WORLD BANK GROUP | KOREA GREEN GROWTH TRUST FUND | Ministry of Economy and Finance

KGID 2025 Green Growth: The Path to Sustainable Jobs

Global Cooperation Strategy for Advanced Energy Technology Development and Market Entry

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(KETEP, ROK-U.S. Energy Cooperation Center)

KETEP's R&R

KETEP(Korea Institute of Energy Technology Evaluation and Planning) is an energy R&D funding agency under MCEE(Ministry of Climate, Energy and Environment) in the Republic of Korea which undertakes roles in planning, evaluating, and managing national energy R&D Projects

Energy R&D Policy Development

01 Establishment of Technology Development strategy

- Establishment of technology development roadmap
- Trend analyzing of energy technology
- Survey on Energy Technology Companies

Energy Technology Development

02 Planning, Evaluation and Management of Energy R&D, Performance Diffusion

- Renewable energy, Hydrogen energy
- Energy efficiency
- Electric power/Nuclear power/ Natural resources/Resources circulation
- Technology Commercialization,
- Supporting R&D performance feedback

Energy Human Resources Development

03 Goal-oriented Energy Human Resources Development

- High-level R&D workforce buildup
- Training for industry specialists
- Promotion of international human resource exchange

Energy International Cooperation

04 International Cooperation/ International Joint Research

- Multilateral/Bilateral international cooperation
- Strategic international joint research

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Energy R&D Budget and R&D Program

KETEP is supporting innovative R&D projects representing a budget of USD $826 million (2025)

Energy New Industry

- Energy Efficiency Enhancement R&D
- Carbon Capture and Storage R&D
- Natural Resource Development R&D
- CCUS R&D and Other 13 Programs

USD $168M

New & Renewable Energy

- New & Renewable Energy R&D
- Green Hydrogen & Fuel Cell R&D
- Safety & evaluation Center for RE integrated ESS
- Other 12 Programs

USD $211M

Electric · Nuclear

- Smart Grid R&D
- Clean Thermal Power R&D
- Nuclear Power R&D
- Other 22 Programs

USD $190M

Infra

- Energy infra funding Programs(R&D Center, Ecosystem)
- **International Joint R&D (USD $35M)**
- Human Resources Development

USD $257M

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Energy R&D Program

Energy Efficiency Enhancement Program

Efficiency Enhancement

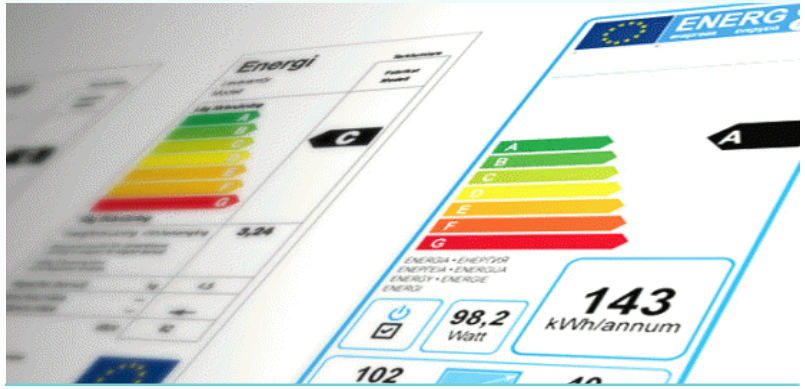
Improving efficiency and decarbonization in industry, building, transport sectors

- Energy load reduction in the building sector and improving cooling and heating devices' efficiency
- Improving building energy efficiency by optimizing utilization of the building energy management system
- Improving the convenience of EV charging infrastructure

Demand side Management

Contribution to achievement of the demand side sector's carbon net-zero and fostering new energy IT industries

- (Promote Digitalization) Strengthen real-time demand response by building and utilizing energy data for each sector
- (New Energy Industry) Promoting new energy services through IT, big-data based Demand Response
- (Distributed System) Securing energy supply and demand flexibility



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Energy R&D Program

Renewable Energy Program

Photovoltaics

Development of high-efficient, low cost photovoltaics tech. & business models

- Securing next-generation solar cell mass production tech. to lead global solar cell tech and market
- Strengthen price competitiveness in global solar energy markets by localization of core materials & equipment
- Increase the commercialization of R&D result to expand application

Wind Power

Improving the reliability of national wind power generation system

- Securing the competitiveness of domestic core components in wind power system
- 10MW above large-scale wind turbine demonstration and commercialization
- Development and demonstration of integrated technology for core components of wind power customized to overseas consumers

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Energy R&D Program

Hydrogen & Fuel Cell Program

Hydrogen

Developing core technologies for a hydrogen infrastructure

- Securing the green hydrogen production water electrolysis fundamental tech and demonstrating large-capacity water electrolysis
- Commercialization of Low cost, high capacity hydrogen storage, transportation technology
- Securing competitiveness in hydrogen commercial vehicles

Fuel Cells

Developing multi-purpose, high-efficiency fuel cell systems

- Promoting hydrogen mobility and demonstration for the implementation of carbon net-zero
- Development of distributed fuel cell for carbon reduction and maximizing the efficiency
- Improvement of Fuel Cell reliabilities

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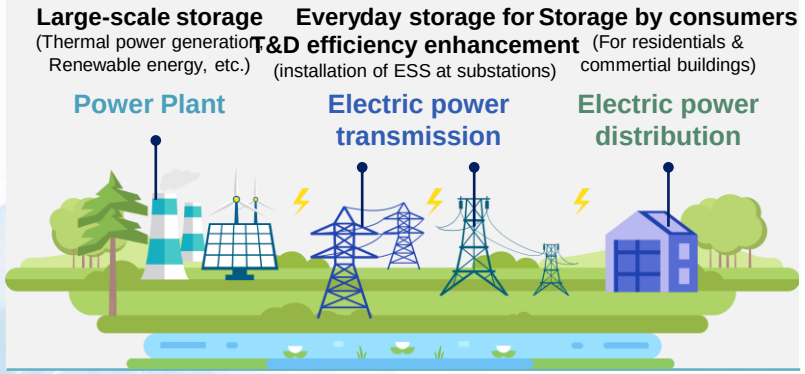
Energy R&D Program

ESS & Energy Safety Program

ESS

Support for energy storage technology development and commercialization

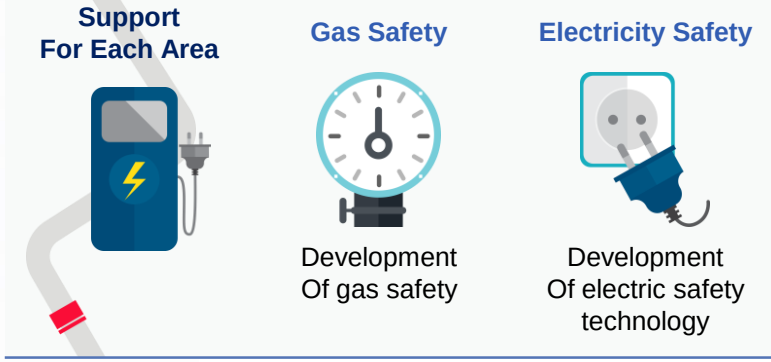
- (Battery) Support research on Li-ion, RFB and other next-generation battery tech.
- (PCS) Support for high-level research on PCS for large-scale projects Demonstration
- (SI) Development on system integration of Energy storage



Energy Safety

By developing energy safety technology to secure stable energy supply and safety in use

- Development of gas safety and Electricity technology
- Technology for gas and electricity accident prevention and loss reduction
- Automation of Energy safety environment
- Safety tech. reflecting changes in the energy environment
- Securing advanced safety tech.



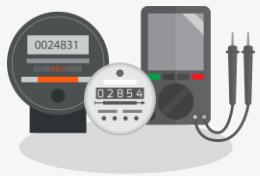
Energy R&D Program

Smart Grid & Nuclear Power Program

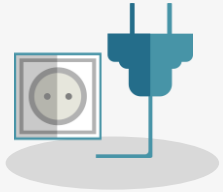
Smart Grid

Boosting of the Smart Grid industry through the establishment of highly-reliable power supply infrastructure

- Development of Smart Transmission & Distribution Technology
- Development of Smart Consumer Technology(R&D)
- Technological Innovation for Electric Machinery(R&D)



Load Leveling



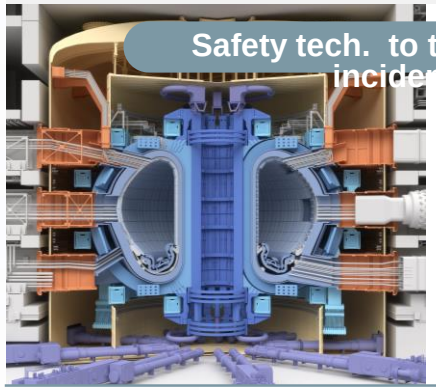
Trouble with Power Supply

Loss during T&D

Nuclear Power

Secure stable energy supply and safety in use, lay the foundation for building an energy-safe society

- Development technologies to prevent or cope with nuclear disasters
- Advancement of Nuclear Safety
- Reinforcement of ecosystem infrastructure for nuclear industry
- Secure maintenance technologies for nuclear power plants



R&D Focus of Korea

The 5th Energy Technology Development Plan (2024–2033) - Technology Development Roadmap

Energy Efficiency & Demand

Efficiency improvement (Electric motors, heat pumps, …),
Building energy optimization,
EV charging infrastructure,
AI–big data integrated systems, VGI and Auto-DR technologies, etc.

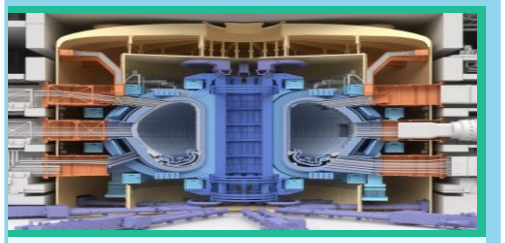
Power system

GW-scale HVDC and non-expansion alternative technologies,
Grid stabilization/monitoring/analysis,
Safety management technologies,
Intelligent distribution technologies,
Flexible resource operation tech., etc.

PV

Ultra-high-efficiency tandem PV cells and modules,
Diversification of photovoltaic system applications,
Digital-based O&M technologies,
Minimization of carbon emissions throughout the entire lifecycle, etc.

Nuclear Power



Innovative small modular reactors,
Next-generation light water reactor (LWR) nuclear fuels,
Flexible operation enhancement of large-scale nuclear power plants, etc.

Wind

Large-scale offshore wind turbines,
Development of floating wind power systems,
Advancement of offshore wind farm development and operation technologies, etc

Hydrogen

Large-scale clean hydrogen,
Advanced refueling infrastructure,
Ammonia-based extraction,
Pipeline transport technology,
Enhanced safety management, etc.

ESS

Battery safety for lithium-based ESS,
Next-generation ESS (sodium, aqueous, etc.)
Utility-scale BESS technology,
Large-capacity ESS based on high-temperature thermal storage, etc

Clean Fuel Power Gen.

High-efficiency hydrogen gas turbines, Eco-friendly ammonia gas turbines
Ammonia co-firing power generation, etc.

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R&D Focus of Korea

The 5th Energy Technology Development Plan (2024–2033) - international Cooperation Strategies

Establishment of R&D collaboration hubs with leading technology countries

- Top-tier domestic and global research institutions collaborate to pursue world-leading and pioneering achievements
- Establishment of Energy Technology Cooperation Centers in key partner countries(U.S., EU, etc.) to identify R&D needs, promote personnel exchange, and support local operations of domestic companies

R&D support for entry into emerging and developing country markets

- Derivation of promising export technologies and implementation of localization R&D, taking into account partner countries' needs, technological self-reliance, and domestic technological capabilities
- Expansion of the operational scope of the global energy market information platform to provide policy, market, and technology trend information supporting overseas expansion

Joint response to global challenges (Climate change, Energy security)

- Acquisition of R&D information and promotion of international joint energy research in connection with the activities of international organizations and multilateral cooperation bodies (IEA, MI, WB, …)

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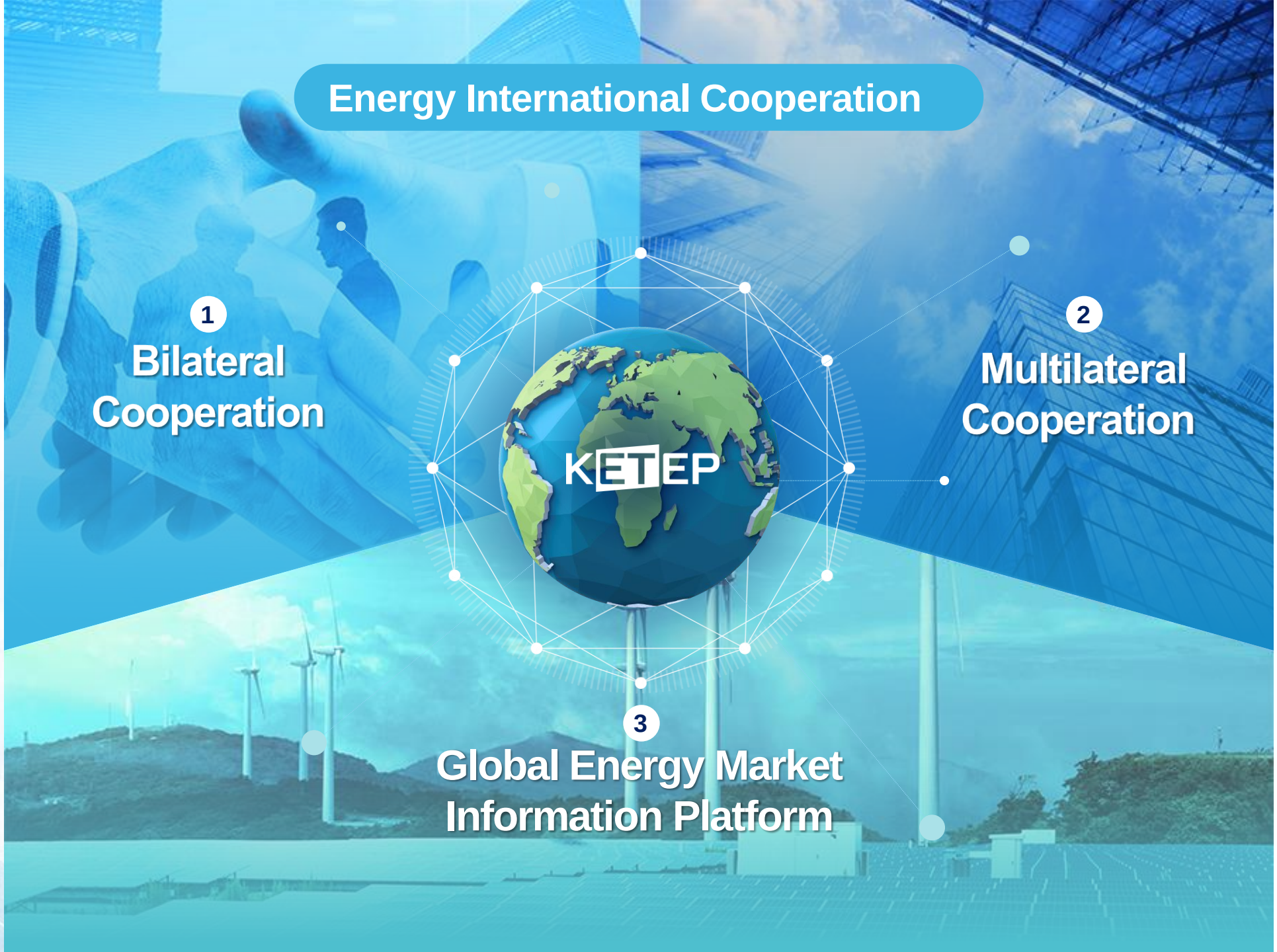
Energy International Cooperation



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International Joint R&D

Bilateral Cooperation

Around 40 int'l collaboration projects are currently underway

- United States of America
- United Kingdom
- Germany
- Czech Republic
- Norway
- Canada
- China
- India
- Thailand
- Australia
- Philippines
- Vietnam
- Mongolia
- Malaysia

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International Joint R&D Program

International Joint R&D Project

Contribute to the global advancement of innovative energy technologies and complement domestic R&D efforts

▸ Project Duration	▸ Funding per Project	▸ Total Budget	▸ In Progress
			
3 yrs	avg **USD $2.5M**	**USD $35M** (FY2025)	**40+@** Projects (FY2025)

Advanced Technology Development

Develop advanced technologies for industrial application

Technology Demonstration

Accelerate technology commercialization and deployment via technology demonstration

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International Joint R&D Projects (Advanced Tech, ROK-U.S. International joint R&D Case)

Overview (2009 ~ 2025)

82 projects (29.92%, out of all supported 274 projects)

USD $80.43M (Total amount of Korea Gov. Funding)

Co-Funded R&D

Hydrogen 	**Fuel cell vehicle demonstration research** (Kor) Hyundai (U.S) HATCI, 2012~2017
	Ionomer–catalyst layers : polymer electrolyte fuel cells (Kor) KIER (U.S) LANL, 2013~2016
	Hydrogen refueling station risk assessment (Kor) Hoseo Univ. (U.S) Sandia NL, 2017~2020
ESS 	**Low-cost Na-based secondary batteries** (Kor) RIST (U.S) PNNL, 2015~2022
Grid 	**Interoperability testing of distributed resources** (Kor) KERI (U.S) Sandia NL, 2012~2015
	Design of a microgrid for military bases (Kor) KERI (U.S) Sandia NL, 2015~2018
	Development of an open RTU system (Kor) KETI (U.S) ExxonMobile URC, 2017~2020

Recent Projects(Ordinary)

[Nuclear power] Commercialization of Design, Fabrication, and Construction Technologies for Applying SC Structures to Nuclear Facilities
(Kor) KHNP, (U.S.) Purdue Univ. 2024~2027

[Data Center] Development of Direct-to-Chip Thermal Management Technology and Server Rack Operation Technology for High-Density Data Centers
(Kor) Aju Univ., (U.S.) Stanford University, UIUC 2024~2027

[Clean Power Gen.] Development of Degradation Assessment Technology for Supply and Power Generation Facility Components under Coal-Ammonia Co-Firing Conditions
(Kor) KEPCO, (U.S.) Stanford University, EPRI 2024~2027

2025 New Projects (Selected)

[SOEC]Development of a High-Durability 5kW-Class SOEC Stack through Multi-Scale Degradation Modeling and AI-Based Lifetime Prediction
(Kor) KIER, (U.S.) LLNL, 2025~2028

[Hydrgen Storage] Development of Manufacturing Technology for Ultra-Lightweight Liquid Hydrogen Fuel Storage Systems for Aviation
(Kor) KAERI, (U.S.) ZeroAvia, UIUC 2025~2028

[Building Efficient] Development of GEB(Grid-Interactive Efficient Building)-Based Technologies and Systems for Buildings as Grid-Interactive Flexible Resources
(Kor)Gacheon Univ., (U.S.) LBNL 2025~2028

[CCUS]

Development of Technologies for Optimization and Safety Enhancement of Integrated CCS System Networks
(Kor) POSCO, (U.S.) Chevron, 2025~2028

Development of Sequentially Relocatable and Expandable Floating CCS Facilities and CO_2 Injection Design Technologies for Operating Distributed CCS Storage Sites in Southeast Asia
(Kor) Hyundai Engineering and Construction, (U.S.) ExxonMobil 2025~2028

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International Joint R&D Projects (Technology Development R&D)

Overview (2009 ~ 2025)

91 projects

Co-Funded R&D (The last 3 years)

Czech	**Geological disposal for spent nuclear fuel** (Kor) HBC (Czech) UJZ Res
	Development of an accident-tolerant nuclear fuel (Kor) KNHP (Czech) UJP PRAHA
Thailand	**Production of biofuel from starch waste** (Kor) Kibana (Thailand) Thai Citric Acid
China	**SOx, PM, and NOx removal system** (Kor) SN (China) Jhejiang University
	PEMFC using hydrogen from methanol reforming (Kor) KLABs (China) Chinese Academy of Sciences
	VPP resource integration and control technology (Kor) Encored Tech. (China) Shanxi Fengxing Cekong

Recent Projects(Ordinary)

[Hydrogen] Development and demonstration of on-site hydrogen refueling equipment
(Kor) Hyundai, (Indonesia) Pertamina, 2024~2027

[Biomass] Development of SAF production technology using biomass
(Kor) DRT, (Vietnam) TVO Group, 2024~2027

[Energy Efficiency] Development of a hybrid modular HVAC system
(Kor) Humaster, (Thailand) Kasetsart Univ.

2025 New Projects (Selected)

[ESS] Development of a long-cycle non-lithium vanadium redox flow battery

(Kor) H2, (China) YOTAI Digital Energy Technology, 2025~2028

[Power system] Integrated operation technology for customer power and load management

(Kor) Krokers, (Vietnam) PSI, IDT, 2025~2028

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Energy International Cooperation

Multilateral Cooperation

IEA

(International Energy Agency)

Activities for the Committee on Energy Research and Technology(CERT)
Participation of the 14 Technology Collaboration Programs(TCPs) Under End-Use Working Party(EUWP), Working party
on Fossil Fuels(FFWP) and the Cross-cutting Working group
Explore joint tasks by operating a domestic council for each TCP

M.I

(Mission Innovation)

(MI 2.0) To achieve the Paris Agreement goal, strengthen international cooperation to introduce affordable clean energy solution, and each member country promotes the development of a 'national innovation pathway strategy' for clean energy technology innovation
(7 Missions) Zero-Emission Shipping, Clean Hydrogen, Green Powered Future, Carbon Dioxide removal, Urban Transitions, Net-Zero Industries, Integrated Biorefineries

WB

(World Bank)

Cooperation with Worldbank group
Conducted a joint KETEP–World Bank training program on building energy technology and policy for Mongolian government officials (Nov. 2019)

Hosted a webinar on offshore wind development cooperation for developing countries (May. 2021)

Global Energy Market Information Platform

Global Energy Market Information Platform

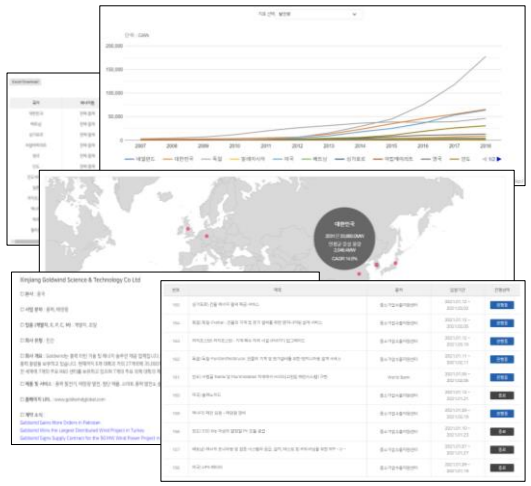
http://ketep.re.kr/globalenergy

Provide Comprehensive Global Energy Information

Easy access to overseas energy industries' information by providing country-specific policy statistic data, and various energy information

Provide Energy Focused Premium Data

Providing continuous updates on energy statistics and electric power supply-demand forecast, overseas company information, and bidding information



Provide Energy International

Providing information on international cooperation activities organized by KETEP and information on the progress of bilateral cooperation between countries in the energy sector

Multilateral Cooperation Information
(IEA, MI)

Progress on Bilateral Cooperation

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KETEP

Thank you

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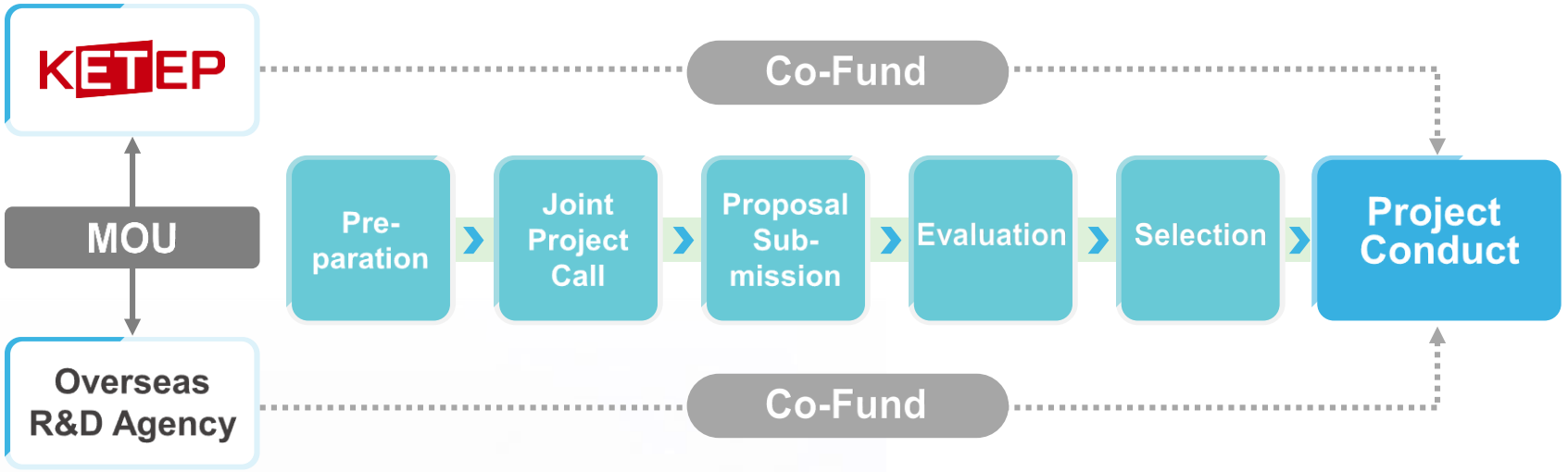
Process of Co-funding International Joint Project Development

Subject to change depending on the requirements of partner organization



Preparation	Joint Project Call	Proposal Submission	Evaluation	Selection	Project Conduct
determining support areas, funding size, other conditions, etc	public announcement for joint project call at the same date	the lead investigators from both countries submit a common proposal to KETEP and its partner organization	KETEP and partner organization independently evaluates in accordance with its own criteria and method	Determining which project to select via sharing the evaluation result and mutual agreement on preferred project	

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