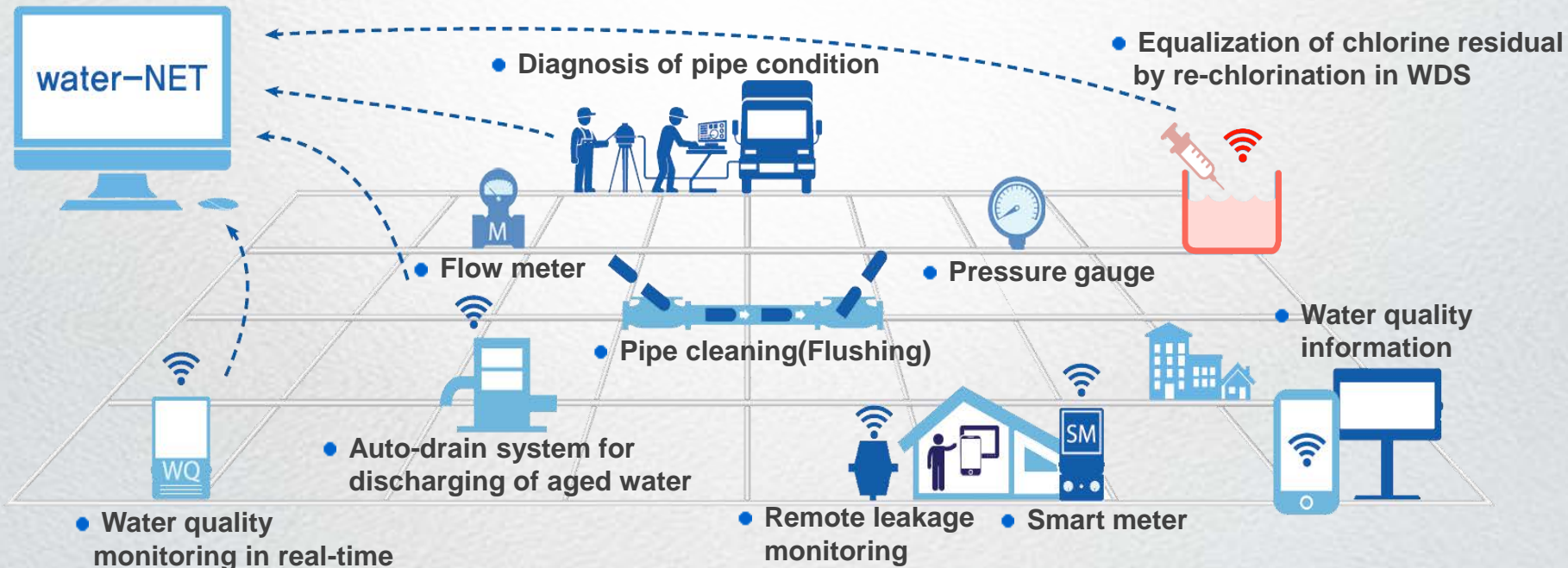
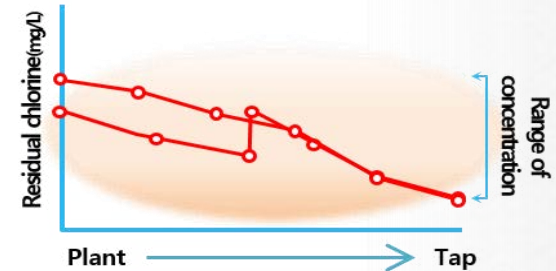
- Real-time water quality monitoring for analysis & control
- Equalization of chlorine constantly in water distribution system
- Discharge of aged water & deposited material to prevent WQ deterioration
- Provision of real-time WQ information by electric board & mobile APP



V-3. SWC in Paju – Smart Technologies

Re - chlorination

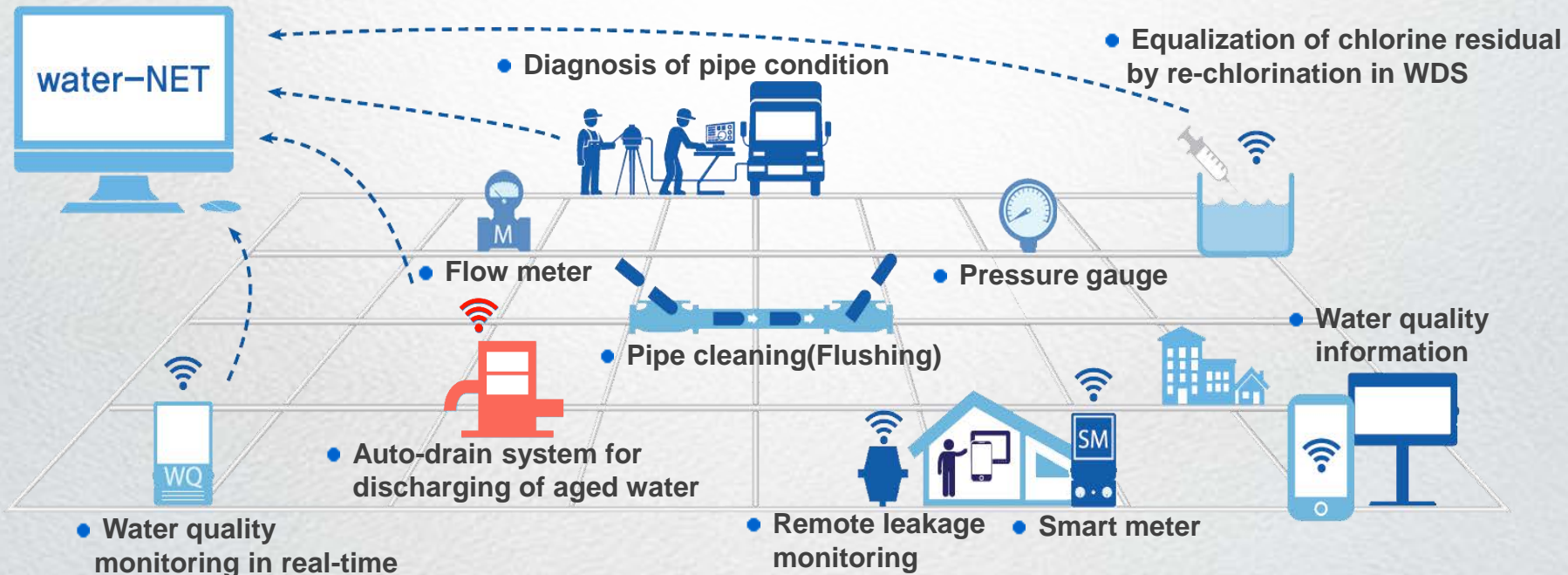
- Implementing re-chlorination of reservoir, chlorine conc. is equalized within WDS
- Splitting injection point of chlorine taste and odor of tap water are improved



V-3. SWC in Paju – Smart Technologies

Automatic flushing device

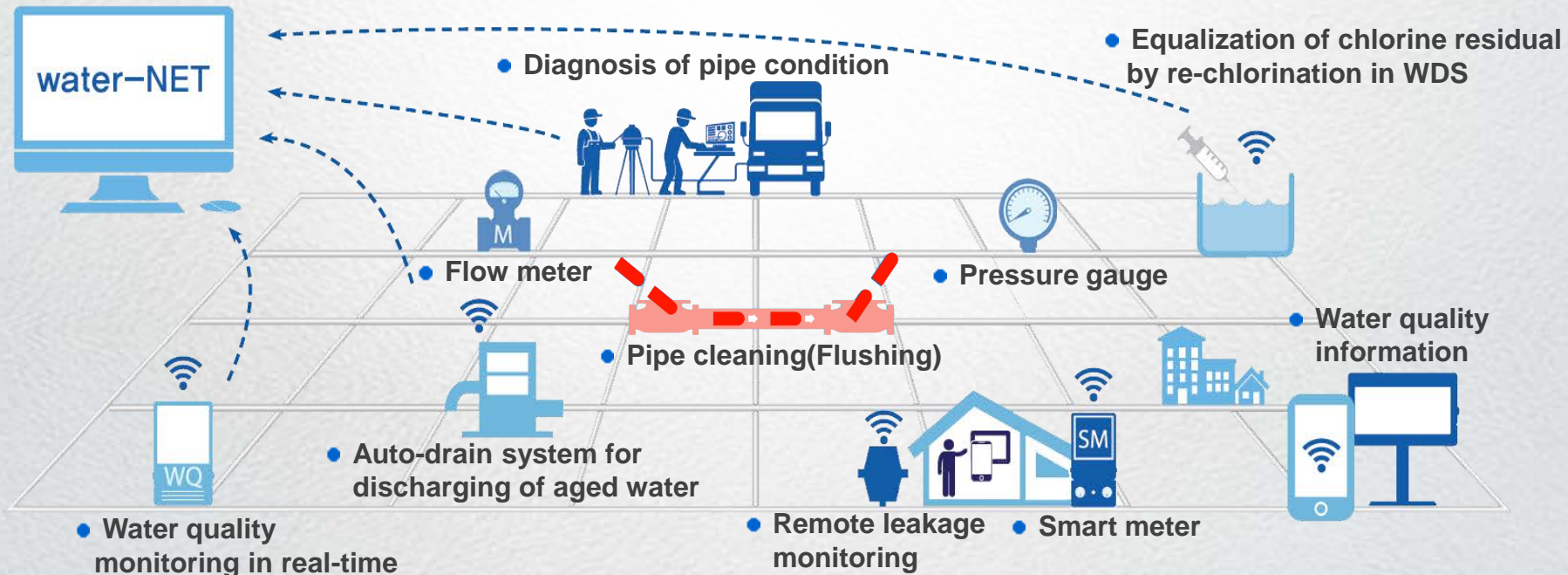
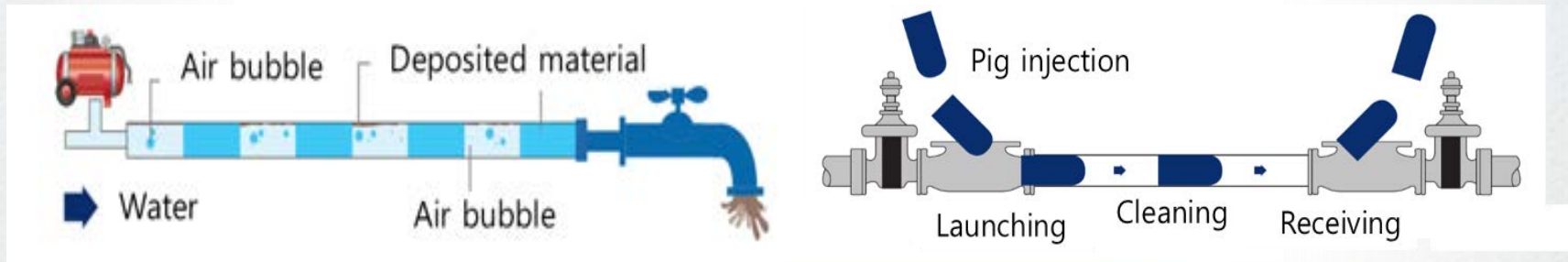
- When the WQ is out of normal range, a contaminated water is discharged automatically



V-3. SWC in Paju – Smart Technologies

Pipeline flushing

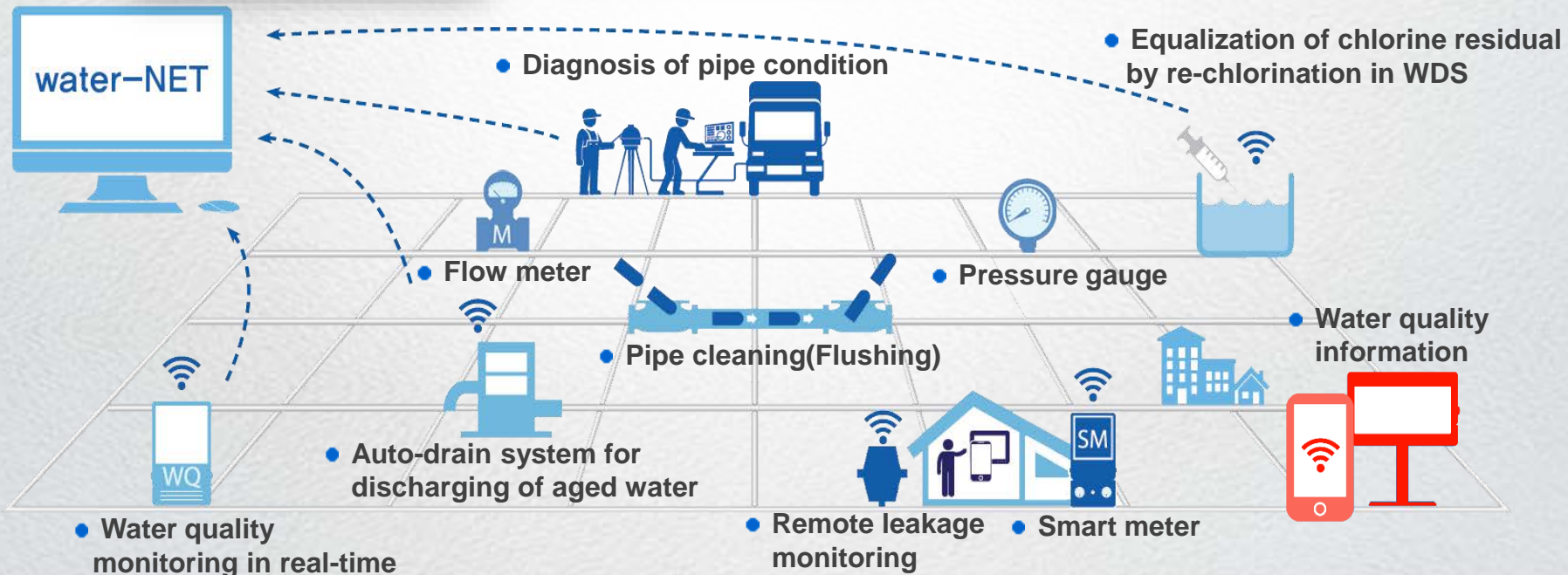
- Flushing is used in the WQ complaints area to prevent a discoloration accident
- Two methods are applied in the pilot project : Air scouring & Sponge PIG



V-3. SWC in Paju – Smart Technologies

Providing real-time WQ information

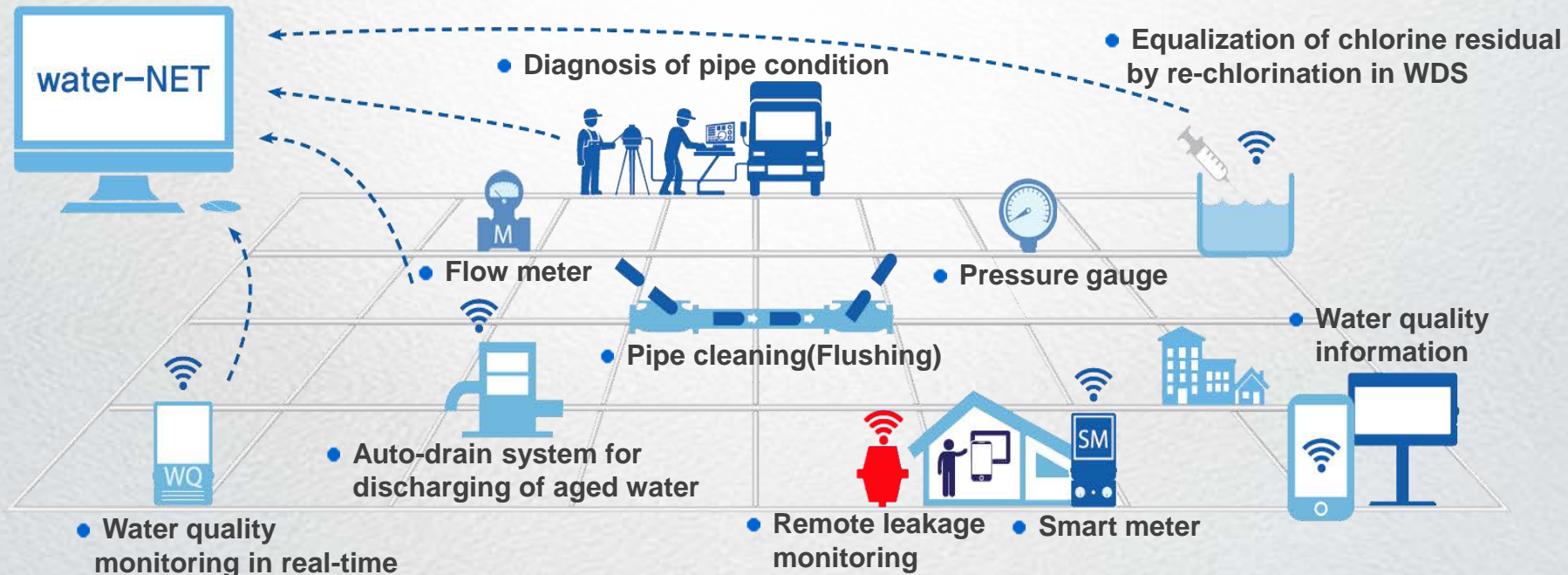
- Water quality sensors are installed in major monitoring points
- Electronic board shows water quality information measured in WDS
- Mobile application provides real-time water quality information to consumers



V-3. SWC in Paju – Smart Technologies

Remote leakage monitoring system

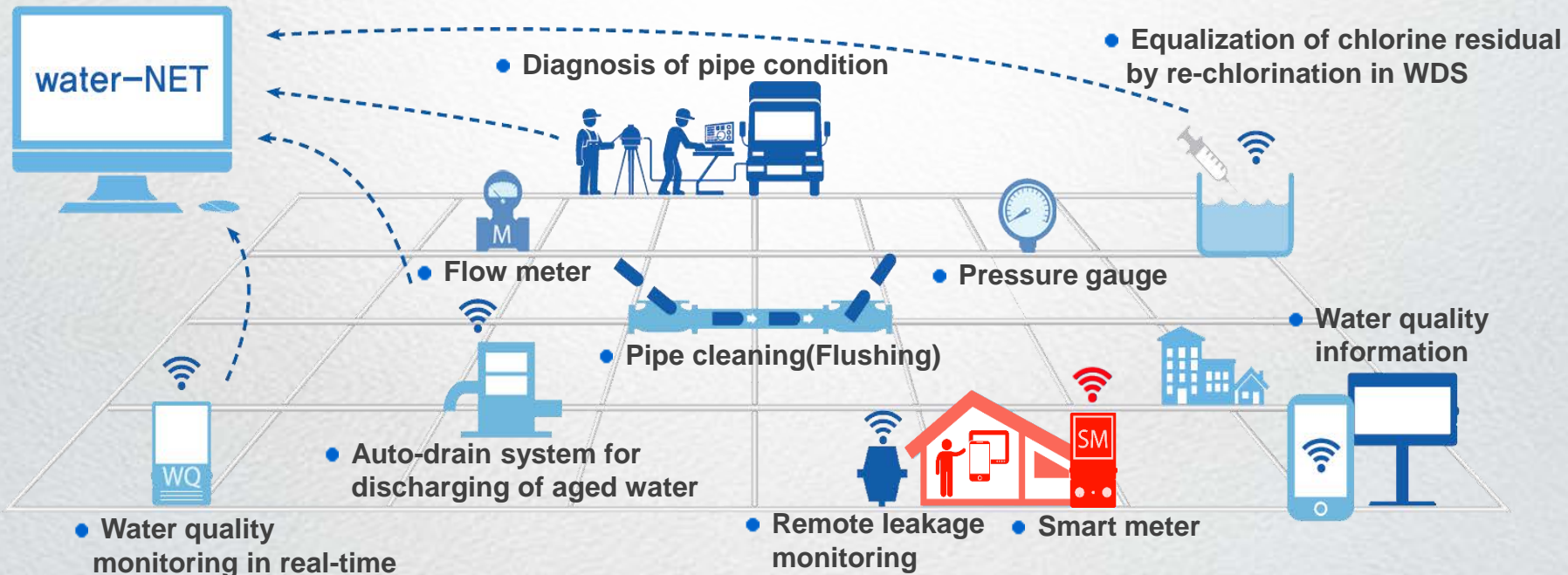
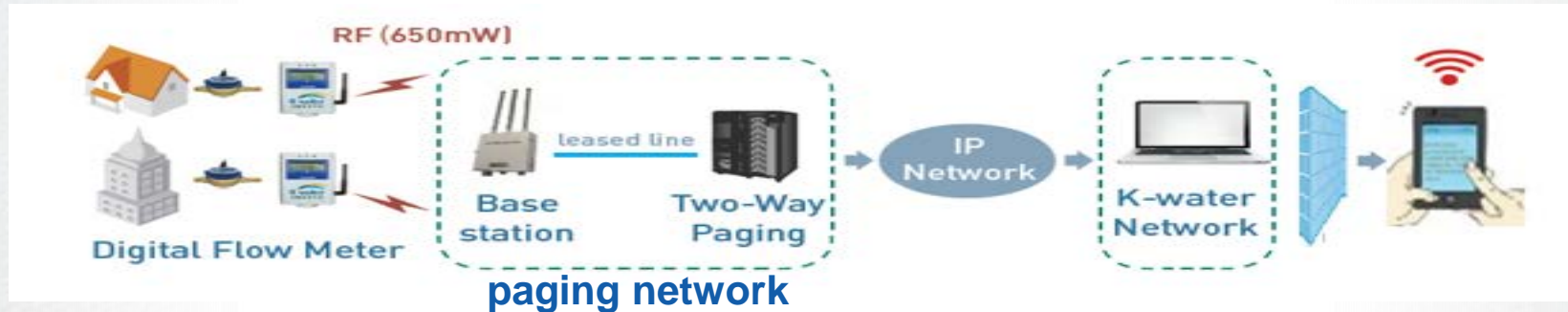
- Remote sensors detect vibrations caused by leakage and monitor water leakage through analyzing frequency, amplitude, etc.



V-3. SWC in Paju – Smart Technologies

Smart meter

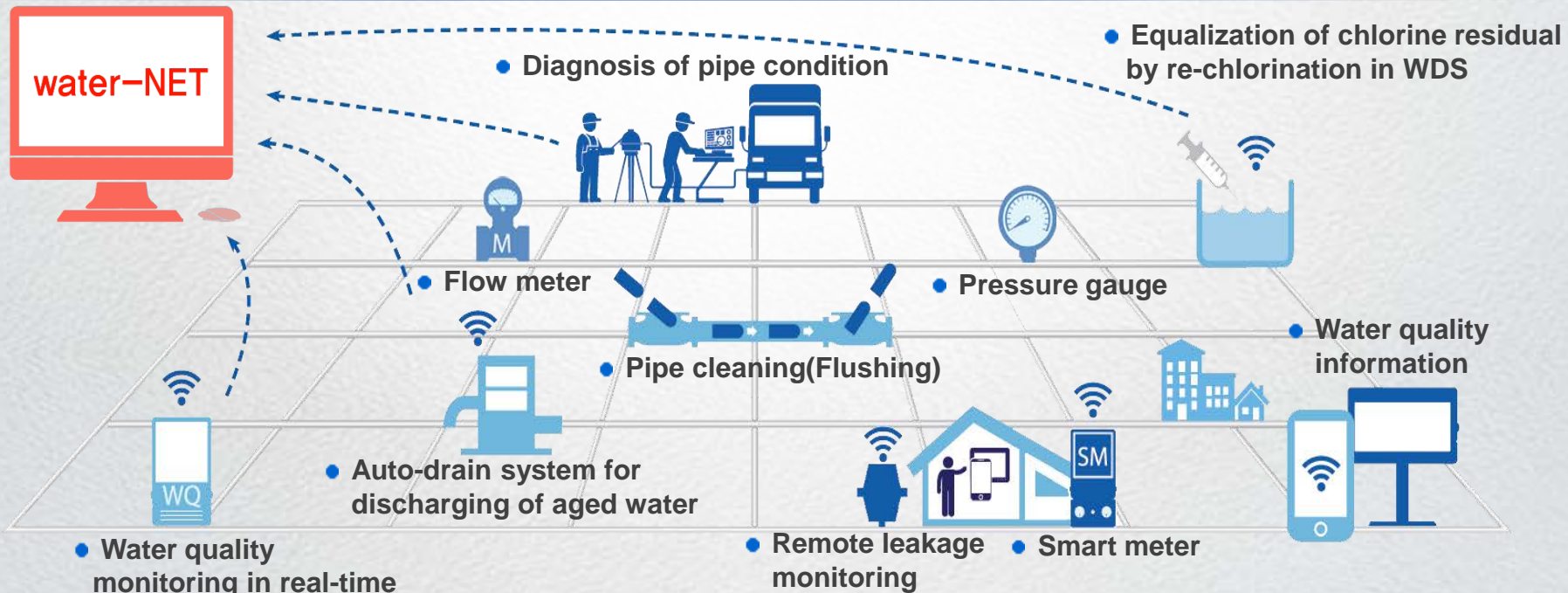
- Leakage monitoring and pressure management can be done through collecting hourly flow data from smart meters installed at



V-3. SWC in Paju – Smart Technologies

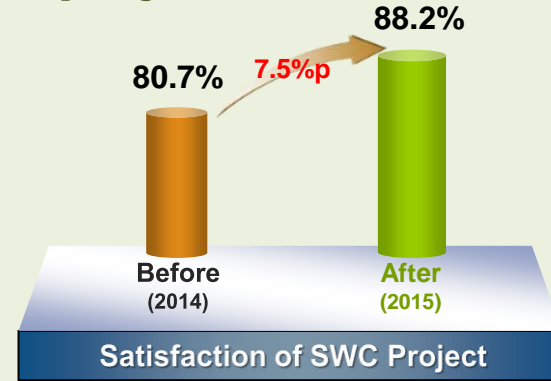
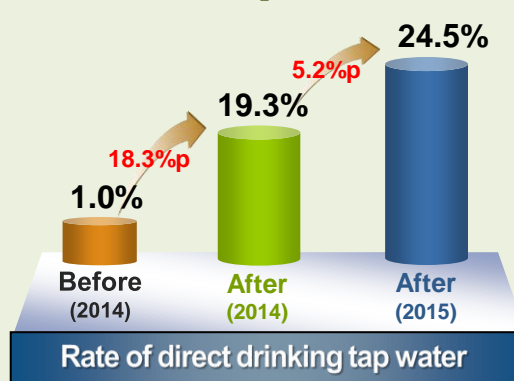
Water-Net

- Supporting decision-making for stable water supply from water treatment plant to consumers based on GIS & sensors

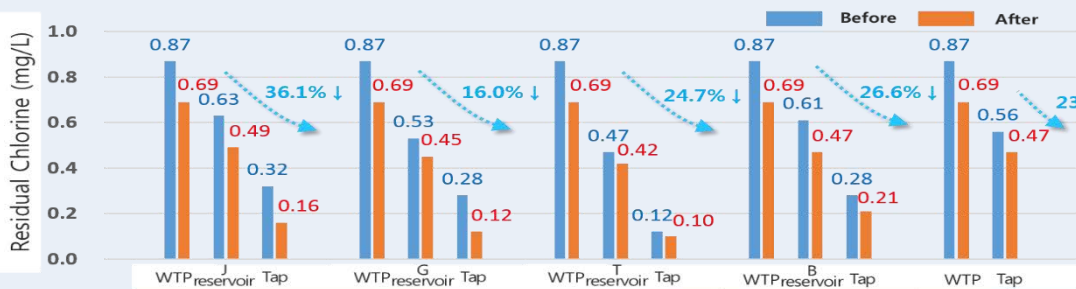


V-4. SWC in Paju - Outcomes

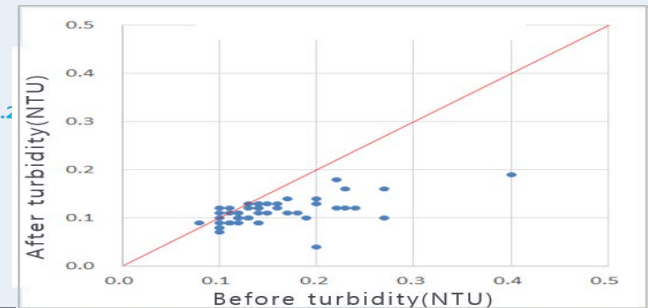
- Increased rate of direct drinking tap water (1.0% → 24.5%)
- Satisfaction improvement of SWC pilot project (80.7% → 88.2%)



- **Water quality improvement in water distribution**
 - Decrease of chlorine service range by splitting injection point (16.0~36.1%)
 - Decrease turbidity of tap by support aged-indoor pipe flushing



Decrease trend of residual chlorine in water distribution



Turbidity before & After flushing

A close-up photograph of a person's hands cupped together, pouring water into a stream. The water is captured in mid-air, creating a dynamic splash. The background is a soft-focus natural setting with green foliage and a bright light source, possibly the sun, creating a warm, golden glow. The overall mood is serene and appreciative of nature.

Thank You!

