WORLD BANK GROUP | KOREA GREEN GROWTH TRUST FUND | Ministry of Economy and Finance | Jeju 제주특별자치도 Jeju Special Self-Governing Province

A global water company leading the response to the climate crisis

K-water Digital Water Management by Super Gap Technology

K water Global Business Division

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History of K-water

K-water has grown into a **'Comprehensive water service company'** with business areas covering the entire water cycle based on its capabilities in carrying out and managing large-scale projects.

1967 Establish

Korea Water Resources Development Corp. Foundation

Large dam construction of Korea (soyanggang, Andong, Daecheong)

'74

Industrial Complex Development Corp. (Change of Corp Name)

Construction of National Industrial Complex (Gumi·Yeosu·Changwon)

'88

K-water

Construction of regional water supply (Ilsan, Metropolitan, Ulsan)

'94 '04 '09

Global Business

National Project

Local water supply Operation Initiate

'16

'17

7th World Water Forum Opening & Establishment of AWC

2018

Unification of water management

Integrated water quantity & quality (Government Dept reorganization)

2019

Function adjustment government-affiliated organizations

Overall water cycle service

2023.7

Declaration of New management policy

Global water Company leading the response to the climate crisis

2023.10

Global expansion of Digital water management Tech

Joint venture into Saudi Arabia through Digital Twin Platform

Mission of the times	National economic development laying the foundation	National welfare and life level up	Sustainable Creating a water circulation system	People, Companies, Government Water management Partnership

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K-water Business Area

For Water Resources

- 37 dams(multipurpose, water supply)
- 16 weirs and 1 waterway

* M&I 12.5 Billion㎥
(61% of national water supply)

* Flood Control 5.3Billlion ㎥
(94% of national flood control)


For Clean Energy

- The largest clean energy provider in Korea
  : Hydropower, Solar and Tidal power

* Capacity : 1,356MW


For Water Service

- 48 multi-regional water supply network

* 17.7 Million ㎥ /day
(48% of national water supply)

- 23 regional water supply and 14 wastewater treatment plant


For waterfront Area

- New waterfront town
  (Songsan GC, Siwha MTV, Busan Eco-delta city)
- Industrial Complex
  (Kumi etc.)

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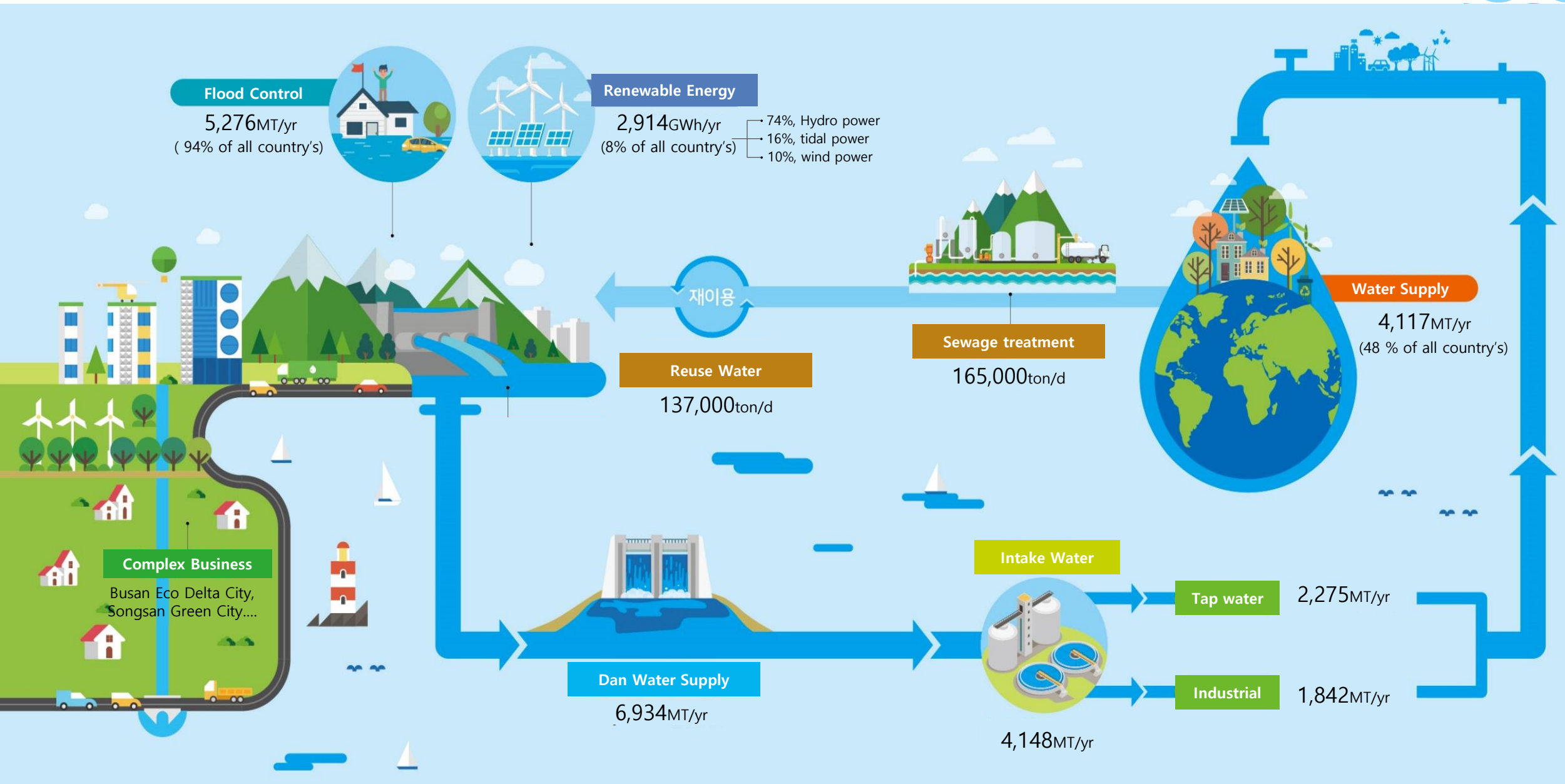
K-water's Water Circulation Business Model



K-water's Global Business

Global Frontier, K-water

After 1994, business in 34 countries have been Successfully completed.
(Business in 10 countries ongoing)

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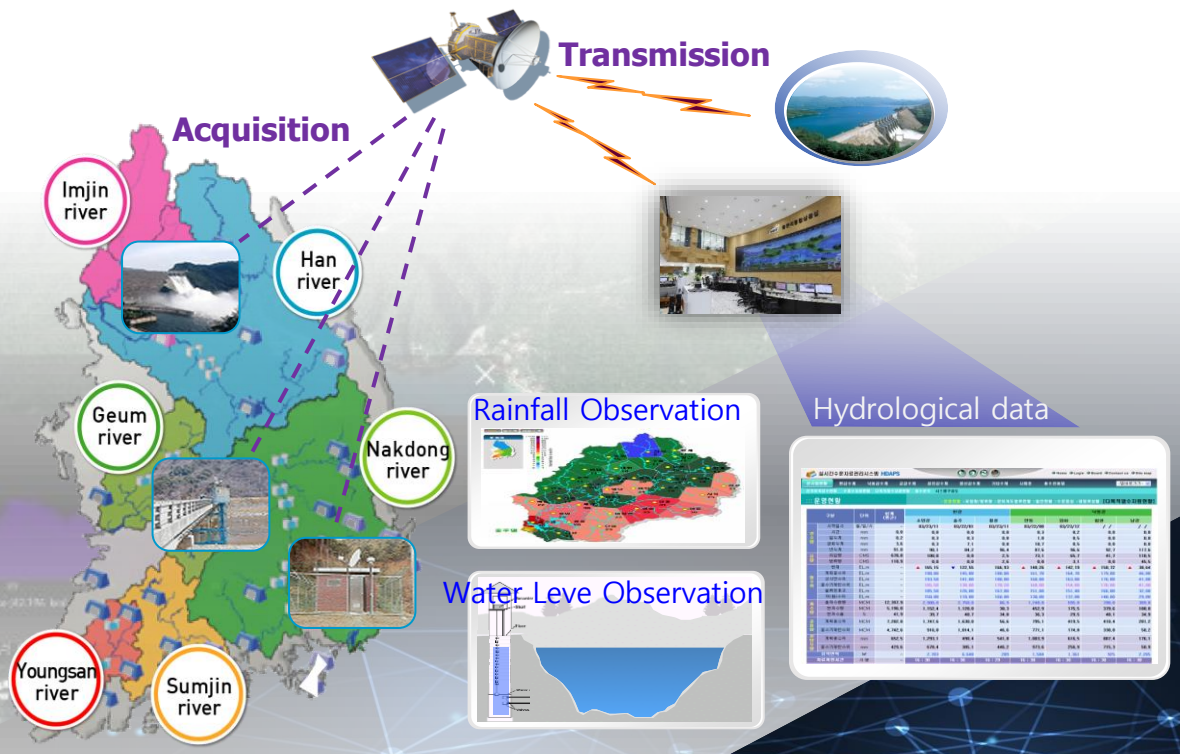
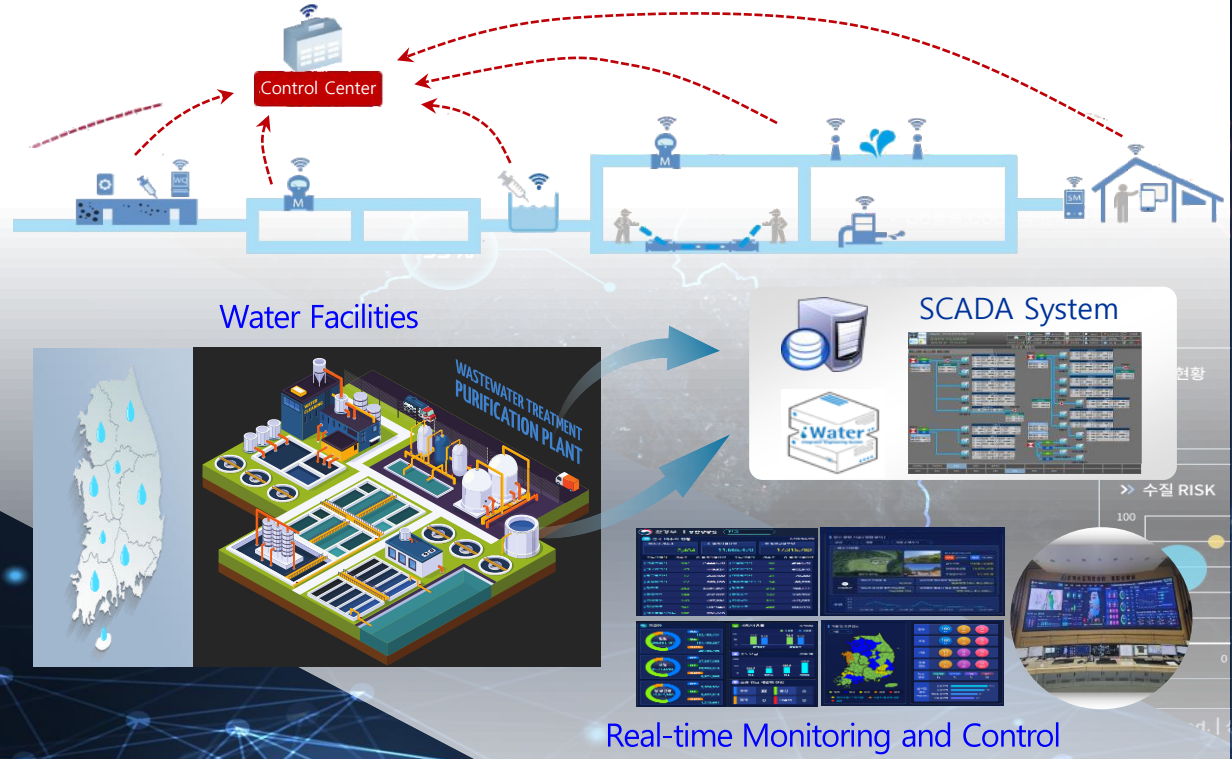
K-water Water Management ICT Technology

Water Disaster Prediction and Response



Water Supply Optimal Operation



Hydrological Data Acquisition and Processing System(HDAPS)

- (Data) Rainfall, Water level, Water quality, etc.
- **(Management) Real-time based Hydrological Data Acquisition and Processing System**
- **(Network) Dual Communication Network(Satellite, CDMA)**

Real-time Water Information System(RWIS)

- (Data) Flow, Level, Water quality, facilities Information, etc.
- **(Management) Real-time Monitoring and Control based SCADA system**
- **(Network) Dual Communication Network(Leased Line, CDMA)**

K-water's Challenge through Digital Transformation

Need for Innovative Approach to Counteract Climate Change through Digital Transformation in the Field of Water Management

Climate Crisis Response

Temperature rise by 1℃ over the last 133 years (1880-2012)

Increasing Risk of Water Disaster

Longest ainy season and Torrential rain in 2020

Digital Transformation

"2 years of digital transformation in 2 months"
(MS CEO)

Key Policy of Government

"Digital Twin, AI" are a key tech in Korean Digital Government

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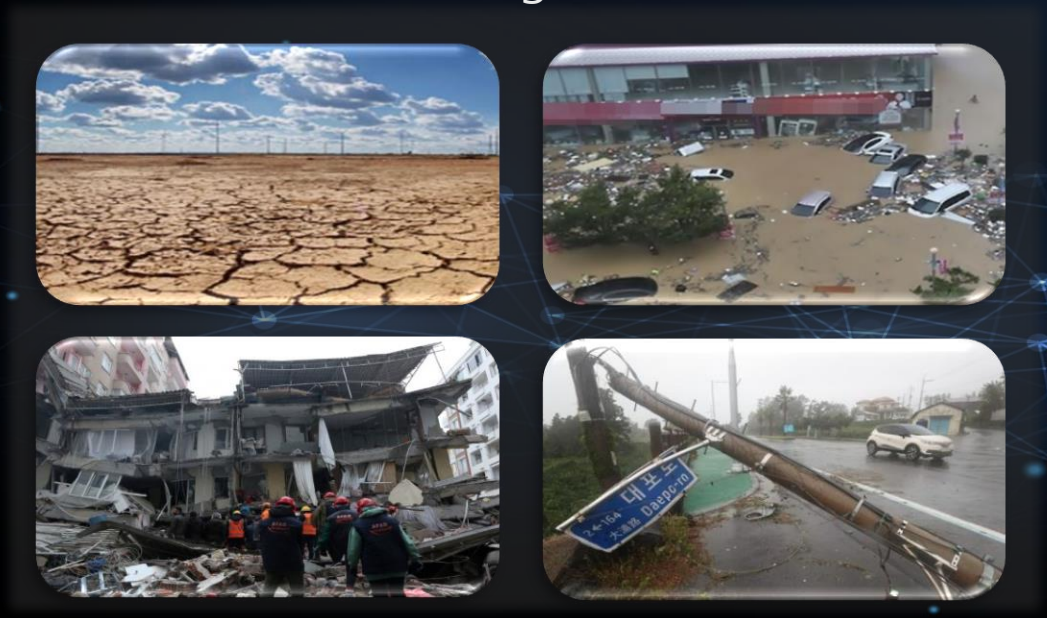
K-water Strategy to Overcome Water Management Limitations

The only survival strategy to respond to climate change,

‘Digital Water Management’

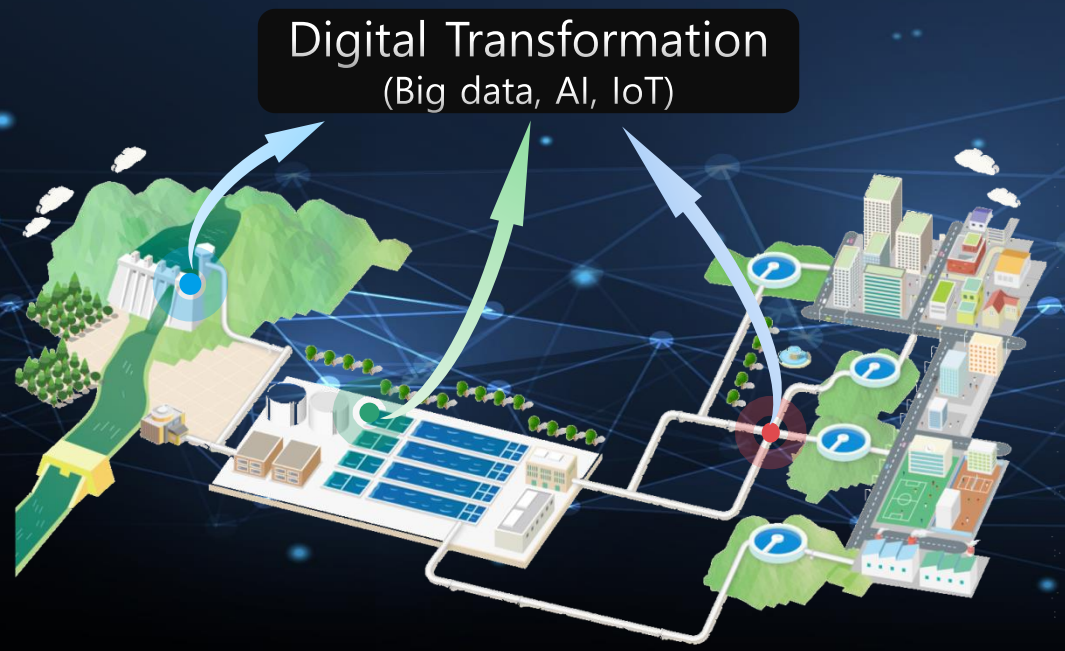
complex water problems,
Limitations of water management

- Limitations in responding to unpredictable water problems due to climate crises such as extreme droughts and floods



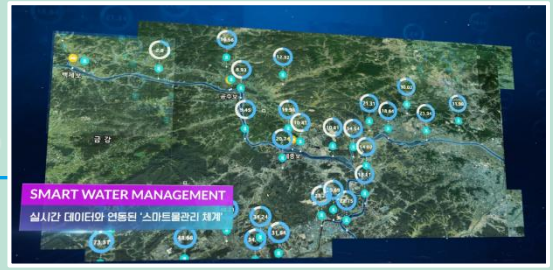
4th industrial revolution technology base,
Transition to digital water management

- Transform to a digital water management system that can respond proactively using digital transformation technologies such as big data, AI and IoT.



Super Gap Technologies

1. Digital-Twin Water Mgmt.



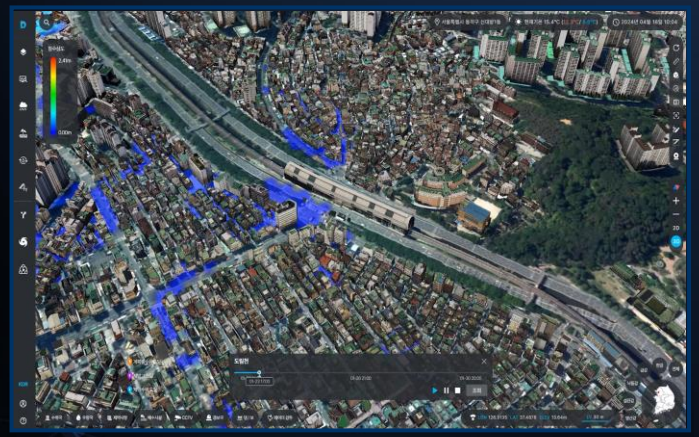
2. AI-driven WTP

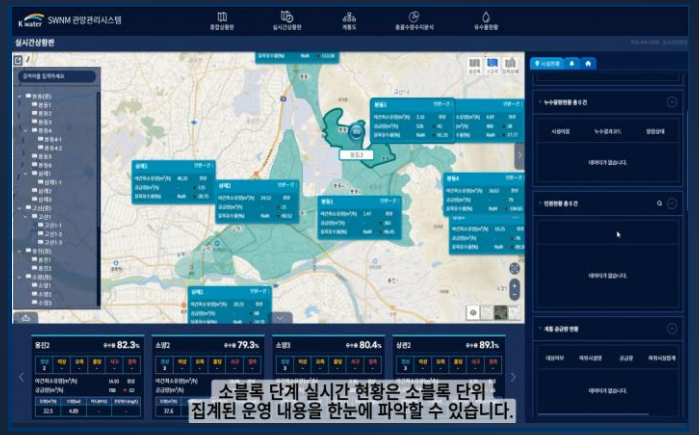
3. Smart Water Network Mgmt.

The world's first implementation of super-gap technology

in the entire water management process

Manages the entire water cycle, from basin floods and droughts to tap water production and supply





Digital GARAM+

- Flood analysis, simulation
- River, dam digital twin
- Real-time hydrological monitoring

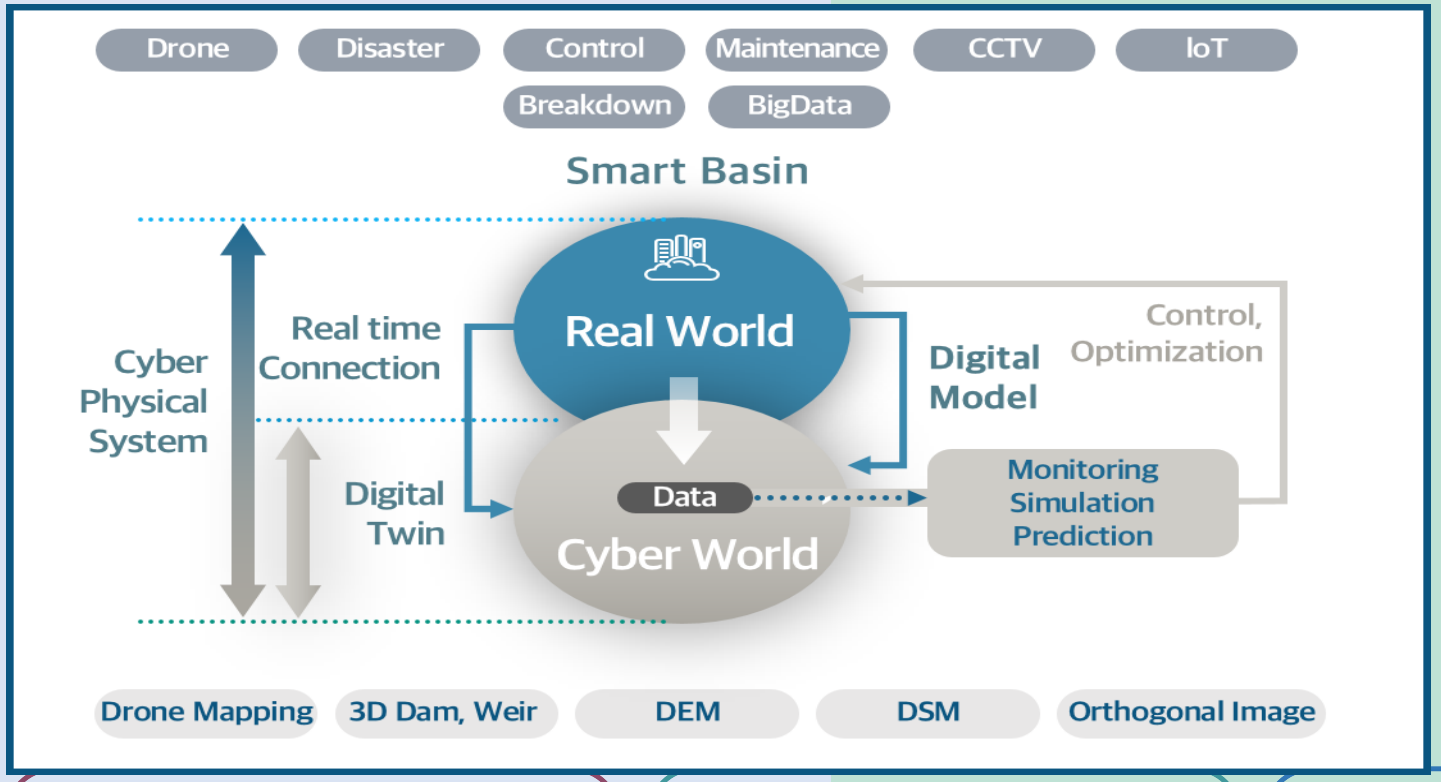
AI Water Treatment Plant

- Autonomous operation of water purification process
- Energy efficiency, safety monitoring
- Facility diagnosis, abnormal symptom detection

Smart Water Network Management

- Flow rate analysis and improvement
- Efficient water pipe network operation
- Scientific water pipe network diagnosis and improvement

Practice 1: Digital Twin Water Resources Management



Real World

Cyber World

Drivers

- Unprecedented climate disasters
- Communication with stakeholders
- Gap between reservoir and river

Enablers

- Floods analysis
- Impact simulation at downstream
- 3-dimensional visualization
- Real-time hydrologic monitoring

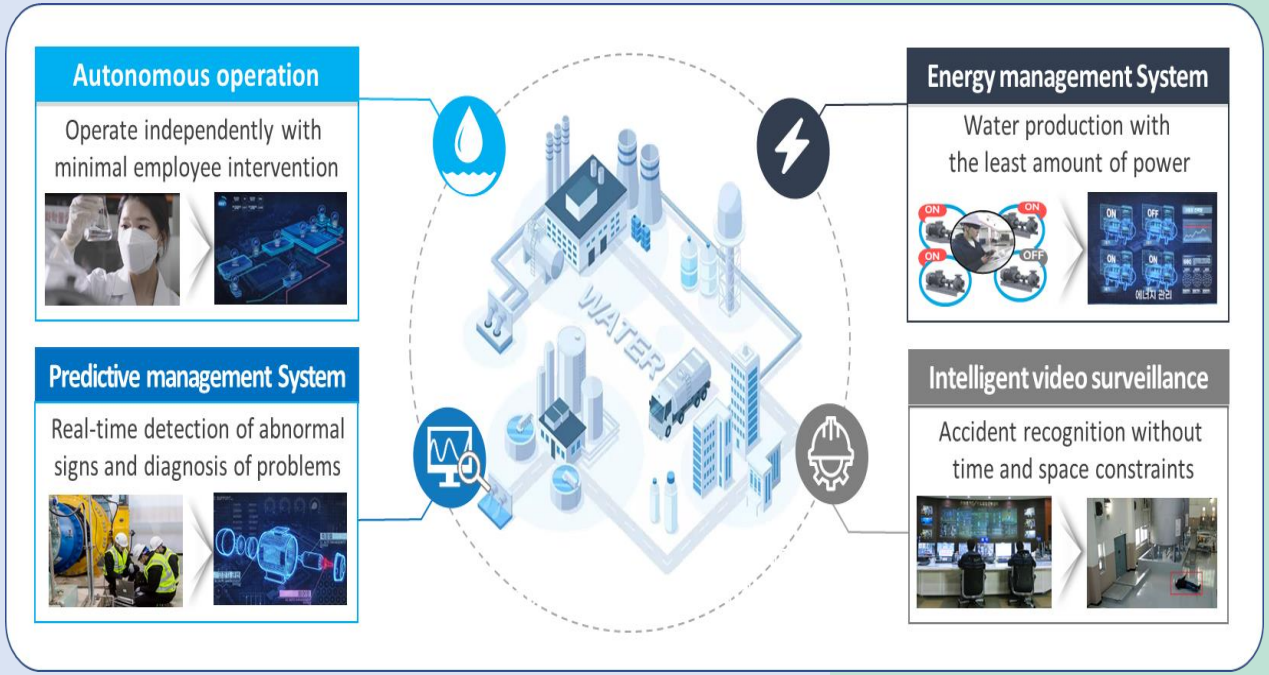
Outcomes

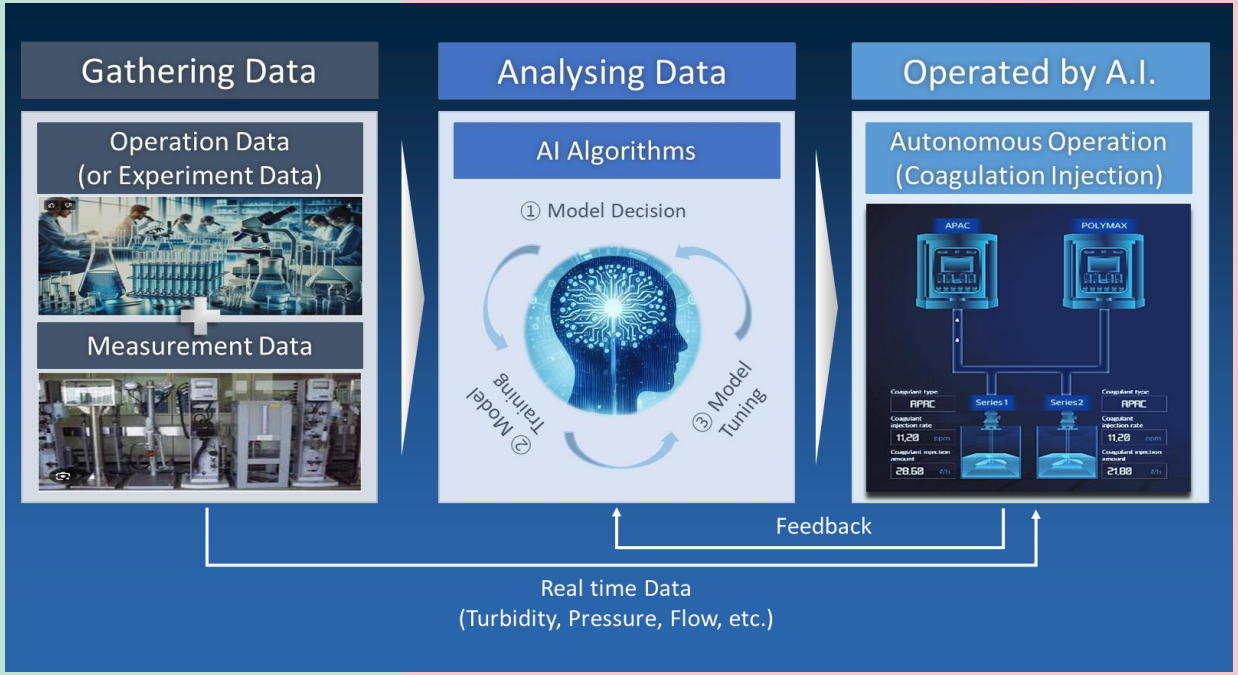
- Better decision-making
- Early detection and warning
- Shared-vision operation

Collaboration

25 October, 2023

Practice 2: AI-driven Water Treatment Plant





Drivers

- Unstable water quality
- Energy efficiency

Enablers

- Optimal chemical dosing
- Optimal energy consumption
- Monitoring the safety of workforce
- Diagnosing abnormal operation

Outcomes

- Saving the chemical (4%)
- Saving the energy (5%)

Recognition

WORLD ECONOMIC FORUM

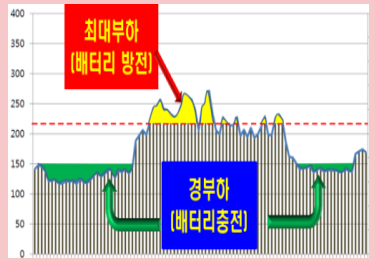
Global Lighthouse Network

December, 2023

Net Zero Water Treatment Plant

ESS(Energy Storage System) (6GWh/yr, 3,000tCO₂)

- Peak management of Electricity
  → Reducing peak consumption of coal power

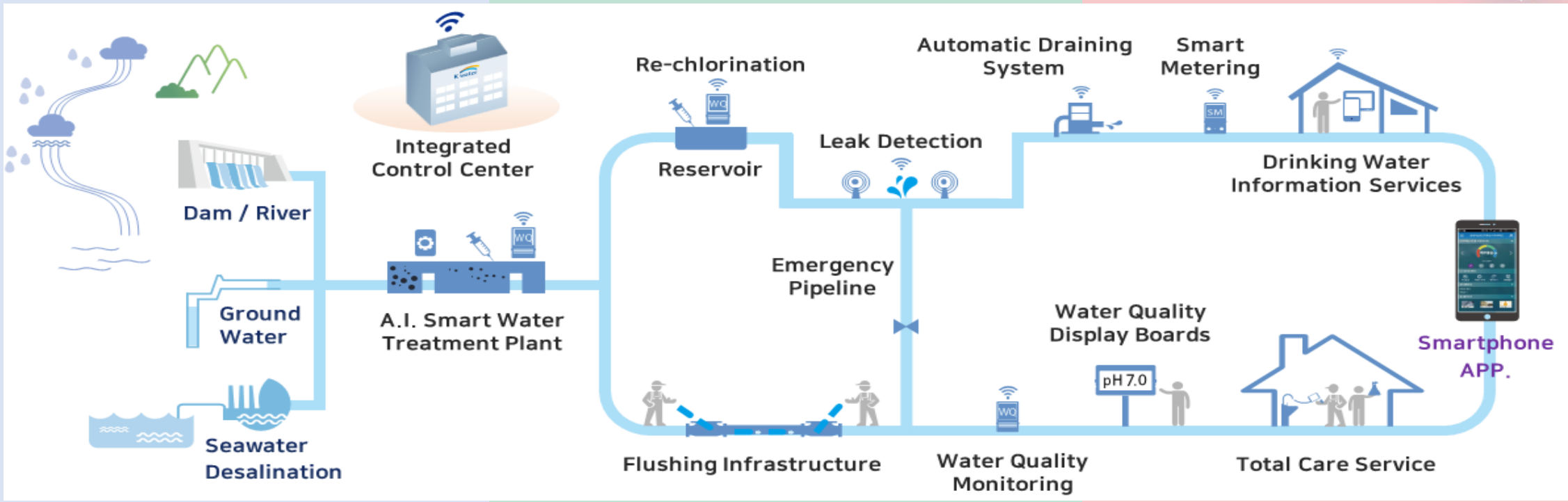


High Efficiency Facility (10GWh/yr, 5,000tCO₂)

- Upgrade low efficiency facilities
  → Carbon reduction with high efficiency facilities

Achieve 100% Net Zero WTP for 43 Bulk water supply system by 2030

Practice 3: Smart Water Network Management



Drivers

- Water leakages and bursts
- Inefficiency of water supply
- Water quality in the pipelines

Enablers

- Sensors for quality and quantity
- AI-driven water leakage detection
- Smart metering
- Pressure management

Outcomes

- Reducing the water loss (15% ↓)
- Guaranteed water quality
- Customer satisfaction

Track Records

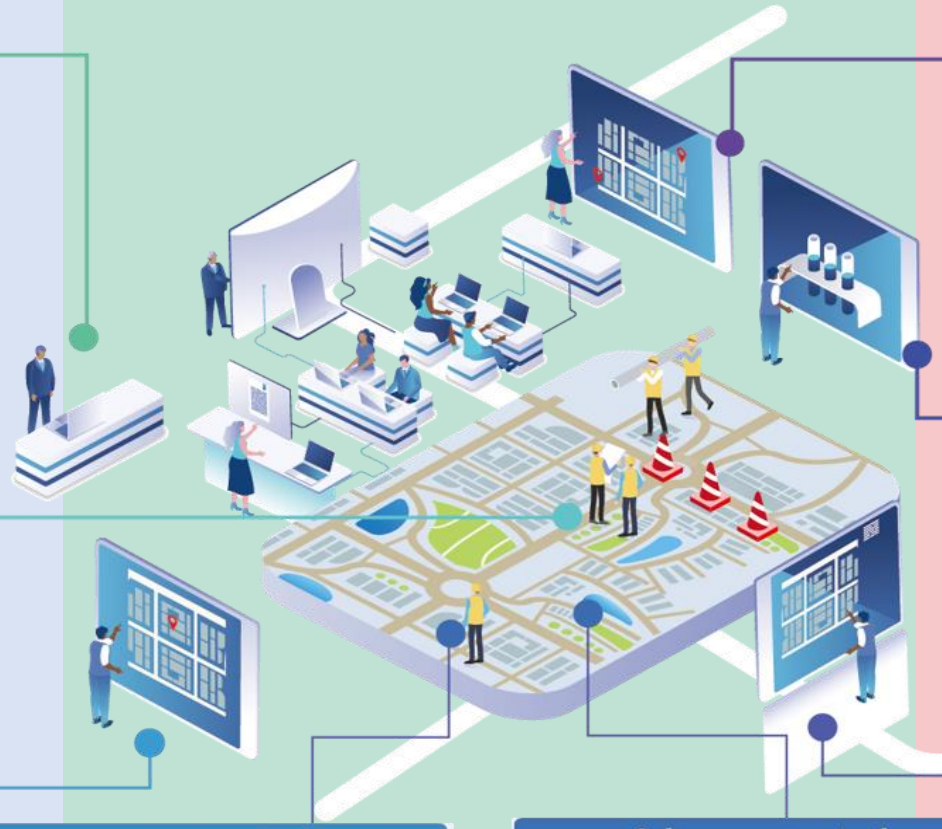
SWNM Technical Overview

Basic Data Collection & Anaiysis

- Current state of water supply facilities
- Waterworks operation DATA
- Current customer usage

Site Investigation

- Investigating current state of waterworks facilities
- Investigating and Exploring Water supply pipes and Valves



DMA, PMA Establishment

- Building large/medium/small/sub DMA (considering system, topography, scale, etc..)
- Establishing appropriate PMA by blocks
- Real-time monitoring of water pressure

Water distribution network management system establishment

- Real-time monitoring of operation data
- Analyzing RWR and MNF
- Optimal control of water pressure
- Asset management system

Map Digitalization

- Digitalizing pipeline map based on the investigation
- Establishing GIS-based pipeline map
- Entering Attribute DB of facilities
- Managing 3D-based pipeline map

Leakage Detection

- Sound locater, electronic/correlation leak detection method, etc..
- Utilizing leak detection sensors
- Applying AI-based leak detection

Advancement of water quality management

- Water quality measuring instrument
- Rechlorination input facility
- Automatic drain facility
- A precision filter

Water distribution network maintenance

- Pipeline diagnosis and deterioration assessment (setting priorities based on leakage, water quality, etc..)
- Selecting optimal maintenance section
- Using line-stopping/hot-tapping method, non-excavation method

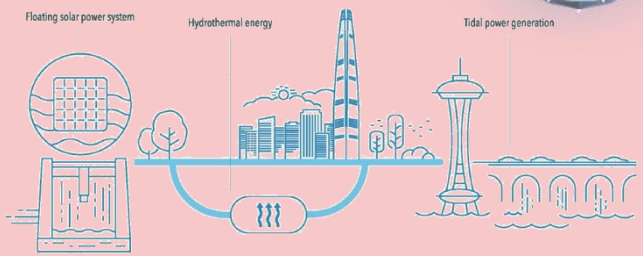
SWNM Business Model

Appropriate level technologies in each tasks are selected considering current network statuses

Task	M1. Investigation	M2. DMA	M3. Leakage	M4. Pressure	M5. Maintenance	M6. System	M7. WQ
Lv1	① Creating water pipeline map(CAD) ② DMA Design ③ Water flow, pressure management plan	① Building small DMA ② Water flow, pressure management	① Leak detection with manpower ② Analyzing MNF of small DMA	① Managing water pressure of small DMA ② Simply decreasing water pressure ③ Simply increasing water pressure(ON/OFF)	① Diagnosing pipe specimen ② Selecting emergency leakage maintenance section	① Building small DMA TM/TC ② Automatic analysis of small DMA units	① Automatic Water Quality Measurement Device ② A rechlorine facility
Lv2	① Water pipeline map(management system) ② DMA Design (small/sub) ③ Water flow, pressure, quality management plan	① Building sub DMA ② Water flow, pressure, quality management	① Leak detection with IoT sensor ② Analyzing MNF of small/sub DMA	① Managing Small DMA(large capacity) ② Decreasing water pressure in proportion to flow ③ Increasing water pressure in proportion to flow	① Endoscopic diagnosis with branching method ② Selecting aging pipe(short-term) replacing section	① Real-time waterworks information offering system ② Managing real-time water flow and risk	① Automatic drain facility ② Establishment of pipe cleaning infrastructure (general)
Lv3	① 3D based water pipeline map ② DMA Design ③ Incident response advancement plan	① Incident response advancement ② Water flow, pressure, quality management and emergency linkage	① AI-based leak detection ② Analyzing daily revenue water ratio	① Managing Small/sub DMA(large capacity) ② Real-time active decompression ③ AI-based self pressurizing	① Diagnosing water pipe network with asset system ② Selecting aging pipe(long-term) replacing section	① Building control center ② Establishing AI-based pipeline network system (RWR analysis, incident response)	① A precision filter ② Establishment of pipe cleaning infrastructure (advanced)

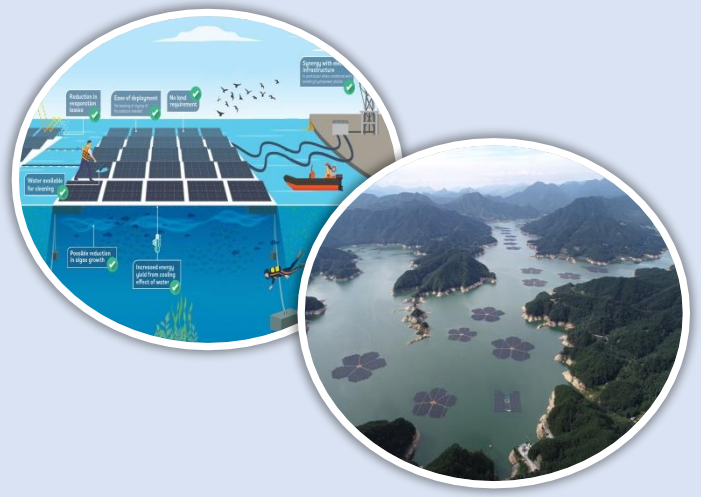
Leading-edge Technologies

We increase the value of water energy and lead to realization of national carbon neutrality



Expanding the application of Floating Solar Power

- 49.6MW-capacity, 5 locations(2023)
- 9.4GW-capacity by 2030
- Annual Reduction of Greenhouse Gas Emission by 5,680,000tons



Supplying Sustainable Clean Hydrothermal Energy

- Create a Cluster in Gangwon-do
- Development of 1GW by 2030
- Annual Reduction of Greenhouse Gas Emission by 240,000tons

Operating the World's Largest Tidal Power Plant

- Sihwa Lake Tidal Power Plant
- Generate up to 552GWh
- Annual Reduction of Greenhouse Gas Emission by 250,000tons

Leading-edge Technologies

Creating an innovative ecosystem for the water industry
to lead the way for the world

Securing Future Growth through Green Hydrogen

- Produced by using the RE
- Ultimate Goal of Hydrogen Prod.
- Carbon neutrality based on its water-energy infrastructure

Technological Independent Ultra-pure Water

- Advanced Ind. Essential Material
- Op.&Equip. Localization
- Promoting domestic industries and leading the global market

Seawater Desalination for Climate Crisis Response

- Expansion of the global market
- Operation of Dae-san facility
- Dev. new business ventures and entry into global market

K-water Digital Water Management Technology Capabilities

Securing a growth engine to leap forward as a global company
with digital water technology, Developing a global business model

Digital Tech Based

Digital transformation foundation to lead the 4th industrial revolution technology(AI, D/T)

K-water Differentiation

Possess unique, specialized technology to enter the global market

The Best Professional Company

Equipped with the world's best digital water management technology capabilities

Total Water Service Provider

Water resources C & M | **Waterworks C & M** | **River R & M** | **Land Development** | **Overseas Business**

Thank you!

K water

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