ESMAP
Energy Sector Management Assistance Program

South Korea Study Tour

October 30-November 7, 2024

Global Capacity Building for Sustainable and Climate-resilient Water Management

Smart Energy Infrastructure Study Tour

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Korea Water Resources Corporation

World's Best Comprehensive Water Platform Provider

Establishment

- In 1967
- Headquarters in Daejeon

Financial Highlights

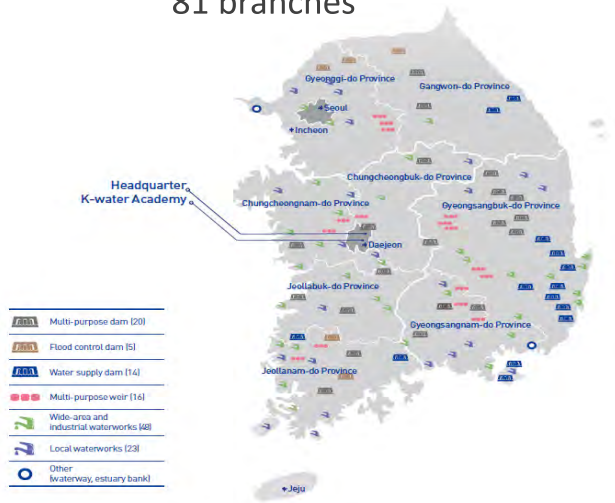
- 100% Government-owned enterprise
- (Total Assets) USD 27 billion
- (Revenue) USD 4 billion
- (Credit Rating) Aa2 (Moody's)

* as of `22 Dec.

Employees & Offices

- (Employees) 6,234 people [as of `24 Oct.]
- (Organization) [as of `24 Oct.]

- (HQs) 8 divisions, 37 depts
- (Region) 7 head offices, 25 depts, 81 branches



(Source: 2023 K-water Sustainability Report)

Main Business Areas (as of `22 Dec.)

Water Sharing

Developing a climate change–proof integrated **water management**

- Creating a comprehensive water disaster response system through dam–river linkages
- Strengthening response capabilities against basin-wide climate change
- Reinforcing the integrated water management system in the basins
- Improving the water environment in the basin for the harmonious coexistence between humans and nature
- Pioneering the digitalization of basin water management

The leading multipurpose dam management in Korea

94%
of the flood control capacity

830
times the size of Seokchon Lake

Water Safety

Ensuring trustworthy **drinking water supplies for all**

- Committing to providing tap water that is safe and reliable, meeting the public's expectations
- Developing a robust system for utilizing basin water that contributes to the growth of the national industry
- Implementing innovative changes in the water supply system to address challenges posed by the climate crisis
- Ensuring equitable access to water services across regions and enhancing the overall reliability of tap water
- Establishing a smart water supply management system leveraging digital transformation technologies

No. 1 tap water supply in Korea

49%
of the nation's water facilities

34,000km
long water pipes

Water Convergence

Striving for global leadership in the **water value nexus**

Water-Integrated Cities

- Laying the foundation for creating climate-resilient environmental cities
- Leading innovative technology–integrated smart water cities
- Establishing carbon-neutral, sustainable cities

Smart-City

Development of Korea's first smart city

Residents experience innovative and improved technologies
Vitalization of living labs

Water-Integrated Energies

- Leveraging current water management facilities to expand water energy
- Harnessing emerging technologies, enhancing energy management, and engaging in new business ventures
- Transitioning systematically toward a net-zero society

No. 1 renewable energy producer in Korea

2,461 GWh

Annual consumption of 740,000 households

Global Platforms

- Securing global water cooperation initiatives
- Promoting significant international investment projects
- Utilizing global platforms to share and disseminate technologies

The world's only global water industry

30 projects in 14 countries

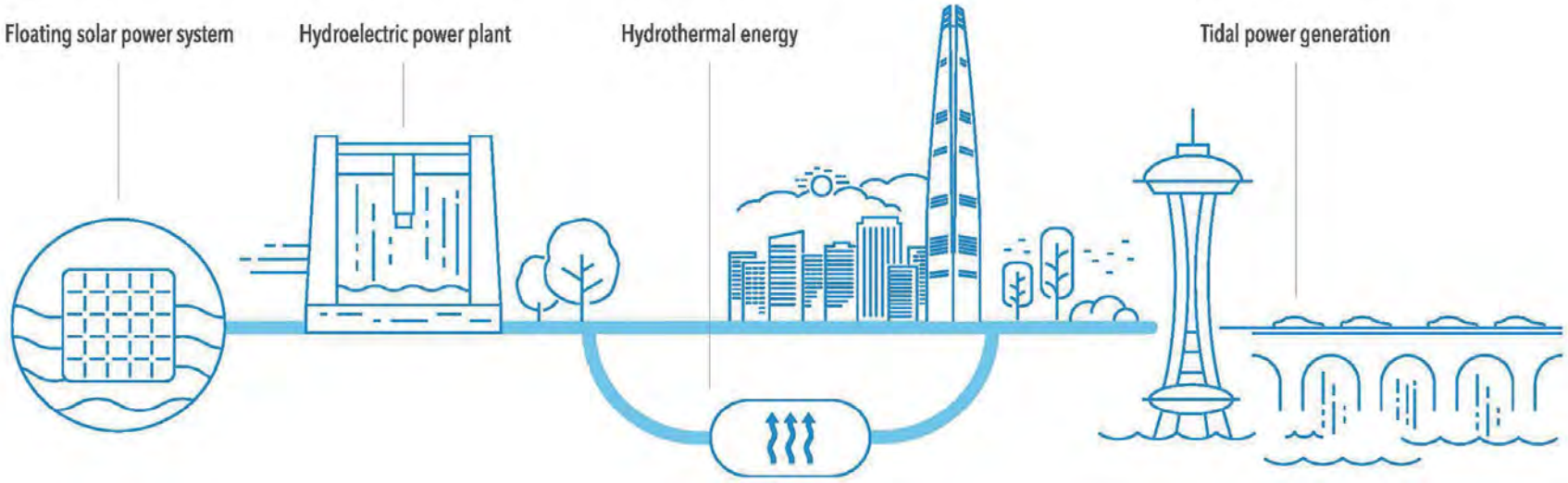
Implementation of overseas projects throughout the entire water cycle

(Source: 2023 K-water Sustainability Report)

Pioneering the Country's Transition to Low Carbon Energy

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

As the largest new and renewable energy producer in Korea, K-water strives to develop eco-friendly energies. We are creating a sustainable future through the expansion of clean energy businesses by participating in RE100 which is an initiative to replace 100% of the nation's power supply with renewable energy.



(Source: 2023 K-water Brochure – YOUR TRUE ESG PARTNER)

Creating new and renewable energy for a sustainable society

Capacity of K-water's renewable energy facilities

1,417 MW

- 1,093 MW (HPP), 254 MW (tidal), 62 MW (solar), and 8 MW (wind)

Korea's No. 1 public corporation for renewable energy

- Producing 2,431GWh of renewable energy per annum through hydroelectric power, solar power, wind power, etc
  - Reduction of the1,120,000tons of greenhouse gas emissions with the electricity that 700,000 households can use for about a year
- Expanding the scope of energy business model to an eco-friendly model involving residents

Renewable energy | energy sources that can be recycled and used continuously without being depleted such as solar, solar heat, hydro, wind, bio, waste, etc

Expanding the application of floating solar power systems for eco-friendly green transformation

- Operating 49.6MW-capacity power facilities at 5 locations, including Hapcheon, Boryeong, and Chungju
- Developing 1.1 GW-capacity power facilities by 2030 in an eco-friendly and regional-friendly manner by utilizing the water surfaces of dam reservoirs
  - Capable of reducing greenhouse gas emissions by 659,000 tons and fine particulates by 715 tons per year

Floating solar power system | An eco-friendly power plant that installs solar modules on the surface of dam reservoirs and a fusion facility that combines renewable (solar) energy with marine technology(shipping+mooring)

Supplying sustainable clean hydrothermal energy

- Development of 286,000 RT (1 GW) by 2030 by utilizing dams, lakes and swamps, and water metropolitan water sources
  - Reduction of annual energy consumption by 978 GWh and greenhouse gas by 240,000 tons
- Promotion of a project to create a hydrothermal energy fusion and complex cluster in Gangwon-do (construction 2020-2027, operation 2028-2057)
  - Utilization of hydrothermal energy generated from the Soyanggang Dam reservoir for the cooling data center facilities (16,500 RT in scale)

Hydrothermal energy | A system for heating and cooling with water (river water, dam·lake water, etc.)

1RT | The amount of heat needed to turn 1 ton of water at 0°C into ice at 0°C within 24 hours (air conditioning and heating available for a space around 33 m² space)

Operating the world's largest tidal power plant

- Operating the world's largest Sihwa Lake Tidal Power Plant (254 MW) to generate up to 552GWh of electricity
  - Reduction of annual greenhouse gas emissions by 250,000 tons

Tidal power generation | A power generation method that produces electricity with water-turbine generators using the water level difference between the tides, and the external and internal seas

Implementing net-zero water management in response to climate change

Converting to net-zero water management by establishing an efficient water supply system and producing new and renewable energy

- Low-energy water management such as recycling, seawater desalination, and eco-filtering
- Net-zero management for metropolitan water treatment plants, development of floating solar panels, and expansion of hydrothermal energy supply

(Source: 2023 K-water Brochure – YOUR TRUE ESG PARTNER)

1. Introduction to K-water

Carbon Neutrality Rate 158% (as of 2023)

Annual Electricity Usage: 1,717GWh/year (97% at WTPs)

Annual Renewable Energy Generation: 2,726GWh/year

HPP (2,194GWh)

Tidal (438GWh)

PV(90GWh)

Wind(4GWh)

Pioneering Water-related Renewable Energy

- **Explore Diverse Energy Sources (113 plants, 1,431 MW in total)**
- **Tailored and Diverse Business Models (Investment Project, Gov-commissioned Project, community-shared Project, etc.)**

(as of Sep `24)

Item	HPP	Tidal	PV	Wind
Capacity (MW)	1,093	254	76	8
Number of plants	64	1	45	3

K-water HRD Institute (K-water Academy)

Global Water Capacity Building for Better Future

- A hub of practical learning and knowledge sharing across the water sector since ‘97

Daejeon Campus

Songsan (Hwasung) Campus

Lectures & Workshops

Study Visits

Hands-on Exercises

ESMAP Energy Sector Management Assistance Program | WORLD BANK GROUP Energy & Extractives

(Source: 2024 K-water Academy Brochure)

2. Global Capacity Building with K-water Academy

Started International Training Program

‘97

Twinning Program with ADB, USAID

‘08

Winner of WaterLinks Awards

‘11

Started Consulting Program for Water Sector Training Institute

‘19

‘00

1st KOICA Global Fellowship Program

‘10

ADB TA Project for Laos, Bhutan & India

‘17

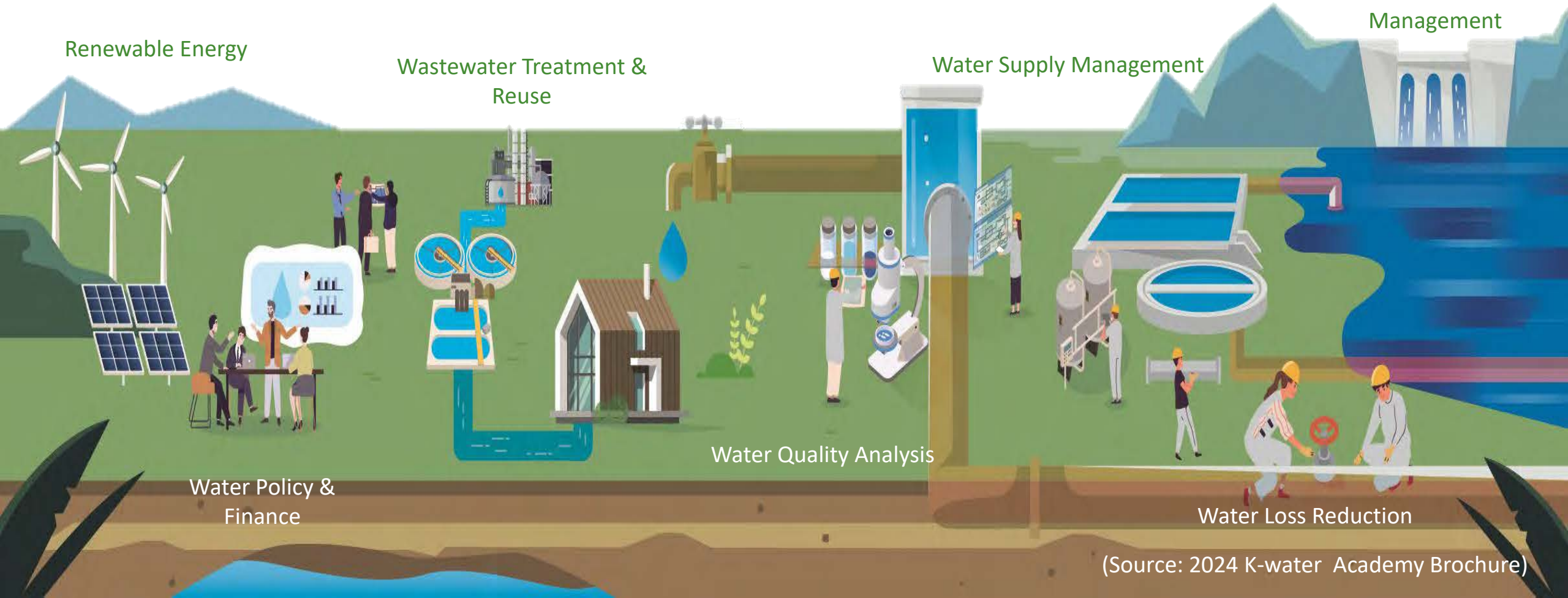
Launched K-water Academy Online Channel

‘23

Capacity Building Consulting & TOT Programs

Features

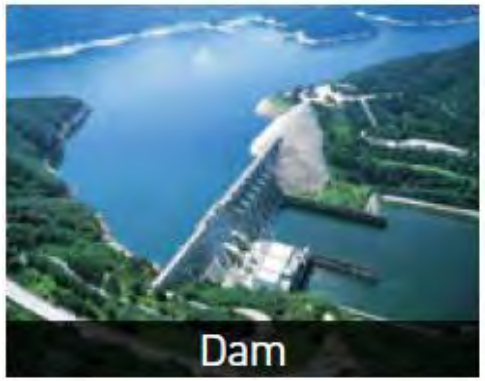
- Comprehensive learning modules covering from source to tap across the entire water process, leveraging K-water's resources and expertise



(Source: 2024 K-water Academy Brochure)

Features

- Variety of Water-related Infrastructure Managed by K-water Available for Study Visits and Hands-on



(Source: 2024 K-water Academy Brochure)

Achievement

- Completed 400 programs for more than 5,000 Alumni from 124 countries (‘97 -`23)

(Source: 2024 K-water Academy Brochure)

- (Example) Consulting for Uzbekistan WSS Training Center

* Grant of Korea Green Growth Trust Fund

Baseline Survey & Gap Analysis

Training of Trainers

- Education
- Career
- Work Period
- Other strength

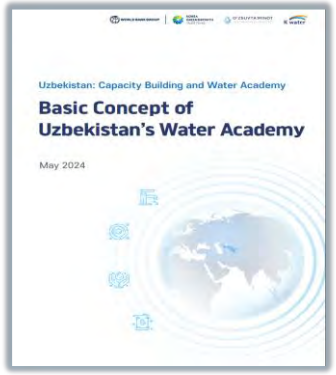
Selection Criteria

+

Online Interview

Selection of Trainer Candidates

Suggestions of Capacity Building Model



- Objectives & Key considerations;
- Training modules, procedure, unit & facilities;
- Professional certifications & Partnership, etc.

Practical Learning
(Lecture, Study visits, Hands-on)

+

Teaching Skill Learning

+

Online Training

Hybrid Training

* Image Source: K-water·WB (2022~2024)

- Support Solutions to Real-world Issues in Clients' Local Context

Uganda`s Climate Resilience in Water Resources Management

- ✓ Partner: WB Uganda (KGGTF) (completed)
  * Korea Green Growth Trust Fund
- ✓ Client: Uganda Ministry of Water Environment/ Water Resources Institute
- ✓ Term: March `20 - `Dec. `22 (34 months)
- ✓ Objectives: Training modules development and Training of Trainers

Hybrid Training


Training (up: KOR, down: UGA)

Training modules


Cyber materials by WB

* Image Source: K-water (2022)

Lake-wide Water Quality Improvement in Lake Victoria Basin

- ✓ Partner: WB Water GP (completed)
  * Korea Green Growth Trust Fund
- ✓ Client: East Africa Community – Lake Victoria Basin Commission
- ✓ Term: 30 May – 2 June, 2023
- ✓ Objectives: Firsthand learning for lake-wise WQ improvement, Discussions with diverse stakeholders


Forum with Korea WSS SMEs


Visit to KECO (WWTPs Tele. Monitoring System)


Workshop with GCF

* K-water (2023)

- Support for Globally-Shared Efforts to Address Eminent Water Issues

Renewable Energy - Floating Solar Panel

✓ Partner: WB KPOK* (competed)
* Korea Program of Operational Knowledge

✓ Target: Government officers, Enterprises & WB staffs of Interest in developing countries

* Image Source: K-water

Water Utility Digitalization

✓ Partner: WB Water GP (Water Digital Team) (in progress)
* Global Water Security & Sanitation Partnership

✓ Target: Water utilities and WB staffs of interest in Asia·Pacific region

* will be followed by a KGGTF funded project

* K-water

Expert Exchange for WSS & WRM

✓ Partners: WB Kenya & Angola Offices (in progress)

* Korea Green Growth Trust Fund

✓ Target:
- Small WASH utilities (Kenya)
- IWRM & Dam safety (Angola)

* (left) K-water·WB (`18), (right) D. Proctor (`23)

Future Steps

Achieving more Efficacy

- ✓ Comprehensive courses for real-world issues
- ✓ Engagement of Diverse Players and Integration of Sectors

Adding more Reciprocity and Sustainability

- ✓ Support for Self-sustaining Capacity Building
- ✓ Private Sector Engagement
- ✓ Reciprocal – “Exchange” of Knowledge, Experience, and Culture …

THANK YOU
감사합니다

Information about K-water and K-water Academy AVAILABLE at

- ✓ https://www.kwater.or.kr/eng/inve/annuPage.do?s_mid=1203 (annual report)
- ✓ https://www.kwater.or.kr/academy/main.do (capacity building programs conducted)

Floating PVs of K-water

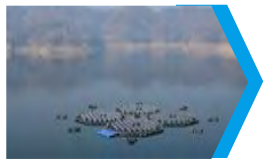
PV power plants on water surface of dam reservoirs
(7 sites 58.5 MW in operation)

Early period ~2013

Juam (Test)
2.4kW ('09)

Hapcheon (Pilot)
100kW ('11.12)

Hapcheon #1
500kW ('12.09)



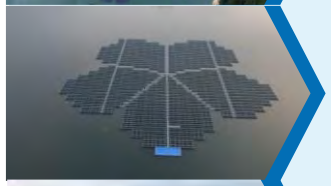
Hapcheon #2 (R&D)
100kW ('13.12)

Growth period ~2023

Boryeong #1
2.0MW ('16. 03)

Chungju #1
3.0MW ('17. 12)

Hapcheon SPC #1
41.5MW ('21. 11)



Chungju #2
2.6MW ('22. 08)

Soyangriver SPC #1
8.8MW ('23. 11)

Leap period 2024~

- 5 new projects (186MW) in progress
- **Imha SPC** 47.2MW ('24. 12)
- **Hapcheon SPC #2** 20MW ('25)
- **Yongdam SPC #1** 20MW ('25)
- **Chungju SPC** 40MW ('25)
- **Soyangriver SPC #2** 59.5MW ('26)

* Sources : K-water